Assets Planning and Delivery Group
Engineering

Strategic Product Specification

SPS 503
Submersible Sewage Pumps

VERSION 2
REVISION 5

FEBRUARY 2024

FOREWORD

Each Strategic Product Specification has been prepared to inform Water Corporation staff, consultants, contractors and land developers of the requirements for selecting and acquiring a manufactured product to be used in strategic Corporation infrastructure. The definition of 'Product' includes items that comprise assembled components, equipment or plant for mechanical, electrical and civil infrastructure applications.

The objective of a Strategic Product Specification is to specify fit-for-purpose Product which will contribute to the provision of effective water services at least whole-of-life cost and with least risk to service standards and safety. A Strategic Product Specification also provides uniform standards for compatibility of new water infrastructure with existing water assets.

Many Strategic Product Specifications have drawn on the design, asset management and operational experience of Product performance in live service gained by the Corporation over time. Some Strategic Product Specifications have drawn on the experience of the water industry nationally by referencing Australian or WSAA standards.

Strategic Product Specifications are intended for reference and use in the following typical procurement scenarios:

- Capital funded infrastructure design and construction work;
- Private developer funded subdivision infrastructure for takeover by the Corporation;
- Operationally funded infrastructure design and construction work;
- Corporation period contracts for Product purchases;
- Product purchases for stock or for miscellaneous minor work.

A published Strategic Product Specification will, in some cases, comprise technical content that is typical of a range of products of the same type (type specification) but may exclude specific requirements that should apply to a particular project or application. In such cases, the project designer is required to document the supplementary project specific requirements in the appropriate Clause of the 'Project Specific Requirements' Appendix of the Specification.

The text of a published Specification should not be directly modified. In the event that a text variation is considered necessary to accommodate the needs of a particular project or application, the text modification should be documented in the appropriate Clause of a 'Project Specific Requirements' Appendix.

Deviation from the requirements of a Strategic Product Specification on a particular project is permissible only in special circumstances subject to consultation with and express acceptance by the Principal Engineer Mechanical, Infrastructure Design Branch to whom all enquiries relating to the technical content of the Specification should be directed.

Your participation, as a user of the Specification, in its ongoing review is invited with the intent of improving its value to your work and to that of other users. All formal requests for its improvement or change should be forwarded to the Senior Principal Engineer, Mechanical who can confirm the appropriate process to be followed when making a submission for standards change.

Improvements to the Specification will be published and issued to registered users on an as needs basis.

Head of Engineering

This document is prepared without the assumption of a duty of care by the Water Corporation. The document is not intended to be nor should it be relied on as a substitute for professional engineering design expertise or any other professional advice.

It is the responsibility of the user to ensure they are using the current version of this document.

REVISION STATUS

The revision status of this standard is shown section by section below.

REVISION STATUS						
SECT.	**VER./ REV.**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION (Section, Clause, Sub-Clause)**	**RVWD.**	**APRV.**
1	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
1	2/0	15.06.09	9-15	Generally revised	SWE	AAK
1	2/1	16.11.09	13	Guarantee Duty Point - definition added	SWE	AAK
1	2/2	12.04.10	11-12	Update of referenced standards	SWE	AAK
1	**2/5**	**16.02.24**	**11-12**	**Update of referenced standards**	**BG**	**SE**
2	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
2	2/0	15.06.09	16	Materials Table 2.1 additions	SWE	AAK
2	2/2	1.04.10	18	Update of materials standards	SWE	AAK
3	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
3	2/0	15.06.09	17-22	Generally revised	SWE	AAK
3	2/1	16.11.09	20	NPSH Clause amended	SWE	AAK
3	2/3	25.08.10	22	Motor requirements changed, Lifting chain requirements changed	SWE	AAK
3	2/4	26.05.23	19,20	Caution Tag added	SWE	SE
3	2/4	26.05.23	19	8mm min chain size added	SWE	SE
4	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
4	2/0	15.06.09	23	Clause 4.2 amended	SWE	AAK
4	2/2	1.04.10	25	Update of materials in Section 2.4 and 4.4	SWE	AAK
4	**2/5**	**16.02.24**	**24**	**Coating spec. references update**	**BG**	**SE**
5	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
5	2/0	15.06.09	24-26	Generally revised	SWE	AAK
5	2/4	26.05.23	26	Table 5.1 ISO 9906 testing grades updated	BC	SE

REVISION STATUS						
SECT.	**VER./ REV.**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION (Section, Clause, Sub-Clause)**	**RVWD.**	**APRV.**
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12	1/0	15.03.06	All	New version using SPS standard template referencing WSA 101	EJP	AAK
12	2/0	15.06.09	35-39	Table 12.1 and Table 12.2 amended as required according to other clause changes	SWE	AAK
13	2/0	15.06.09	40-42	Appendix C – Standards Discharge Bend Details added	SWE	AAK
14	2/0	15.06.09	43-45	Appendix D – Material Master Records (MMR's)	SWE	AAK
14	**2/5**	**16.02.24**	**43-45**	**MMR Table updated**	**IP**	**SE**

Strategic Product Specification
SPS 503
Submersible Sewage Pumps

CONTENTS

1 Scope and General

1.1 Scope

This Specification sets out requirements for the manufacture, supply, testing, handling and delivery of submersible sewage pumps for both *wetwell service* and *drywell service*. The Specification details requirements in lieu of specific clauses, or as clarification for options that exist within, or as additional requirements to WSA 101. The pumps may be required to be configured for either *wetwell service* or *drywell service* as stated in the purchasing schedule. The scope of supply of mechanical components for the two options is as shown in Figs 1&2.

This specification currently covers pumps with motor sizes in the range of 3 – 250kW. The upper limit on power may be extended; in consultation with the Principal Mechanical Engineer IDB; where required to meet future needs.

Fig 1 – Scope of Mechanical Supply for *Wetwell Service*

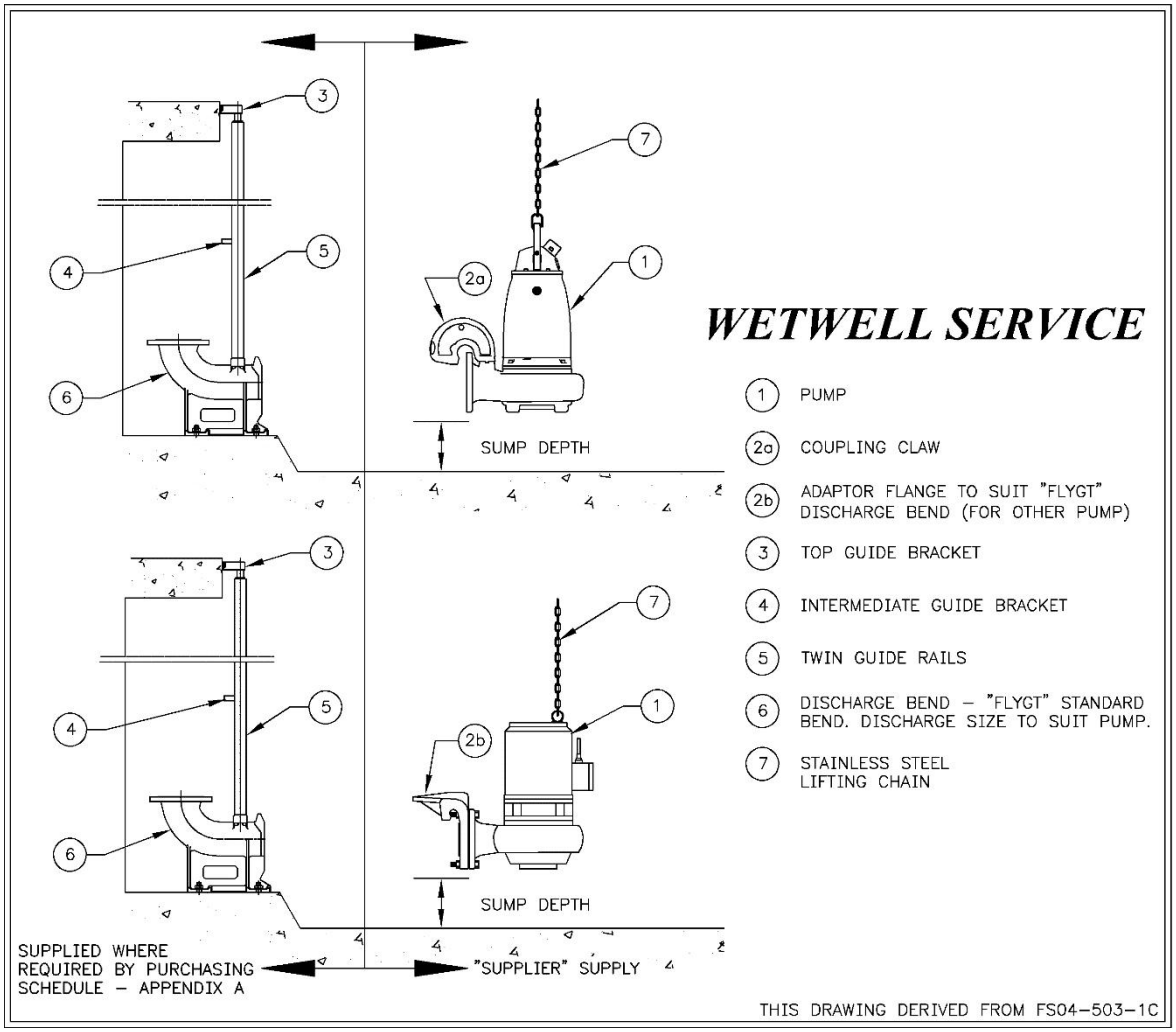
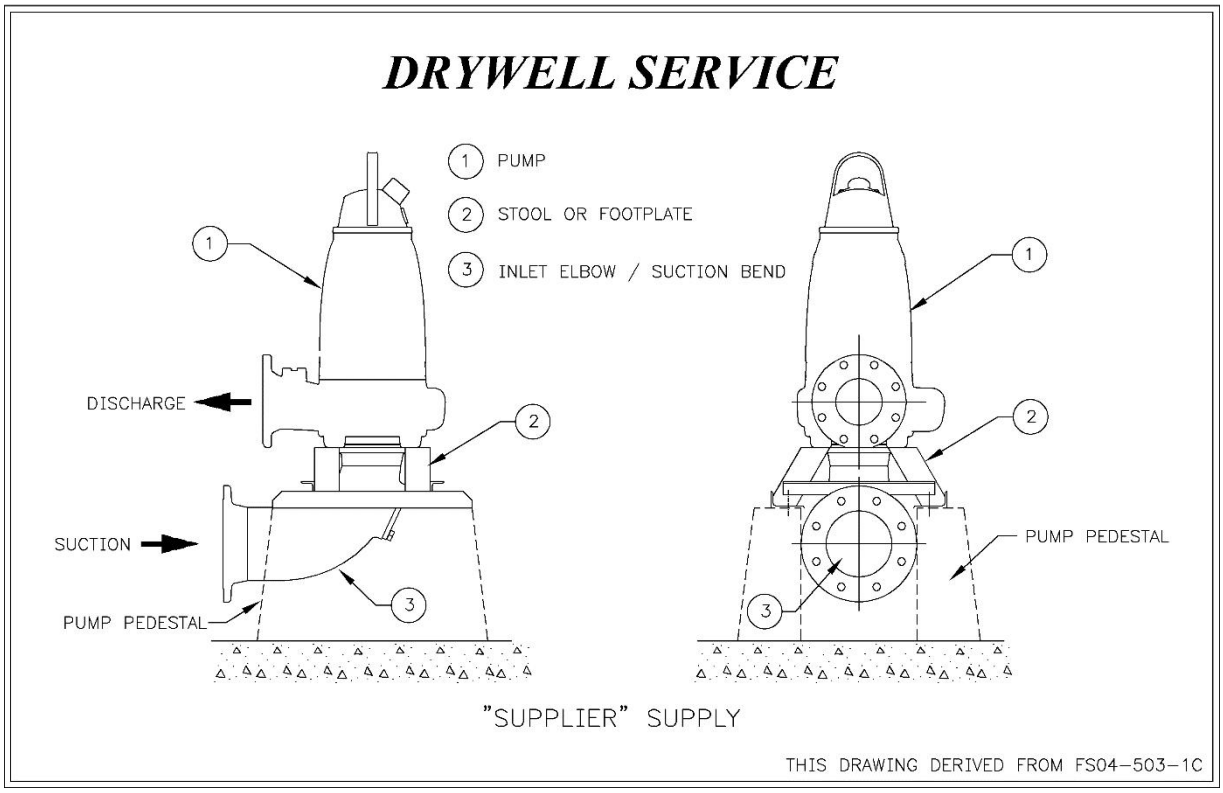


Fig 2 – Scope of Mechanical Supply for *Drywell Service*



1.2 Referenced Documents

The following documents are referenced in this Specification:

AS

681	Elastomeric Seals
1359	Rotating electrical machines
1627.0	Metal finishing – Preparation and pre-treatment of surfaces – Method of selection guide
1627.1	Metal finishing - Preparation and pre-treatment of surfaces – Removal of oil, grease and related contamination
1627.4	Metal finishing – Preparation and pre-treatment of surfaces – Abrasive blast cleaning
1646	Elastomeric Seals for Waterworks Purposes
1830	Grey Cast Iron
2550.1	Cranes, Hoists and Winches – Safe Use – General Requirements
2550.3	Cranes, Hoists and Winches – Safe Use – Bridge, Gantry, Portal (including container cranes), Jib and Monorail Cranes
2550.5	Cranes, Hoists and Winches – Safe Use – Mobile Cranes
2550.11	Cranes, Hoists and Winches – Safe Use – Vehicle Loading Cranes
3679.1	Structural Steel – Hot Rolled Bar Sections
4797	Stainless Steel Chain for Lifting Purposes
5200.000	Technical specification for plumbing and drainage products

AS/NZS

1802	Electric Cables – Reeling and trailing – For Underground Coal Mining Purposes
3678	Structural steel - Hot-rolled plates, floorplates and slabs
5000.1	Electric cables - Polymeric insulated
4158	Thermal-bonded Polymeric Coatings on Valves and Fittings for Water Industry Purpose
4680	Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles

ISO

20816-3	Mechanical vibration — Measurement and evaluation of machine vibration — Part 3: Industrial machinery with a power rating above 15 kW and operating speeds between 120 r/min and 30 000 r/min
21940-11	Mechanical vibration Rotor balancing Part 11: Procedures and tolerances for rotors with rigid behaviour
9906	Rotodynamic pumps - Hydraulic performance acceptance tests - Grades 1, 2 and 3

AS/NZS ISO

9001	Quality management systems – requirements

ASTM

A276/A276M	Standard Specification for Stainless Steel Bars and Shapes
A312/A312M	Standard Specification for Seamless, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes
A313/A313M	Standard Specification for Stainless Steel Spring Wire
A532/A532M	Standard Specification for Abrasion-Resistant Cast Irons

DIN

5687-1	Round Steel Link Chains Part 1: Grade 5, medium tolerance, tested
5688-1	Grade 5 chain slings with hook or ring type terminal fittings

AS/NZS ISO/IEC

17000	Conformity assessment - Vocabulary and general principles

ISO/IEC

17007	Conformity assessment — Guidance for drafting normative documents suitable for use for conformity assessment
17025	General requirements for the competence of testing and calibration laboratories
17050-2	Conformity assessment Supplier's declaration of conformity Part 2: Supporting documentation

BIS IS/ISO/IEC

Guide 23	Methods Of Indicating Conformity With Standards For Third-Party Certification Systems - Guidelines
Guide 28	Conformity Assessment - Guidance On A Third-Party Certification System For Products - Guidelines

WSA

Industry Standards for Submersible Pumps for Sewage Pumping Stations

Water Corporation Standards and Specifications

DS 51	Design and Construction of Wastewater Pumping Stations and Pressure Mains 4 to 90 Litres per Second Capacity
A1	Surface Preparation For The Application Of Protective Coatings On Steel Or Cast Iron
D1	High Build Epoxy Coating On Steel Or Cast Iron

1.3 Definitions and Notation

1.3.1 Abrasive Service

Treatment plant grit, sludge or slurry application; or similar installation where there is a likelihood of sand, grit or other abrasive materials forming a significant proportion of the inflow.
Sewage pump station or drainage applications where the catchment is generally undeveloped and likely to have sustained sand ingress may also be considered for classification as *Abrasive Service*.

1.3.2 Certificate

A formal certificate defined in AS/NZS ISO/IEC 17000and operated in accordance with ISO/IEC 17050-2 that, as an outcome of Product Certification, attests Product conformity with the nominated product and test standards and authorizes the use of a Certification Mark.

1.3.3 Certification Body

An independent (or third party) organisation duly accredited by the Joint Accreditation System of Australia and New Zealand (JAS-ANZ) to operate Certification Schemes.

In the case of a non-strategic plumbing Product, a Certification Body means an organisation approved by Standards Australia to administer the National Certification of Plumbing and Drainage Products (NCPDP) Scheme in accordance with SAA MP 52.

1.3.4 Certification Mark

A trademark or other mark of product conformity with a specified standard defined in AS/NZS ISO/IEC 17000 and applied in accordance with BIS IS/ISO/IEC GUIDE 23 that is issued under the rules of a Certification Scheme.

1.3.5 Certification Scheme

A product certification program or system which is operated in accordance with JAS-ANZ Procedure 15 – General requirements for bodies operating product certification systems and in accordance with the general rules of BIS IS/ISO/IEC GUIDE 28and System No. 5 as defined in ISO/ITC publication - Certification - Principles and practice. In the case of a non-strategic plumbing Product, a Certification Scheme means the NCPDP Scheme.

NOTE: The effect of this is to require maintenance by the manufacturer of effective production control planning in addition to full type testing from independently sampled production and subsequent verification of conformity with specified standards.

1.3.6 Compliant Product

Product that has been assessed, by means of Product Appraisal, as conforming with standards and specifications that are nominated by the Corporation.

1.3.7 Contractor

The party responsible for supplying the fixed mechanical components of the pump station. *The contractor* may be a representative of the corporation, a developer delivering assets for takeover by the corporation, or a contractor or subcontractor with such responsibility.

1.3.8 Corporation

The Water Corporation of Western Australia.

1.3.9 Design Operating Envelope

The range of required pump operating duties defined by the guarantee duty point and any secondary duty points in Appendix A - purchasing schedule.

1.3.10 Designation of Size

Submersible sewage pumps referred to in this Specification generally applies to pump sizes in the range of 3kw up to and including 250 kW. The upper limit may be extended, in consultation with the Principal Mechanical Engineer, IDB, where required to meet future needs.

1.3.11 Drywell Service

The vertical installation of the pump in a room or structure within a pump station building; which requires piped suction to the pump; which forms a normally dry and accessible working environment; but which may be prone to flooding under certain infrequent failure events.

1.3.12 Guarantee Duty Point

The operating point, consisting of the Guarantee Duty Head and Guarantee Duty Flow which forms the basis of the manufacturer's performance guarantee.

1.3.13 Manufacturer

An entity or combination of entities that are responsible for selection, processing and control of Product constituent materials or compounds and for the processing equipment that collectively result in the manufactured product.

1.3.14 Nominal Size

An alphanumeric designation of size for components of a pipe-work system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections.

1.3.15 Notation

Statements expressed by use of the word 'shall' are mandatory or 'normative' requirements of the Specification. Statements expressed by use of the words 'should' or 'may' are 'informative' but not mandatory and are provided only for information and guidance. Notes in Specification text are informative. Notes that form part of Specification Tables are normative. An Appendix to the Specification that is designated 'normative' contains mandatory requirements. An Appendix that is designated 'informative' is provided for information and guidance only. The term 'specified' includes requirements of the Specification and requirements stated or referenced in other project documentation.

1.3.16 $NPSH_3$

The Net Positive Suction Head producing a 3% loss in total operating head.

1.3.17 NPSHa

The Net Positive Suction Head available at the suction eye of the impeller as a result of ambient conditions, minimum fluid level and (for *drywell service*) suction pipework losses.

1.3.18 NPSHr

$NPSH_3$, plus an appropriate manufacturer determined margin, to ensure long term operation without cavitation damage.

1.3.19 Officer

A duly authorised representative or appointed agent of the Corporation.

1.3.20 Pressure Class (PN)

A classification of pressure by PN number, based on the allowable operating pressure (AOP) expressed in Megapascals (PN = 10 x AOP).

1.3.21 Product

A single or multiple units of manufactured end product, or an assembly of manufactured component products, materials or equipment. This Specification and accompanying Purchasing Schedule define the nature and details of Product to be supplied. In this Specification the Product shall refer to submersible sewage pumps.

NOTE 1: An end product is most commonly an output of manufacturing processes that result in finished end products having the same features and characteristics and can be the result of a single or multiple production batches.

NOTE 2: Manufactured equipment and assemblies of Product components or materials are commonly procured for mechanical, electrical and civil infrastructure applications.

1.3.22 Product Appraisal

A formal process whereby Product, including product design, is subjected to systematic engineering assessment to determine Product fitness for prescribed end uses and to evaluate the extent of Product and production systems conformity with nominated standards and specifications. Product Appraisal includes verification of the extent of compliance in accordance with the requirements of a relevant 'Technical Compliance Schedule' Appendix.

1.3.23 Product Assessor

An organization, Officer or other person who, having demonstrated specialist product knowledge and competence acceptable to the Corporation, is nominated by the Corporation, subjects Product to Product Appraisal and issues one or more Product Verification Reports.

1.3.24 Product Certification

A formal process whereby the production and management systems for the manufacture of Product, are assessed by a Certification Body to evaluate compliance of these systems with prescribed product standards and tests, under Certification Scheme rules.

1.3.25 Product Verification Report

A formal report wherein a Product Assessor evaluates the extent of Product compliance with the nominated product standards and specifications.

NOTE: Verification may be on a project-by-project basis or at agreed intervals, as appropriate to the scope of a Purchasing Schedule and Product end use, subject to determination by the Corporation.

1.3.26 Product Warranty

A formal express undertaking by a Supplier or Manufacturer that Product is:

a) In conformity with the nominated product specification and referenced standards;
b) Fit for the nominated Product end use or application;
c) Designed for sustained operation at the nominated service performance levels for the specified design life;
d) Adequately packaged for intended transportation, handling and storage conditions;
e) Supported by English language installation, operating and servicing instructions;
f) Adequately supported by Supplier capacity to provide technical Product support.

NOTE: Where required, a Product Warranty should indemnify the Corporation against claims made or losses suffered as a result of breach of the Warranty by means of Public and Products Liability Insurances as specified in the undertaking.

1.3.27 Pump

Pump referred to in this Specification shall mean submersible sewage pump and motor configured for either *wetwell service* or *drywell service*.

1.3.28 Purchasing Schedule

A Corporation purchase order, tender, schedule of prices, bill of quantities, or specification that details the nature, quantity and other characteristics of Product to be supplied, purchased or installed.

1.3.29 Quality System

A management system that establishes, documents, implements and maintains organizational structures, resources, responsibilities, processes and procedures for the manufacture of Product and provision of Product related services in accordance with the requirements of AS/NZS ISO 9001.

1.3.30 Standard Discharge Bend

A standard ‘duckfoot’ type pedestal, based on the ‘ITT Flygt’ range of products, which The Corporation has adopted for the installation of pumps in *wetwell service*.

1.3.31 Strategic Product

An essential product whose performance is critical in eliminating risk to the safe and effective provision of water services, which are functions of the Corporation under the Water Corporation Act as licensed under the Water Services Coordination Act.

NOTE : Strategic product is most commonly an element of permanent Corporation infrastructure. Ancillary operational and safety equipment, not intended to form part of this infrastructure, may be considered strategic by virtue of enhanced operational performance or personnel safety.

1.3.32 Supplier

An entity or combination of entities that is responsible for the supply of Product.

NOTE: A Supplier may be a Product manufacturer, owner, producer, distributor or vendor or an agent, tenderer or contractor for supply of Product or Product related service.

1.3.33 Testing

The determination of Product characteristics by inspection and by the application of specified test procedures.

1.3.34 Type

The corporation's standard sizes of submersible sewage pump stations based on maximum design pump rate: *Type 10; Type 40, Type 90, Type 180, Type 350* representing maximum pump rates of 10l/s to 350l/s.

1.3.35 Wetwell Service

The vertical installation of a pump in a generally inaccessible wetwell location; where it is partially or fully submerged in the pumped liquid; connects via guide rails to a *standard discharge bend* and draws directly from the surrounding liquid.

1.3.36 WSAA

The Water Services Association of Australia of which the Water Corporation is a corporate member.

2 Materials and Components

2.1 General

Pump components shall be constructed from the basic minimum materials shown in Table 2.1 of WSA 101 except where modified in the table and clauses below.

Table 2.1 – Materials and Components

Component	Material	Standard	Grade
Pump shaft, impeller nut, keys	Stainless steel	ASTM A 276/A276M	431, 316
Impeller (and wear-plate where applicable) - *Abrasive Service*	Chromium White Iron(1)	ASTM A 532/A532M	15% Cr-Mo
Coupling Claw/Adaptor Flange (*wetwell service*)	Grey Cast Iron	AS1830	T250
Guide Rails (wetwell service)	Stainless Steel Pipe 40S	ASTM A 312/A312M	316L
Guide Rail Brackets (wetwell service)	Stainless Steel	ASTM A 312/A312M	316L
Stool, Pedestal or Footplate (*drywell service*)	Structural Steel Sections Structural Steel Plate	AS3679.1 HDG to AS/NZS 4680 AS/NZS 3678 HDG to AS/NZS 4680	250 250
Mechanical seal flange	Stainless steel	ASTM A 276/A276M	316
Mechanical seal springs	Stainless steel	Hastelloy C	-
Lower Mechanical Seal Faces	SiC / SIC	-	-
Upper Mechanical Seal Faces	SiC / Carbon	-	-
Pump component O-rings	EPDM, NBR	AS 1646	70 IRHD

NOTE: (1) Alternative Chromium White Iron compositions accepted subject to minimum BHN = 550.

Alternative materials in Appendix B of WSA101, which have lower corrosion resistant properties are not permitted.

2.2 Non-Metallic Materials

Non-metallic materials used in the components of the Product shall be fit for the intended purpose and shall exhibit dimensional stability after extended periods of time immersed in water.

2.3 Corrosion-Resistant Materials

Metal components subject to continuous immersion shall either be manufactured from corrosion resistant materials or shall be coated in accordance with section 4 Protective coatings of this Specification. For the purposes of this Specification, the following materials are deemed to be corrosion-resistant:

a) Austenitic stainless steel complying with ASTM A 276/A276M, series 300, containing not less than 8% nickel, except that grades 303 and 304 are not permitted and duplex (ferritic-austenitic) stainless steels ASTM/ASME A240 UNS S32750, S32304, S31803, and S31500.

b) Stainless steel complying with ASTM A 313/A313M.

3 Design and Manufacture

3.1 General

In addition to the requirements of Section 3 of WSA 101, the pumps shall be designed in accordance with the following clauses.

3.2 Wetwell Service - Standard Discharge Bend

The corporation has adopted the use of a *standard discharge bend* that is based on the 'ITT Flygt' 90 degree 'duckfoot' bend. Standard details and dimensions of the bend are shown in Appendix C. The purpose of this standard is to ensure the long term interchangeability of pumps between pump stations and reduce the number of spare pumps required to be held in stock; without restricting the range of manufacturers' pumps that can be supplied. The *standard discharge bend* shall be supplied with the pump where indicated in the purchasing schedule, to suit the nominal discharge of the pump being supplied.

The following nominal pump discharge sizes are permitted: DN80, DN100, DN150, DN200, DN 250, DN300. *The supplier* shall indicate the nominal size on the response schedule.

Each submersible pump shall be supplied fitted with a *coupling-claw* or where required an *adaptor flange* to suit the s*tandard discharge bend*. The *coupling claw* and *adaptor flange* arrangement shall be standard cast and machined factory manufactured components, specifically designed to couple with the guide rails and to seal against the *standard discharge bend* providing a leak proof joint.

3.3 Wetwell Service - Guide Rail Brackets

Where required in the purchasing schedule *the supplier* shall supply upper guide rail brackets to support the guide rails at the inside of the wetwell opening and intermediate support brackets where the guide rails are longer than 4.0 metres. Guide Rail Bracket materials shall comply with table 2.1.

3.4 Wetwell Service - Guide Rails

Where required in the purchasing schedule the supplier shall supply guide rails.

Guide rails shall be made from schedule 40 stainless steel pipe (refer table 2.1 standard and grade), in nominal sizes of either 2" (50mm NB) or 3" (80mmNB). *The supplier* shall indicate on the response schedule the size of guide rails required for *the pump*.

3.5 Wetwell Service - Maximum Dimensions & Clearances

The corporation uses standard *type* pump station designs for submersible sewage pump stations, based on the maximum flow capacity of the wetwell, for example 'Type 40' for pump rates up to 40l/s.

For each standard *type* the dimensions of the pump, when measured in plan view from tip of coupling claw to outer extremity of casing, shall not exceed the requirements in table 3.1. The pump shall also be capable of being installed with the upper guide rail bracket mounted on the inside of the clear opening.

For each standard *type* the 'sump depth' shown on Fig 1.1 is the floor level difference - between the level on which the *standard discharge bend* is mounted and the bottom of the *wetwell* below *the pump.* Unless stated otherwise in the *purchasing schedule*, the 'sump depth' is shown in table 3.1.

The pump shall operate without blockage or reduced performance when installed in this configuration.

Table 3.1 Maximum Plan Dimension and Sump Depth

Station Type (l/s)	Maximum Plan Dimension (mm)	Usual Nominal Size of Discharge Bend 'inlet x outlet' (mm)	'Sump Depth' provided. (mm)
10	915	80x80 or 100x100	50
40	900	150x150 or 150x200	100
90	1670	150x200 or 200x200 or 200x250	150
180	1670	200x250 or 250x250 or 250x300	300
350	1816	300x300 or 300x350 or 350x350	350

Additional *type* installation drawings are provided in DS51 and available on request.

NOTE 1: The discharge bend is selected by *the contractor* to have an inlet to match the pump nominal size and an outlet as close as possible to the nominal size of the vertical discharge pipework.

NOTE 2: In order to minimise corrosion, the design of the pump station will ensure that the pump motor casing is fully submerged at the maximum normal operating (cut-in) level.

3.6 Wetwell Service - Lifting Chains

3.6.1 General

Where required in the purchasing schedule *the supplier* shall supply stainless steel lifting chains.

The chain and fittings shall be assembled by suitably experienced qualified person (i.e licensed dogman).

3.6.2 Chain

a) Each submersible pump shall be fitted with a nominated length of stainless steel lifting chain and shall have a Working Load Limit (WLL) in excess of two times the mass of the pump.

b) Lifting chain shall comply with either AS 4797 or with DIN 5687-1 Grade 50 or 60

c) Lifting chains links and fittings shall have a minimum sectional diameter of 8mm.

3.6.3 Fittings

Termination fittings installed on the chain shall be Stainless Steel 316L - Grade 50 or 60 in accordance with DIN 5688. All fittings shall have a Working Load Limit (WLL) in excess of two times the mass of the pump and shall comply with ASTM A 276/A276M. The upper terminal fitting shall comprise of a master link suitable for lifting hook entry. The lower terminal fitting shall comprise of a master link and a suitably sized shackle for connection to the pump lifting point. Connection of the master link to the chain shall be via a clevis shackle or a connection link (hammerlock). A 316L stainless steel bolt and nyloc nut shall be installed into the chain link that is level with the pump station slab to indicate to correct pump installed (seated) position.

NOTES : Chain and fitting requirement of two times pump weight provides an additional margin for unseating forces and allowance for corrosion. The minimum sectional diameter of 8mm required to simplify the lifting equipment and process. Stainless steel chains and fittings which comply with the above requirements are available from Bullivants (Welshpool) and other specialist suppliers.

3.6.4 Caution Tag

Each chain shall be fitted with an engraved Stainless Steel 316L Caution Tag. The caution tag shall be attached to the upper terminal fitting (master link) and carry the following wording in minimum 12mm & 8mm lettering:

CAUTION !

Chain subject to CORROSION

Exercise CAUTION when lifting

INSPECT each time pump lifted

3.7 Drywell Service – Stool, Pedestal or Footplate

Where required in the purchasing schedule, the pump shall be supplied with a mounting stool, pedestal or footplate that is specifically designed to securely support the pump in a drywell installation. The stool, pedestal or footplate shall be fabricated from steel plate and/or sections and hot-dip galvanized on completion. The supplier shall provide full technical details of any additional structural plinths or supports that are required to complete the installation, secure the pump and to achieve the *vibration level* requirements below. The pump supporting structure shall provide unrestricted access to the access cover on the suction bend.

3.8 Drywell Service – Suction Bend

Where required in the purchasing schedule, the pump shall be provided with a 90 degree suction bend to transfer flow from the horizontal suction pipe-work to the vertically installed pump. The suction bend shall be manufactured from the same material and grade as the pump casing, tapered, and fitted with an appropriately sized access cover for inspection and cleaning of the impeller via the suction nozzle.

3.9 Vibration Level

The vibration level of each installed pump shall not exceed 7.1 mm/sec RMS in compliance with ISO 20816-3.

3.10 Pump Maximum Speed

The pump rotational speed should not exceed 1500 r/min (4 pole) unless otherwise authorised by *The Corporation* (refer following Note).

Where the selected motor output is rated higher than 170kW the rotational speed shall not exceed 1000 r/min (6 pole).

Where the pump is required to operate at varying speed, the maximum speed of *the pump* required to meet any normal duty point shall not exceed its nominal synchronous speed at 50Hz.

NOTE: In relatively low flow / high head applications where the selection of a 2 pole (~3000r/min) pump would result in an overall efficiency significantly (>10%) higher than a 4 pole unit, a 2 pole pump may be selected.

3.11 Pump Minimum Speed

Pumps may be required to perform at variable speeds to meet a range of duty points as indicated in the purchasing schedule. Where variable speed service is indicated the following requirements are applicable:

Where the motor cooling is provided by integral cooling system that uses pumped media; the manufacturer shall provide test data, specific to the pump, and shall guarantee the minimum speed at which the pump can operate to ensure the removal of entrapped air from, and prevent the settlement of solids within, the cooling jacket.

Where the motor cooling is provided by submergence of the motor casing, or a 'closed loop' re-circulated fluid, the manufacturer shall indicate and guarantee a minimum operating speed for the pump.

NOTE: In variable speed applications, a margin (10% of nominal speed minus guarantee minimum speed) over and above the manufacturers guarantee minimum speed will be used by *The Corporation* in choosing an actual minimum speed in controlling the pump. For example a 50Hz pump with a guaranteed minimum speed of 35Hz will have an actual minimum speed of [35 + (50-35)*10%)] = 36.5Hz.

3.12 Pump Selection and Operating Range - Fixed Speed

For fixed speed applications *the pump* shall be selected so that Guarantee Duty Flow is as close as possible to the Best Efficiency Point flow (Q_{BEP}) and within the preferred range of 70% to 110% of Q_{BEP}. Where this cannot be achieved a selection within the range of 50% to 120% of Q_{BEP} may be made but will not be preferred.

Selection outside an operating range of 50% - 120% of Q_{BEP} will only be permitted in exceptional circumstances where dictated by the required duty and after consideration of reduced efficiency, reduced reliability and alternative design solutions.

3.13 Pump Selection and Operating Range – Variable Speed

For variable speed applications the pump shall be selected so that the Guarantee Duty Flow is in the range of 80% to 120% of (Q_{BEP}) in order to maintain high efficiency when operating at reduced speed.

3.14 Pump Selection and NPSH

The pump shall be selected so that, at the Guarantee Duty Flow; NPSHa is greater than NPSHr, and NPSHr is less than 9.0m.

3.15 Pump Selection and Impeller Design

Where available pumps are similar in other selection parameters, pumps with semi-open impellers that have a proven record of clog-free performance and site adjustable seal clearances will be preferred. Semi-open impellers and impeller facing wear plates shall be flame or induction hardened.

Closed impellers shall have an absolute minimum throughlet of 70mm. Where possible, closed impeller throughlet shall be minimum 100mm, increasing to 125mm where the guarantee duty flow is greater than 200l/s.

3.16 Electric Motor

3.16.1 Type and Standard

Each pump motor shall be of the cage induction type and shall comply with the requirements of AS 1359 except where otherwise specified. The motor shall be suitable for a nominal 415 volts, line to line, 50 Hertz, three phase four wire supply with solidly earthed neutral. The steady state voltage range may vary ±10% from the nominal voltage and the steady state frequency range may vary ± 2% from the nominal frequency.

3.16.2 Rating

The motor shall be rated for continuous operation, within the voltage and frequency range specified at clause 3.16.1, in unscreened sewage at 30ºC at not less than 110% of the power required at any point within the *design operating envelope*. Motors shall have a minimum rating of 3 kW.

3.16.3 Motor Starting

(a) Motors shall be suitable for starting using one of the following forms of starter, as specified in Appendix A

I. Direct on line starter

II. Auto transformer starter

III. Electronic soft starter

IV. Variable speed controller (VSD's will be fitted with output sine filters).

(b) Motors specified to be suitable for use with auto transformer starters or with electronic soft starters shall have a rated voltage infinite bus DOL torque characteristic with torque value at 75% nominal speed - in excess of 150% of the pump full load speed full load operating torque.

3.16.4 Motor Cooling

Motor cooling may be provided by:

(a) Natural convection of air for small pumps in drywell service with appropriate motor de-rating.

(b) Submergence of the motor casing in *wetwell service*.

(c) A closed loop motor jacket cooling system comprising an internally circulated glycol / water / inhibitor mixture, transferring heat to the pump casing.

(d) An open loop motor jacket cooling system comprising once-through circulation of pumped media via internal pathways. No external piping or external cooling system is permitted.

NOTE: Where available for the size of motor, pumps using **option (c) will be preferred**.

3.16.5 Mechanical Seal Chamber

The motor shall be sealed against the ingress of sewage by use of two independent mechanical seals fitted to the pump shaft and contained in an oil filled or dry chamber. The seal chamber shall incorporate oil filling and drainage points. Moisture ingress detection shall be provided where required in table 3.3.

3.16.6 Motor Casing Sealing

Each motor shall be fitted with watertight terminal boxes at the non-drive end. The terminal boxes shall be spacious and complete with a cable gland to tightly fit the cable specified herein.

The motor shall incorporate a sensor to detect leakage of moisture into the motor enclosure at the terminal box or connection chamber in accordance with Table 3.3 of this Specification.

3.16.7 Motor Winding Protection

Thermistors shall be embedded in each motor winding prior to the varnishing process. Thermisters shall be connected in series and selected to have a trip value of 1000 ohms each (total loop resistance 3000 ohms) at a trip temperature no greater than 160ºC.

3.16.8 Winding InsulationTemperature Rating

The winding insulation temperature rating of the motor shall not be less than Class 155(F) in accordance with IEC 60085

The motor rated full load winding temperature rise shall not be more than allowed for Class 130(B) insulation in accordance with IEC 60085

3.16.9 Rated Impulse Voltage

The motor shall have a rated impulse voltage of not less than 1500 volts

3.16.10 Cable

The cable shall contain four tinned copper motor stator supply conductors rated to suit the motor load and copper pilot wires suitable for the connection of the protective circuits. The cable shall contain no hygroscopic elements and shall be rubber insulated (R-EP-90), neoprene (HD-85-PCP) or chlorosulphonated polyethylene (R-CSP-90) sheathed cable complying with the requirements of AS/NZS 1802 or AS/NZS 5000.1 respectively.

3.16.11 Cable support

Where required to prevent excessive bending, strain or damage during installation and removal - larger pump cables shall be provided with suitable socks and lifting hooks to facilitate lifting of the pump using a single crane or hoist.

3.16.12 Balancing

Each complete motor rotor assembly shall be dynamically balanced to a balance quality grade of G6.3, or better, as defined in ISO 21940-11.

3.16.13 Motor Bearings

Upper and Lower bearings shall: be caged ball or roller type; be designed for a minimum 50,000 hours operating life; be grease lubricated and sealed for life. The outer rings shall be positively secured to the motor case to prevent rotation in the housings. Non drive end bearings shall incorporate a means of preventing rotation of the outer ring.

Non drive end and drive end bearing housings shall be fitted with thermal sensors, where required by Table 3.3 of this Specification, which shall shut down the pump in the event that the temperature set point for the bearings is exceeded.

3.16.14 Condition Monitoring and Protection

Table 3.3 summarises the condition monitoring and protection feature requirements for particular pump motor sizes.

Table 3.3 – Condition Monitoring, Protection

Ref	CM and Protection Required	Motor Size	
		<100 kW	≥ 100 kW
1	Stator winding protection - Thermistors	R	R
2.	Motor terminal box moisture detection/protection	_	R
3.	Drive-end bearing high temperature protection	_	R
4.	Non drive-end bearing high temperature protection	_	R
5.	Seal chamber moisture detection	R	R

3.16.15 Electronic Monitoring Unit

Where required in the purchasing schedule, the supplier shall supply a proprietary Electronic Monitoring Unit suitable for mounting in an electrical switchboard and capable of providing the condition monitoring functions required by the previous section.

4 Protective Coatings

4.1 General

In addition to the requirements of the Protective Coatings clause 2.4 of WSA 101, the coating clauses described in the following shall apply.

4.2 Scope

In lieu of the polymeric coating to AS/NZS 4158 specified in WSA 101 the coating may alternatively be a 2-pack epoxy in accordance with Water Corporation specifications A1 and D1.

For *wetwell service*, coatings shall be applied to the submersible pump and ancillary fittings e.g. pump end, motor casing, pedestal bend, discharge connection and mounting brackets.

For *drywell service*, the inlet bend shall be coated and the fabricated mild steel pedestal or baseplate shall be hot dip galvanized in accordance with AS/NZS 4680 in addition to the required submersible pump coatings.

4.3 Coating Preparation

The pump shall be prepared in accordance with Corporation Technical Specifications A1. Oil or dirt shall be removed in accordance with AS 1627.1.

Surfaces to be coated which will become inaccessible after assembly shall be cleaned and coated before assembly.

4.4 Application

The epoxy coating shall be a two-pack liquid applied epoxy applied in accordance with Corporation Technical Specifications D1 except that:

(a) The surfaces to be coated shall be blast cleaned in accordance with AS 1627.4 to a Class 3 (white metal) finish as specified in AS 1627.0.

(b) The surfaces to be coated shall be given at least two coats of an approved two-pack epoxy- to produce a 400 micron minimum dry film thickness.

5 Testing

5.1 General

In addition to the requirements of Section 5 of WSA 101 pumps shall be tested and witnessed as required in Table 5.1. Testing shall be to ISO9906 and shall be performed by accredited staff in factory facilities which meet the requirements of ISO 9906. Testing shall be deemed acceptable when test outcomes have been formally verified by the manufacturer's accredited staff or where required, witnessed by *The Corporation's* appointed testing Officer. Product for which a test requirement has not been met shall be classified as non-compliant Product.

Table 5.1 – Pump Testing Requirements

Ref	Test / Grade Required	Motor Size			
		<10kw	**10 - <50kw**	**50 - <= 250kw**	**>250kw**
1.	Pump Casing Leakage Air Pressure Test During Manufacture.	R	_	_	_
2.	Pump Casing Hydrostatic Test to 1.5 times rated pressure	_	R	R	R
3.	NPSH Test. Required where $NPSH_R$ > m	_	8	7	6
4.	Performance Test to ISO 9906 grade:	(1)	Grade 2B	Grade 1B	Grade 1B
5.	Water Corporation Witness Required	_	_	_	R

NOTE 1: Refer to Section 4.4.2 of ISO 9906.

5.2 Notification of Testing

Where witness testing is required *The Corporation* shall be notified in writing of each formal test proposal at least twenty eight (28) days prior to the scheduled test date. This notification is required to enable the Corporation to make all necessary arrangements including appointment of a testing Officer in a timely manner.

5.3 Access to the Place of Manufacture

The testing Officer shall be afforded access, at all reasonable times, to all places of manufacture of Product or product components and shall be authorised to arrange or undertake such testing there as the Corporation deems appropriate to the testing regime specified.

5.4 Place of Manufacture other than WA

Where any Product or product component is being manufactured other than in Western Australia the Corporation may appoint an inspecting Officer to undertake inspections and witnessed testing as required. The testing Officer shall be provided with all due authority and permits required to carry out testing at the place of manufacture.

The cost of witnessed testing arranged by the Corporation will normally be borne by the Corporation unless otherwise negotiated.

5.5 Performance Test Requirements

5.5.1 Site Acceptance Tests

During Commissioning, each pump will be tested by *The Corporation* as follows:

(a) A non-certified test at the guarantee duty point to verify performance within the required tolerance.

(b) A sealing test at the shut off head of the pump to verify zero leakage of the seal between the standard discharge bend and the pump. (*submersible service* only).

(c) A non-certified vibration test to verify that there are no 'significant' variations from the vibration levels provided by the production test (*drywell service* only).

NOTE. The site acceptance tests performed do not meet the stringent requirements of ISO 9906 but are considered to provide a good indication of performance. Where failure of any test is not resolved by initial investigation by *The Corporation; the supplier* will be required to investigate and rectify the problem.
Where the results of the site acceptance tests are in dispute, The Corporation may arrange for independant testing of the pump. The cost the cost of testing, transportation and rectification shall be met by the supplier if the Site Acceptance Test results are confirmed.

5.5.2 Motor Type Tests

(a) Type tests are defined as performance tests taken on the first machine of a particular type of design to determine the characteristics of the machine and to verify conformance with its specification.

(b) The design of all motors shall be verified by Type Tests at the manufacturer's works and Type Test Certificates shall be presented for all motors.

(c) All tests carried out as part of Type Testing shall be carried out in accordance with the requirements of the relevant parts of AS 1359.

(d) Type Tests shall include the following tests:
- i) winding resistance measurement;
- ii) winding insulation resistance tests at not less than 500 volts;
- iii) dielectric test at 1830 volts;
- iv) no load test at rated voltage - recording volts, amps and kW;
- v) bearing temperature rise;
- vi) winding temperature rise;
- vii) efficiency test by summation of losses method at 50% load at 75% load and at 100% load;
- viii) current versus slip curve at full voltage from locked rotor to full load speed;
- ix) torque versus slip curve at full voltage from locked rotor to full load speed;
- x) vibration test;
- xi) noise test.

5.5.3 Motor Routine Tests

(a) Routine Check Tests are defined as tests applied to a machine to show that it is able to withstand the appropriate high voltage tests, and is in correct working order both electrically and mechanically.

(b) All motors shall be subjected to Routine Check Tests at the manufacturer's works and Routine Check Test Certificates shall be presented for all motors.

(c) All tests carried out as part of Routine Check Testing shall be carried out in accordance with the requirements of the relevant parts of AS 1359.

(d) Routine Check Tests shall include the following tests:
- i) winding resistance measurement;
- ii) winding insulation resistance tests at not less than 500 volts;
- iii) dielectric test at 1830 volts;
- iv) no load test at rated voltage recording volts, amps and kW;
- v) bearing temperature rise (where monitoring required in table 3.3);
- vi) vibration test.

vii) vacuum leakage test of sealed motor casing

5.5.4 Minimum Speed Test

Where variable speed service is indicated in the purchasing schedule, the manufacturer is shall provide documented evidence that minimum speed tests have been performed as required in section 3.9

5.5.5 Test Certificates

In addition to clause 5.1 Type Test Certificates of WSA 101 the following shall also apply. For the purposes of acceptance, each test certificate shall, as a minimum, bear the relevant Product item serial number and shall certify that the Product item has complied with the specified test requirements.

5.5.6 Acceptance of Performance Tests

Each test certificate shall show the relevant pump serial number. Pumps or components shall not be dispatched until accepted for dispatch. Dispatch shall be authorised only when each component or group of components has demonstrably complied with the test and guaranteed performance requirements.

6 Marking and Packaging

6.1 Marking

6.1.1 Body Markings

Each Product shall be marked in accordance with clause 6.0 Marking, Labelling, Packaging, Spare Parts and Documentation of WSA 101.

6.2 Packaging

In addition to clause 6.3 Packaging of WSA 101 the following shall also apply:

6.2.1 General

Product shall be packaged with appropriate protection, which shall prevent damage or defects as a result of handling, storage or transportation. Flexible packaging material shall have a minimum expected life in outside storage conditions of 12 months from the date of delivery.

6.2.2 Identification Tag

Wherever requested in the Purchasing Schedule each Product item shall be identified using a weatherproof marking pen on a corrosion resistant metal identification tag securely wired to the Product in a conspicuous position using a galvanized tie wire with the following information:

a) Contract number.

b) Purchase order number.

c) Delivery Contact Person.

6.2.3 Marking of Packaging

Where requested in the purchasing schedule the Product shall be identified by marking on the outside of any protective packaging the same information as shown on the identification tag.

7 Manuals

7.1 Format and Language

Where required, Product shall be supplied complete with appropriate installation, operation and maintenance instructions or manuals, in clear diagrammatic and text format, in English.

7.2 Content

The manuals shall contain all the relevant information required to commission and maintain the Product in operational service, including the following:

a) Details of Product features

b) Operational adjustments

c) Installation and commissioning instructions

d) Preventative maintenance requirements and intervals

e) Testing procedures

f) Trouble shooting guidelines

g) Complete list of parts and associated exploded views or sectional diagrams and reference part numbers.

h) A list of recommended spare parts.

8 Spare Parts and Special Tools

8.1 Spare Parts

In addition to clause 6.4 Spare Parts and Tools of WSA 101 the following shall also apply:

8.1.1 Interchangeability

All spare parts shall be interchangeable for a manufacturer's Product of the same size and model.

8.1.2 Availability

Spare parts and servicing facilities for the product shall be readily available in Western Australia.

8.2 Special Tools

Any special tools required for service and maintenance of the Product shall be supplied.

9 Transportation, Handling and Storage

9.1 General

Transportation, handling and storage facilities shall be designed to prevent Product damage or defects and to maintain Product free of deleterious matter. Product shall not be dropped off elevated vehicle platforms or sites. Mechanical handling equipment shall be in accordance with AS 2550.1, AS 2550.3, AS 2550.5 and AS 2550.11 and shall be appropriate to the loads to be lifted. Manual handling shall be in accordance with the National Standard for Manual Handling and the National Code of Practice for Manual Handling, published by National Occupational Health and Safety Commission, Australia. Product restraint during transportation shall be in accordance with Load Restraint Guide—Guidelines for Safe Carriage of Loads on Road Vehicles, published jointly by the Federal Office of Road Safety and the National Road Transport Commission, Australia.

NOTE: Where wire ropes or chains are used for loading and unloading, they should not come into direct contact with Product. Lifting elements in direct contact with Product should be of a non-abrasive design e.g. elastomeric or fabric webbing straps. During transportation, Product restraints should be checked for tension at regular intervals of travel and should not be released until the transporting vehicle is resting in a secure stable disposition on level ground.

9.2 Preservation of Product in Storage

Product shall be stored in original Product packaging in accordance with the published requirements of the manufacturer, prior to installation. Sensitive component materials shall be protected from extended exposure to direct sunlight and high temperatures e.g. elastomeric components shall be stored in accordance with the guidance on storage of seals given in AS 681. Designated Product storage areas shall be of sufficient size to accommodate Product deliveries and shall be flat, reasonably level and free of combustible vegetation, sharp stones or projections that could cause Product damage or defects.

10 Quality Assurance

10.1 Certification

10.1.1 Certification of Product

Wherever this Specification requires compliance with nominated Product and test Standards, conformance shall be certified by means of a Certification Scheme, conducted by a Certification Body. Each Certificate shall expressly attest compliance of all Product items with the nominated Standards. Wherever specified, Certificates shall be submitted to the Officer nominated for this purpose. Product shall be marked in accordance with the requirements of the Certification Body.

NOTE: Compliance of Product including related accessories and services with nominated Standards and specified requirements may be verified by means of a Product Verification Report provided by a Product Assessor. The Product Verification Report should identify all relevant Certificates of Product compliance, duly issued in accordance with Certification Scheme rules.

10.1.2 Quality System

The processes for manufacture, testing, supply, transportation, handling, delivery and storage of Product to be supplied in accordance with this Specification shall form part of a documented Quality System. The System shall be certified by a Certification Body as complying with the requirements of AS/NZS ISO 9001 and shall provide for identification and traceability, control of production and delivery to the specified destination, customer verification and control of documents and records.

10.1.3 Product Re-verification

Product compliance with the Specification shall be subject to re-verification by a Product Assessor when, during the agreed Product supply period, there occurs any:

a) Substantive change in Product design, material formulation or performance

b) Product failure to perform in operational service to the nominated performance specification.

Re-verification shall require the issue of a new or supplementary Product Verification Report. Product components and test outcomes that are not significantly affected by the Product change or failure may be excluded from the scope of re-verification, provided that these outcomes have already been reported in a current valid Product Verification Report that is acceptable to *The Corporation*.

Wherever the requirements of the Specification apply to a Product supply period in excess of three years, continuing acceptance of Product shall be subject to re-verification. The purpose of re-verification shall be to confirm the continuing compliance of Product quality and production control processes with the requirements of the Specification

10.2 Compliance and Acceptance

10.2.1 Means of Demonstrating Compliance

Compliance with this Specification shall be demonstrated by means of Product Appraisal and issue by a Product Assessor of a Product Verification Report that confirms compliance. Otherwise, Product shall be deemed non-compliant and ineligible for registration as Product authorized for use in Corporation infrastructure.

NOTE 1: Where a project includes design work including Product design, Product Appraisal may form part of the project design review process and the Product Assessor may be a member of the project design review team.

NOTE 2: A Product Verification Report should verify the extent of compliance with the Specification including all relevant 'Technical Compliance Schedule' Appendices and the currency of a Certificate where relevant to the Product.

10.2.2 Acceptance Criteria

For acceptance, Product shall be supplied as specified in the Purchasing Schedule.

Prior to the implementation of any arrangement to supply Product, the Supplier shall, in accordance with specified requirements:

a) Nominate applicable Product Warranty terms; and

b) Provide documentary verification in the form of a current valid Certificate or Product Verification Report as appropriate to the Product; and

c) Detail each element of Product that does not comply with the specified requirements together with the extent of non-compliance.

NOTE : Where the Specification includes Technical Compliance Schedules, the nature and extent of all non-compliances should be provided in accordance with the appropriate Schedules.

10.3 Non-compliant Product

10.3.1 General

Product whose design, workmanship or performance fails to conform to the specified requirements shall be clearly tagged and quarantined by the Supplier as non-compliant and shall be subject to rejection for return to and replacement by the Supplier.

Where the Specification includes a 'Technical Compliance Schedule', Product shall be deemed non-compliant except where a Supplier has demonstrated compliance in accordance with the requirements of the 'Technical Compliance Schedule' Appendices of the Specification.

10.3.2 Manufacturing Repairs (In-process)

Welding, the use of fillers and other repairs shall generally not be permissible on Product which is in the course of production. Repairs to custom-built Products such as axially-split pumps and large valves may be considered only if determined by *The Corporation* to be minor casting repair work in non-strategic locations. Accordingly, details of any defect which the Manufacturer considers can be repaired; together with details of proposed repair procedures shall be submitted in writing for determination by the Corporation.

The Manufacturer shall make provision in its production Quality System and in the appropriate ITP's for sufficient hold points whenever casting defects are encountered. Production work on non-compliant components shall cease and repair work shall not commence until the following details have been confirmed by the Corporation in writing that:

(a) Repair of the non-compliant components in lieu of their replacement is acceptable; and

(b) Proposed repair procedures are acceptable; and

(c) Any proposal to vary the terms of the original Product Warranty as a consequence of the in-process repair is acceptable.

10.3.3 Product Warranty

The Supplier shall replace non-compliant Product with Product that conforms to the acceptance criteria or shall repair or rectify all faults, damage or losses caused by defective Product. Except as may otherwise be specified, the Product Warranty shall indemnify and keep indemnified the Corporation against all losses suffered by the Corporation as a result of non-compliant Product for a period no less than 24 months after Product delivery or 12 months after Product installation, whichever period elapses first.

10.3.4 Product Repair

All reasonable proposals for repair or remedy of defects will be considered, provided that each such proposal is accompanied by a methodology statement that accords with the performance objectives of this Specification, as determined by the Corporation. For acceptance, a proposal for repair or remedy of Product defects shall not void or otherwise diminish the provisions of the Product Warranty.

11 Appendix A Project Specific Requirements (Normative)

11.1 General

Project specific information and requirements, not included elsewhere in this Strategic Product Specification, shall apply as specified in the following Clauses.

11.2 Technical Requirements

The following table details project specific requirements for the submersible sewage pumps to be procured.

TABLE 11.1: PURCHASING SCHEDULE - PROJECT TECHNICAL REQUIREMENTS

Pump Duty, Service , Test Requirements			
	Guarantee Duty Point	Secondary Duty Point 1	Secondary Duty Point 2
Flow, l/s			
Head, m			
NPSHa, m			
Wetwell or *Drywell* Service			
Abrasive Service Materials Y/N			
Motor Starter Type (Clause 3.16.3)			
Speed (Fixed / Variable)			
Sump Depth Available (Table 3.1)			
Test Grade ISO 9906: 1B / 2B / ISO 9906 Section 4.4.2 (Table 5.1)			
Pump Accessories Required			
Cable Length (Normally 15m) / m			
Electronic Monitoring Unit Y/N			
Pump Station Items Required (Y/N)			
Discharge Bend (1) (Clause 3.2)			
Guide Rail Brackets (1) (Clause 3.3)			
Guide Rails (2) (Clause 3.4)			
Lifting Chain (2) (Clause 3.6.2, 3.6.3, min 8mm)			
Caution Tag (2) (Clause 3.6.4)			
Pump Pedestal or Footplate (3) (Clause 3.7)			
Pump Suction Bend (3) (Clause 3.8)			

NOTES:

(1) Wetwell Service Only – May be supplied by pump supplier or installer (refer section 14 for MMR's)

(2) Wetwell Service Only – Normally supplied by pump installer.

(3) Drywell Service Only – Normally supplied by pump supplier.

12 Appendix B Technical Compliance Schedules (Normative)

12.1 Technical Compliance Schedule 1

Suppliers shall demonstrate Product compliance with the Specification by completing Technical Compliance Schedule 1 as shown in **TABLE 12.1** on an item by item basis. For acceptance, the extent of scheduled technical item compliance shall be supported by verifiable documentary evidence. Each scheduled item nominates a Specification clause number with which the extent of Product compliance shall be demonstrated.

The Supplier shall denote compliance of an item by ticking the unshaded 'Yes' column appropriate to that item. Where Product does not comply with specified requirements, the Supplier shall tick the 'No' column and shall detail the reasons for non-conformance and any proposed alternatives in the 'Comments' column. The Supplier shall denote acceptance and understanding of a Specification clause by ticking the corresponding 'Noted' column wherever unshaded.

Failure to notify the Corporation of all non-compliant Product components, including the extent of non-compliance, may void an accepted offer to supply or may result in rectification of all non compliant Product elements, at the Supplier's cost.

TABLE 12.1: TECHNICAL COMPLIANCE SCHEDULE 1

Submersible Sewage Pumps					
Section/Clause		**Noted**	**Compliance**		**Comments**
			Yes	**No**	
1.	**SCOPE AND GENERAL**				
1.1	Scope				
1.2	Referenced Documents				
1.3	Definitions and Notations				
2.	**MATERIALS AND COMPONENTS**				
2.2	Non Metallic Materials				
2.3	Corrosion-Resistant Materials				
3.	**DESIGN AND MANUFACTURE**				

3.2	Wetwell Service – Standard Discharge Bend				
3.2	Nominal Pump Size DN80,100,150,200,300				
3.2	Adapter Flange/Coupling Claw - Standard Machined Component				
3.3	Wetwell Service – Guide Rail Brackets				
3.3	Wetwell Service – Guide Rails				
3.5	Wetwell Service – Maximum Dimensions & Clearances				
3.6	Wetwell Service – Lifting Chains				
3.6.2	Chain				
3.6.3	Fittings				
3.6.4	Proof Testing				
3.7	Drywell Service – Stool, Pedestal or Footplate				
3.8	Drywell Service – Suction Bend				
3.9	Vibration Level				
3.10	Pump Maximum Speed				
3.11	Pump Minimum Speed				
3.12	Pump Selection and Operating Range – Fixed Speed				
3.13	Pump Selection and Operating Range – Variable Speed				
3.14	Pump Selection and NPSH				
3.15	Pump Selection and Impeller Design				
3.16	Electric Motor				
3.16.1	Type and Standard				
3.16.2	Rating				
3.16.3	Motor Starting				
3.16.4	Motor Cooling				
3.16.5	Mechanical Seal Chamber				
3.16.6	Motor Casing Sealing				
3.16.7	Motor Winding Protection				
3.16.8	Temperature Rise				
3.16.9	Winding dV/dt Rating				
3.16.10	Cable				
3.16.11	Cable Support				
3.16.12	Balancing				
3.16.13	Motor Bearings				
3.16.14	Condition Monitoring and Protection				
3.16.15	Electrical Monitoring Unit				
4.	**PROTECTIVE COATINGS**				
4.2	Scope				
4.3	Coating Preparation				
4.4	Application				
5.	**TESTING**				
5.1	Pump Testing Requirements				
5.2	Notification of Testing				
5.3	Access to the Place of Manufacture				
5.4	Place of Manufacture other than WA				
5.5.1	Production Tests				
5.5.2	Site Acceptance Tests				
5.5.3	Motor Type Tests				
5.5.4	Motor Routine Tests				
5.5.5	Minimum Speed Test				
5.5.6	Test Certificates				
5.5.7	Acceptance of Performance Tests				
6.	**MARKINGS AND PACKAGING**				
6.1.1	Body Markings				
6.2	Packaging				
6.2.1	General				
6.2.2	Identification Tag				
6.2.3	Marking of Packaging				
7.	**MANUALS**				
7.1	Format and Language				
7.2	Content				
8.	**SPARE PARTS AND SPECIAL TOOLS**				
8.1.1	Interchangeability				
8.1.2	Availability				
8.2	Special Tools				

9.	**TRANSPORTATION, HANDLING AND STORAGE**				
9.1	General				
9.2	Preservation of Product in Storage				
10.	**QUALITY ASSURANCE**				
10.1.1	Certification of Product				
10.1.2	Quality System				
10.1.3	Product Re-verification				
10.2.1	Means of Demonstrating Compliance				
10.2.2	Acceptance Criteria				
10.3.1	General				
10.3.2	Manufacturing Repairs (In-process)				
10.3.3	Product Warranty				
10.3.4	Product Repair				
11.	**APPENDIX A - PROJECT SPECIFIC REQUIREMENTS (NORMATIVE)**				
11.2	Technical Requirements				
12.	**APPENDIX B - TECHNICAL COMPLIANCE SCHEDULES (NORMATIVE)**				
12.1	Technical Compliance Schedule 1				
12.2	Technical Compliance Schedule 2				
13.	**APPENDIX C - STANDARD DISCHARGE BEND DETAILS**				

Supplier Details	**Company Name**	**Telephone**	**Signature**	**Date**

12.2 Technical Compliance Schedule 2

When requested by the Corporation, the Supplier shall provide the information required by Technical Compliance Schedule 2 as shown in **TABLE 12.2**. This Table shall be completed **in lieu of** the schedule contained in Appendix D of WSA 101.

TABLE 12.2: TECHNICAL COMPLIANCE SCHEDULE 2

Submersible Sewage Pumps		
1.	**SUPPLIER'S REPRESENTATIVE**	
1.1	Full name	
1.2	Postal address	
1.3	Facsimile number	
1.4	Email address	
1.5	Phone number	
1.6	Mobile number	
2.	**QUALITY ASSURANCE**	
2.1	Extent of third party accreditation of supplier	
2.2	Extent of third party accreditation of manufacturer	
2.3	Details of certificates and verification reports attached	YES/NO
3.	**TECHNICAL INFORMATION**	
3.1	Performance information	YES/NO
3.2	Details of the manufacturer's inspection and testing plans supplied.	YES/NO
3.3	Details of servicing facilities in Perth supplied.	YES/NO
3.4	Additional pamphlets and drawings in conjunction with the technical literature supplied.	YES/NO
4.	**GENERAL**	
4.1	Manufacturer's name	
4.2	Place of manufacture	
4.3	Pump type	
4.4	Pump model	
4.5	Speed, rpm	
4.6	Pump dimensions (length x depth x width) , mm	
4.7	Pump mass, kg	
5.	**PERFORMANCE GUARANTEEES**	
5.1	Duty flow rate, L/s	
5.2	Duty total head, m	
5.3	Duty pump efficiency, %	
5.4	Duty motor efficiency, %	
5.5	Duty power, kW	
5.6	NOL power input to duty impeller, kW	
5.8	Duty NPSHr required, m	
5.9	Vibration severity, mm/s	
5.11	Maximum sound power level, dB(A)	
5.10	Vibration severity, mm/s RMS	
6.	**PUMP DESIGN**	
6.1	Minimum submergence, m	
6.2	Moment of inertia of rotating element	
6.3	Casing volute type	
6.4	Casing wear ring fixing	
6.5	Standard Discharge Bend	
6.6	Impeller:	
6.6.1	Type	
6.6.2	Number of vanes	

6.6.3 Throughlet, mm	
6.6.4 Diameter – duty, mm	
6.6.5 Diameter – maximum, mm	
6.6.6 Attachment and retention methods	
6.6.7 Wear ring fixing	
6.6.8 Wear ring diametral clearance	
6.7 Shaft	
6.7.1 Dynamic deflection at maximum head, mm	
6.7.2 First critical speed, rpm	
6.8 Mechanical seals:	
6.8.1 Brand	
6.8.2 Model/Type	
6.8.3 Number off	
6.8.4 Arrangement	
6.8.5 Oil-filled operating chamber	
6.8.6 Oil filling and drain point fitted	
6.8.7 Leak detection fitted to seal chamber	
6.9 Pump test standard and grade	
6.10 Pump discharge pedestal	
6.10.1 Flange standard and rating	
6.10.2 Number of holding down bolts and size (DN)	
6.11 Guide rails	
6.11.1 Type	
6.11.2 Size, mm	
6.11.3 Bracket spacing	
6.12 Chains	
6.12.1 Type	
6.12.2 WLL, kg	
6.12.3 Tagged	YES/NO
7. ELECTRIC MOTOR DESIGN	
7.1 Make	
7.2 Model	
7.3 Rating, kW	
7.4 Voltage type, V	
7.5 Voltage tolerance, ±%	
7.6 Winding	
7.7 Insulation (class)	
7.8 Compatible with VSD	YES/NO
7.9 Rotor assembly balance quality grade	
7.10 Protection	
7.10.1 PTC	
7.10.2 RTD	
7.10.3 Terminal box moisture detection/protection	
7.10.4 Upper bearing high temperature protection	
7.10.5 Lower bearing high temperature protection	
7.11 Efficiency, %	
7.11.1 Full load	
7.11.2 ¾ load	
7.11.3 ½ load	
7.12 Power factor	
7.12.1 Full load	
7.12.2 ¾ load	
7.12.3 ½ load	
7.13 Locked rotor	

7.13.1 Torque, Nm			
7.13.2 Current, A			
7.14 Full load			
7.14.1 Speed, rpm			
7.14.2 Torque, Nm			
7.14.3 Current, A			
7.14.4 Temperature rise at full load			
7.15 Motor cables			
7.15.1 Type			
7.15 2 Additional cores			
7.15.3 Demountable flange			
7.15.4 Length, m			
7.16 Bearings			
7.16.1 Manufacturer			
7.16.2 Type			
7.16.3 Series number, drive end			
7.16.4 Series number, non drive end			
7.16.5 Rating fatigue life L_{10}			
7.17 Motor housing			
7.17.1 Watertightness at 20 m head, m			
7.17.2 Cable entry glands			
7.18 Motor cooling			
7.18.1 Conventional air cooling			
7.18.2 Jacketed housing			
8.0 PUMP MATERIALS	**Material**	**Standard**	**Grade**
5.1 Pump casing			
5.2 Motor casing			
5.3 Pump pedestal and discharge connection			
5.4 Guide rail mounting brackets			
5.5 Impeller			
5.6 Impeller locknut			
5.7 Casing wear rings			
5.8 Impeller wear rings			
5.9 Shaft			
5.10 Mechanical seal			
5.10.1 Motor side rotating and stationary faces			
5.10.2 Medium side rotating and stationary faces			
5.10.3 Spring material			
5.10.4 Flange			
5.10.5 O-rings			
5.11 Pump pedestal resilient seal			
5.12 Coating			
5.12.1 Pump and ancillary cast iron component external			
5.12.2 Pump internal coating			
5.13 Pump lifting bracket or eyes			
5.14 Lifting chains, shackles and links			
5.15 Chain sling marking tags			
5.16 Guide rails			
5.17 Fasteners			
5.18 Nameplates			

Supplier Details	**Company Name**	**Telephone**	**Signature**	**Date**

13 Appendix C – Standard Discharge Bend Details

Fig 13.1 Standard Discharge Bend Detail Drawing - Original Design - (Refer Table 13.1 for applicability and dimensions)

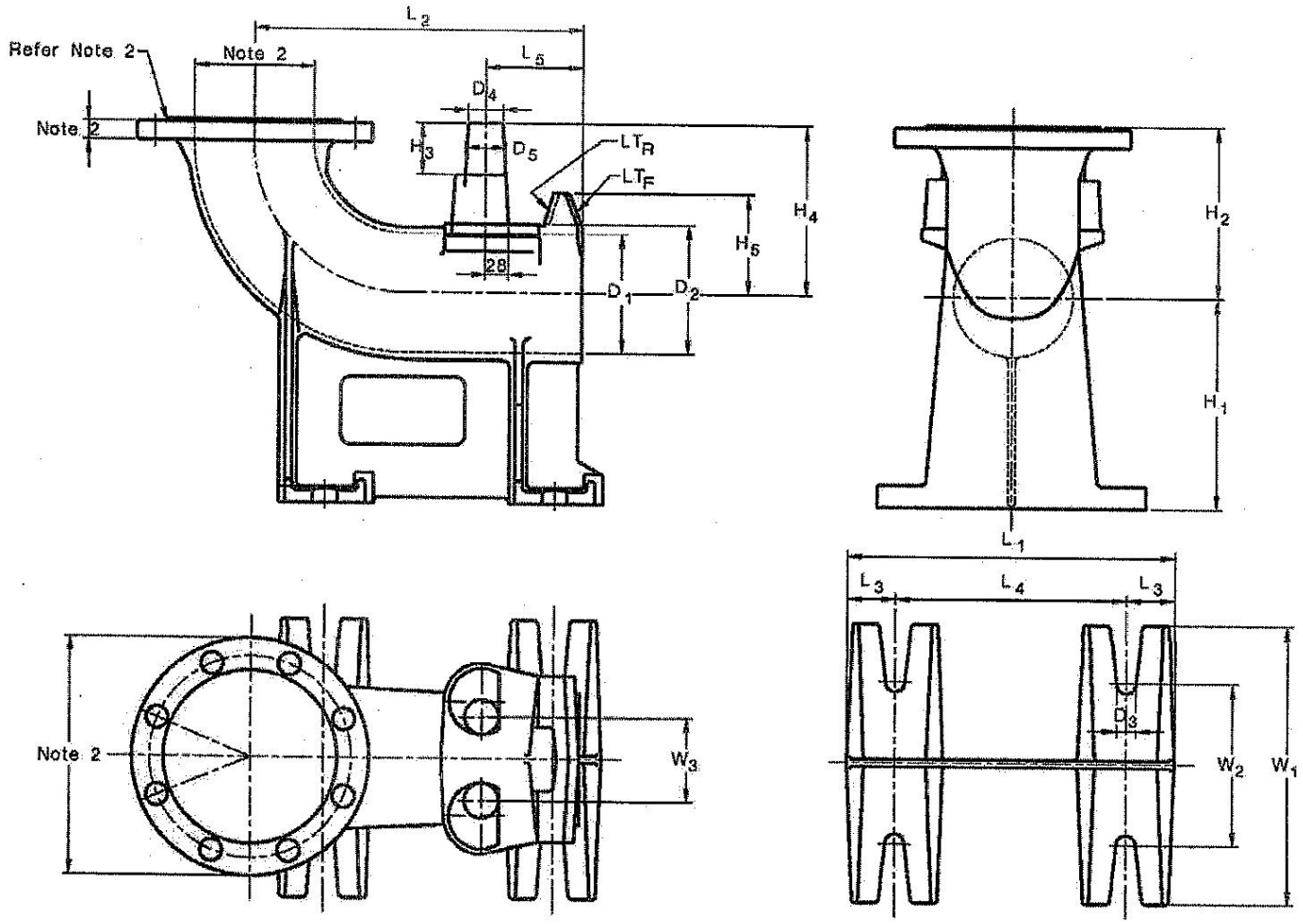


Fig 13.2 Standard Discharge Bend Detail Drawing - New 2008 Design - (Refer Table 13.1 for applicability and Dimensions)

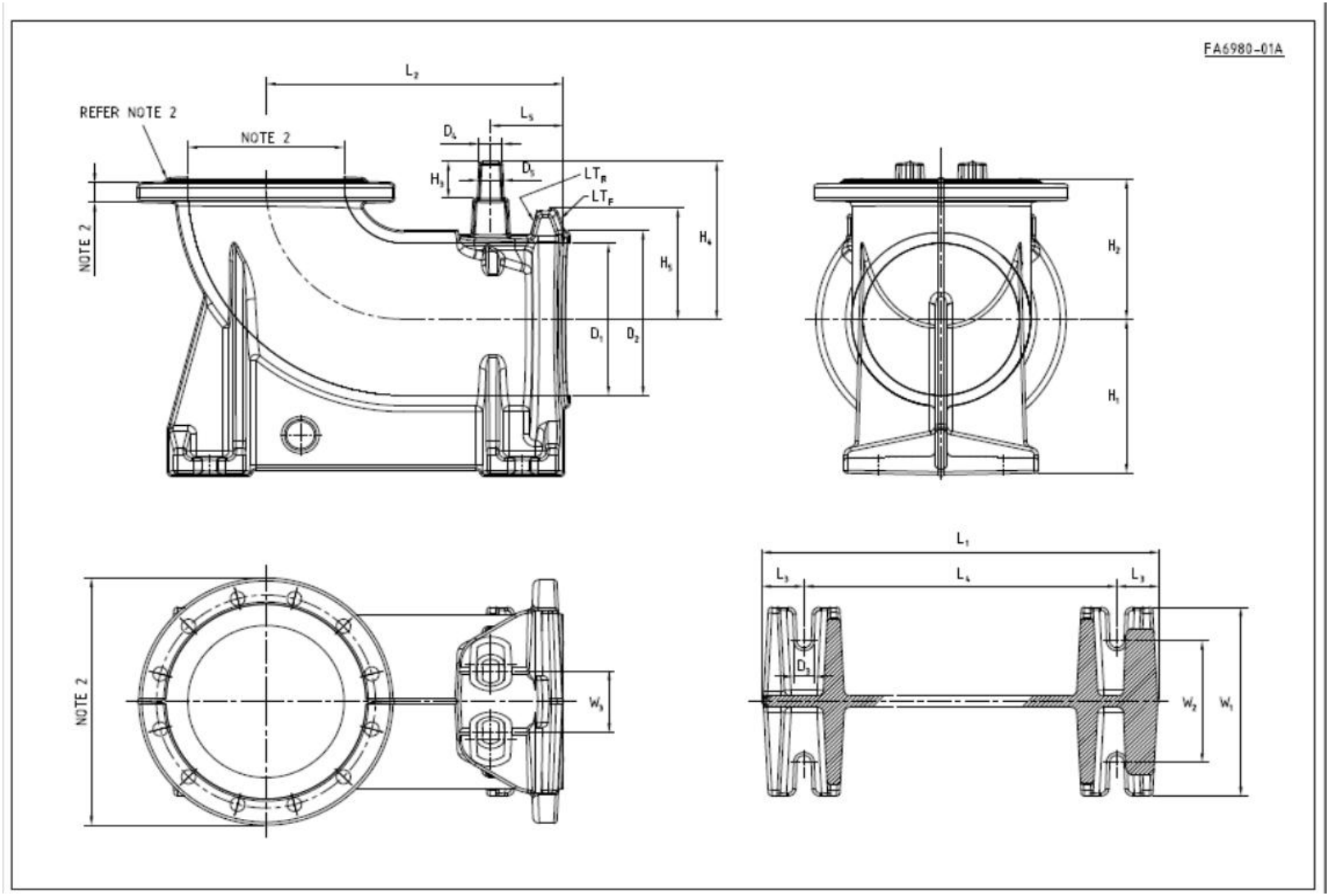


Table 13.1 Standard Discharge Bend (Original and New 2008 Design) Dimensions and Tolerances.

ITT Flygt Discharge Bends Information Sheet

Ref WAS 101-2005

Nominal Size	Overall Dimensions					Seating Face		Anchor Points					Guide Rail Boss						Locating Taper		
DN X DN	H1	H2	L1	L2	W1	D1	D2	No.	W2	L3	L4	D3	D4	D5	H3	H4	W3	L5	LTF	LTR	H5
80 X 80	200	200	300	355	270	80	100	4	150	70	250	23	44	50	60	118	100	116	20	15	90
100 X 100	200	200	390	365	270	100	120	4	200	70	250	23	44	50	60	180	100	116	20	15	100
150 X 150	***275***	***175***	***408***	***395***	***310***	***150***	***170***	***4***	***250***	***64***	***280***	***23***	***44***	***50***	***60***	***200***	***124***	***116***	***20***	***15***	***97***
150 X 200	257	193	390	425	310	150	170	4	200	57.5	280	23	44	50	60	209	100	116	20	15	125
200 X 200	260	190	390	425	30	200	215	4	200	55	280	23	44	50	60	175	100	116	20	15	155
200 X 250	225	225	610	475	310	200	224	4	200	62.5	500	23	44	50	60	235	100	116	20	15	152
250 X 250	***225***	***225***	***610***	***475***	***310***	***200***	***224***	***4***	***200***	***66***	***500***	***23***	***44***	***54***	***60***	***197***	***124***	***116***	***20***	***15***	***152***
250 X 300	500	300	610	475	620	250	244	4	460	85	500	23	44	54	60	200	124	116	20	15	152
300 X 300	***500***	***300***	***610***	***550***	***620***	***300***	***326***	***4***	***460***	***85***	***500***	***23***	***44***	***72***	***60***	***215***	***124***	***116***	***20***	***15***	***203***
300 X 350	300	300	750	650	700	300	330	4	600	50	650	30	65	72	70	240	124	174	20	15	222
350 X 350	300	300	770	650	700	350	380	4	600	55	650	30	65	72	70	265	124	174	20	15	246

NOTES:

1. Tolerances to be applied ± 1.0mm all dimensions except D3 tolerance of 0, + 1.0 mm. LTF and LTR tolerance of ± 0.5mm.
2. Dimensions of the discharge flange shall be in accordance with Figure B2 of AS 4087.
3. Australia Stock Item
4. Items ***Shown Bold Italic*** are to New 2008 design, all others to Original Design. No change to critical dimensions between the two designs.

14 Appendix D – Material Master Records

The following Material Master Records (MMR) comprise Corporation catalogue numbers that are unique to the particular products described for the purposes of Corporation activities or work.

MMR	Purchase order Long Text (Standard Discharge Bend for Submersible Pump Stations)
20953	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN80 x DN80; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20954	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN100 x DN100; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20955	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN150 x DN150; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20956	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN150 x DN200; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20957	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN200 x DN200; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20958	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN200 x DN250; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20959	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN250 x DN250; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20960	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN250 x DN300; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20961	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN300 x DN300; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.

20962	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN300 x DN350; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.
20963	Elbow, Flange To Pipe; 90 Degree Standard Discharge Bend; DN350 x DN350; Discharge Flange to AS 4087 Figure B2; Dimensions shall comply with Table 13.1 of SPS503; Materials and Coatings in Accordance with SPS503; To Suit Sewage Pump Station.

MMR	**Purchase order Long Text** **(Guide Rail Supports for Submersible Pump Stations)**
20964	Bracket, Mounting; Upper Guide Rail; DN50 (2" Nominal); Stainless Steel (316); To Suit 2" Schedule 40 Stainless Steel Pipe Guide Rails for Submersible Sewage Pump Station.
20965	Bracket, Mounting; Intermediate Guide Rail; DN50 (2" Nominal); Stainless Steel (316); To Suit 2" Schedule 40 Stainless Steel Pipe Guide Rails for Submersible Sewage Pump Station.
20966	Bracket, Mounting; Upper Guide Rail; DN80 (3" Nominal); Stainless Steel (316); To Suit 3" Schedule 40 Stainless Steel Pipe Guide Rails for Submersible Sewage Pump Station.
20967	Bracket, Mounting; Intermediate Guide Rail; DN80 (3" Nominal); Stainless Steel (316); To Suit 3" Schedule 40 Stainless Steel Pipe Guide Rails for Submersible Sewage Pump Station.

MMR	Purchase Order Long Text (Submersible Sewage Pumps)
22390	Pump, Centrifugal; Flygt Model: NS3085.060SH Submersible Free Standing Pump; C/W Code 253 (139mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN80 Outlet; Rated Flow 12.0l/s; Rated Head 13.2m; 2-Pole, 3 Phase, 415Vac/50Hz, 2.4kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Forrest Street SPS, Kellerberrin. (FL - S6010406).
22399	Pump, Centrifugal; Flygt Model: NS3085.060SH Submersible Free Standing Pump; C/W Code 255 (126mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN80 Outlet; Rated Flow 6.72l/s; Rated Head 13.8m; 2-Pole, 3 Phase, 415Vac/50Hz, 2.4kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Askew Road SPS, Geraldton. (FL - S4010119).
22389	Pump, Centrifugal; Flygt Model: NP3127.060SH Submersible Pedestal Mount Pump; C/W Code 247 (164mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN80 Outlet; Rated Flow 16.2l/s; Rated Head 21.6m; 2-Pole, 3 Phase, 415Vac/50Hz, 7.4kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Dartee Street SPS, Corrigin. (FL - S6010405).
22395	Pump, Centrifugal; Flygt Model: NP3127.060SH Submersible Pedestal Mount Pump; C/W Code 246 (173mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN80 Outlet; Rated Flow 5.05l/s; Rated Head 35.6m; 2-Pole, 3 Phase, 415Vac/50Hz, 7.4kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Complete with Flygt P/N #380 91 00 Guide Claw Adaptor; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Clarkson Street SPS, Dongara. (FL - S4010115).
22408	Pump, Centrifugal; Flygt Model: NP3153.185SH Submersible Pedestal Mount Pump; C/W Code 275 (167mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 23.3l/s; Rated Head 20.6m; 2-Pole, 3 Phase, 415Vac/50Hz, 11kW Motor; 20m x Flygt 4G4 + 2x1.5mm2 SubCab Submersible Cable with MiniCAS Relay; 100mm Forrers Guide Claw Adaptor Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Goldfields Road SPS, Esperance PS No.12.
22388	Pump, Centrifugal; Flygt Model: NP3153.185HT Submersible Pedestal Mount Pump; C/W Code 451 (275mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 44l/s; Rated Head 19.5m; 4-Pole, 3 Phase, 415Vac/50Hz, 13.5kW Motor; 20m x Flygt 4G6 + 2x1.5mm2 SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Alfred Street SPS, Merredin. (FL - S6010404).

MMR	Purchase Order Long Text (Submersible Sewage Pumps)
22406	Pump, Centrifugal; Flygt Model: NP3153.185HT Submersible Pedestal Mount Pump; C/W Code 454 (250mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 14.8l/s; Rated Head 21m; 4-Pole, 3 Phase, 415Vac/50Hz, 13.5kW Motor; 20m x Flygt 4G6 + 2x1.5mm2 SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Timewell Rd WWTP Disc Thickener Pump, Albany.
22407	Pump, Centrifugal; Flygt Model: NP3171.185HT Submersible Pedestal Mount Pump; C/W Code 453 (286mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 37.25l/s; Rated Head 23.5m; 4-Pole, 3 Phase, 415Vac/50Hz, 15kW Motor; 20m x Flygt 4G6 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Troode Street SPS, Collingwood Park. (FL - S7016561).
22391	Pump, Centrifugal; Flygt Model: NP3171.185SH Submersible Pedestal Mount Pump; C/W Code SH274 (213mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 15.4l/s; Rated Head 60.6m; 2-Pole, 3 Phase, 415Vac/50Hz, 22kW Motor; 20m x Flygt 4G10 + S(2x0.5mm2) SubCab Submersible Cable with MiniCas Relay; 100mm Forrers Guide Claw Adaptor attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Bartram Street SPS, Beverley PS No.1. (FL - 6010408). Critical Spare for Bussell Hwy, SPS, Cowaramup. (FL - S8023743).
22400	Pump, Centrifugal; Flygt Model: NP3171.185HT Submersible Pedestal Mount Pump; C/W Code 451 (320mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 58.39l/s; Rated Head 27.6m; 4-Pole, 3 Phase, 415Vac/50Hz, 22kW Motor; 20m x Flygt 4G10 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Tuart Street SPS, South Bunbury. (FL - S8023746). Critical Spare for Rendall CI SPS, Margaret River. (FL - S8023745).
22387	Pump, Centrifugal; Flygt Model: NP3102.060MT Submersible Pedestal Mount Pump; C/W Code 464 (162mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN100 Outlet; Rated Flow 7.56l/s; Rated Head 7.67m; 4-Pole, 3 Phase, 415Vac/50Hz, 3.1kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Hilton Way SPS, Narembeen. (FL - S6010403).
22402	Pump, Centrifugal; Flygt Model: NP3102.060MT Submersible Pedestal Mount Pump; C/W Code 464 (162mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN100 Outlet; Rated Flow 8.47l/s; Rated Head 7.49m; 4-Pole, 3 Phase, 415Vac/50Hz, 3.1kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Includes Flygt Twin 50mm Dia Guide Rail Type Adaptor, with Steel Face; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Lester Avenue SPS, Geraldton. (FL - S4010120).

MMR	Purchase Order Long Text (Submersible Sewage Pumps)
22404	Pump, Centrifugal; Flygt Model: NP3202.185SH Submersible Pedestal Mount Pump; C/W Code 273 (230mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 19.7l/s; Rated Head 60.1m; 2-Pole, 3 Phase, 415Vac/50Hz, 32kW Motor; 20m x Flygt 4G16 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 100mm Forrers Guide Claw Adaptor Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Capel Drive SPS, Capel. (FL - S8023744).
22405	Pump, Centrifugal; Flygt Model: NP3202.185SH Submersible Pedestal Mount Pump; C/W Code 273 (230mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 37.27l/s; Rated Head 48.2m; 2-Pole, 3 Phase, 415Vac/50Hz, 32kW Motor; 20m x Flygt 4G16 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 150mm Forrers Guide Claw Adaptor Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Loftie Street SPS, Bridgetown. (FL - S8023752).
22398	Pump, Centrifugal; Flygt Model: NP3202.185SH Submersible Pedestal Mount Pump; C/W Code 274 (215mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 34.9l/s; Rated Head 40.4m; 2-Pole, 3 Phase, 415Vac/50Hz, 32kW Motor; 20m x Flygt 4G16 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 100mm KSB Amarex KRT Guide Claw Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Durlacher Street SPS, Geraldton. (FL - S4010118).
22394	Pump, Centrifugal; Flygt Model: NP3127.060HT Submersible Pedestal Mount Pump; C/W Code 488 (215mm Dia) Hard Iron Adaptive Impeller and Insert Ring; DN100 Outlet; Rated Flow 13.5l/s; Rated Head 13.7m; 4-Pole, 3 Phase, 415Vac/50Hz, 4.7kW Motor; 20m x Flygt 4G2.5 + 2x1.5mm2 SubCab Submersible Cable with Thermistors; Pump Performance Test to ISO 9906-Annex A; Critical Spare for Forrest Street SPS, Leonora. (FL - 7016557).
22392	Pump, Centrifugal; Flygt Model: NP3202.185SH Submersible Pedestal Mount Pump; C/W Code 272 (244mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 15.6l/s; Rated Head 73.9m; 2-Pole, 3 Phase, 415Vac/50Hz, 47kW Motor; 20m x Flygt 4G25 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 150mm Forrers Guide Claw Adaptor Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Stirling Tce SPS, Toodyay. (FL - S6010409).

MMR	Purchase Order Long Text (Submersible Sewage Pumps)
22393	Pump, Centrifugal; Flygt Model: NP3202.185SH Submersible Pedestal Mount Pump; C/W Code 271 (257mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 26.8l/s; Rated Head 75.2m; 2-Pole, 3 Phase, 415Vac/50Hz, 47kW Motor; 20m x Flygt 4G25 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 150mm Forrers Guide Claw Adaptor Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Goomalling Road SPS, Toodyay. (FL - S6010410).
22397	Pump, Centrifugal; Flygt Model: NP3153.185-HT453 Submersible Pedestal Mount Pump; C/W Code 453 (261mm Dia) Hard Iron Impeller and Insert Ring; DN100 Outlet; Rated Flow 29.7l/s; Rated Head 19.8m; 4-Pole, 3 Phase, 415Vac/50Hz, 9.0kW Motor; 20m x Flygt 4G6 + 2x1.5mm2 SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Hull Street SPS, Cape Burney. (FL - S4010116). Critical Spare for Finch Street SPS, Manjimup. (FL - S8023751).
22714	Pump, Centrifugal; Flygt Model: NP3202.185HT Submersible Pedestal Mount Pump; C/W Code 458 (310mm Dia) Hard Iron Impeller and Insert Ring; DN150 Outlet; Rated Flow 54.9l/s; Rated Head 26.3m; 4-Pole, 3 Phase, 415Vac/50Hz, 30kW Motor; 20m x Flygt 4G16 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Broome PS No.5.
22401	Pump, Centrifugal; Flygt Model: NT3202.185HT Submersible Dry Mount Pump; C/W Code 456 (326mm Dia) Hard Iron Impeller and Insert Ring; DN150 Outlet; Rated Flow 80.26l/s; Rated Head 25.7m; 4-Pole, 3 Phase, 415Vac/50Hz, 37kW Motor; 20m x Flygt 4G16 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Symmons Street SPS, Bunbury. (FL - S8023747).
22445	Pump, Centrifugal; Flygt Model: NP3301.185HT Submersible Pedestal Mount Pump; C/W Code 458 (350mm Dia) Hard Iron Impeller and Insert Ring; DN150 Outlet; Rated Flow 95.0l/s; Rated Head 31.0m; 4-Pole, 3 Phase, 415Vac/50Hz, 55kW Motor; 20m x Flygt 4G35 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 1; Critical Spare for Hedditch Street SPS 1A, South Hedland.
22396	Pump, Centrifugal; Flygt Model: NP3301.185HT Submersible Pedestal Mount Pump; C/W Code 454 (390mm Dia) Hard Iron Impeller and Insert Ring; DN150 Outlet; Rated Flow 62.51l/s; Rated Head 50.3m; 4-Pole, 3 Phase, 415Vac/50Hz, 70kW Motor; 20m x Flygt 4G35 + S(2x0.5mm2) SubCab Submersible Cable with MiniCAS Relay; 150mm KRT Guide Claw Adaptor (KSB P/N. 19527797) Attached to Pump; Pump Performance Test to ISO 9906-Grade 2; Critical Spare for Willcock Drive SPS, Mahomets Flats. (FL - S4010117).

MMR	Purchase Order Long Text (Submersible Sewage Pumps)
22446	Pump, Centrifugal; Flygt Model: NP3231/705 Submersible Pedestal Mount Pump; C/W Code 480 (380mm Dia) Hard Iron Impeller and Insert Ring; DN200 Outlet; Rated Flow 134.2l/s; Rated Head 41.5m; 4-Pole, 3 Phase, 415Vac/50Hz, 125kW Motor; 2 x 20m Flygt 3x50 + 2G35/2 + S(2x0.5mm2) SubCab Submersible Power Cables; 1 x 20m Flygt S24x1.5mm2 SubCab Submersible Control Cable; Pump Performance Test to ISO 9906-Grade 1; Critical Spare for Cooke Point Road SPS 11, Port Hedland.
23620	Pump, Centrifugal; Flygt Model: NT3202.185HT; Hard Iron Impeller and Insert Ring; DN150 Outlet; Flow Rate 46.49 l/sec; Rated Head 42.0m; Motor: 4-Pole, 3 Phase, 415 Volt AC, 50Hz, 37kW; Cable: 20m, Flygt 4G16 + S(2x0.5mm2) SubCab Submersible; C/W MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2. Comply with WCWA SPS503 standards. Suitable for Raw Sewage and Wastewater. Rotable Spare for Garden & York Streets SPS, Albany.
23057	Pump, Centrifugal; Flygt Model: NT3202.185HT; Submersible Dry Mount; Vertical; Code 450 (380mm Dia); Hard Iron Impeller and Insert Ring; DN150 Outlet; Flow Rate 45.44 l/sec; Rated Head 46.8m; Motor: 4-Pole, 3 Phase, 415 Volt AC, 50Hz, 45kW; Cable: 30m, Flygt 4G25 + S(2x0.5mm2) SubCab Submersible; C/W MiniCAS Relay; Pump Performance Test to ISO 9906-Grade 2. Comply with WCWA SPS503 standards. Suitable for Raw Sewage and Wastewater. Critical Spare for Le Grande Avenue WWPS, Albany.

MMR	Purchase Order Long Text (Portable Pumpset)
22430	Pump Unit, Centrifugal; Godwin NC150M Hushpac Pumpset; Perkins Diesel Engine Model: 1104D-44TA; 63.7kW at 2100 Rpm; Automatic Kensho K35M Control Panel; Shutdown Protection; NC150 Dri-Prime Automatic Self-Priming End Suction Centrifugal Pump; Flygt-N Multi-Vane Type Hard Iron 60HRC Impeller; DN150 Suction/Discharge Branches Drilled to BS10 Table D and Fitted with 6in Bauer Fittings; Mounted on Heavy Duty Steel Base with 330L Bunded Diesel/Fuel Tank; Forklift Pockets; Enclosed Hushpac Steel Canopy with Access Doors; Build to Water Corporation Design Standard DS32 and SPS503; Critical Spare for York Street WWPS, Albany.

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