Assets Planning and Delivery Group
Engineering

Strategic Product Specification

SPS 263
Butterfly Guard Valves

VERSION 2
REVISION 1

MAY 2022

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 '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.

Enquiries relating to the technical content of this Specification should be directed to the Senior Principal Engineer, Mechanical, Engineering; to whom all enquiries relating to the technical content of the Specification should be directed. Future Specification changes, if any, will be issued to registered Specification users as and when published.

Manager, 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.

Users should 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	01.06.11	All	New SPS	JP	SE
1	1/1	01.10.11	9-14	Clause 1.1, 1.3, 1.4.2–1.4.6, 1.4.9, 1.4.12, 1.4.13, 1.4.16-1.4.22, 1.4.29, 1.5, 1.6 amended; 1.2, 1.3.8, 1.4.1, 1.4.8, 1.4.25 added; previous 1.4.12 deleted	JP	SE
1	2/0	16.01.19	12-18	Clause 1.1, 1.2, 1.48, 1.49, 1.4.11	SE	DM
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2	1/1	01.10.11	15, 16	Clause 2.1, Tables 2.1 and 2.2, amended; previous 2.3 -2.5 deleted		
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3	1/0	01.06.11	All	New SPS	JP	SE
3	1/1	01.10.11	17 - 25	Clauses 3.1, 3.3.1, 3.4, 3.4.1, 3.4.2, 3.4.4 - 3.4.8, 3.5, amended; 3.2.1, 3.2.2, added; previous 3.2.1, 3.2,5 - 3.2.7, 3.2.9, 3.3.3, 3.3.7 deleted; 3.2.3.3 transferred	JP	SE
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3	**2/1**	**13.04.22**	**19, 24**	**Table 3.1, Clause 3.5.3 amended**	**DB**	**SE**
4	1/0	01.06.11	All	New SPS	JP	SE
4	1/1	01.10.11	26	Clause 4.1, 4.2, 4.2.2, 4.3 amended	JP	SE
4	2/0	16.04.19	29	Generally Revised	SE	DM
5	1/0	01.06.11	All	New SPS	EJP	SE
5	1/1	01.10.11	27-31	Clauses 5.1, 5.5, 5.5.2 - 5.5.6, 5.5.6.1, 5.5.6.2 Table 5.1, amended; 5.5.1 added	JP	SE
5	2/0	16.04.19	All	Generally Revised, Hydraulic System and ITP Included	SE	DM
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6	1/1	01.10.11	32	Clause 6.1.1, 6.1.2 amended, 6.1.3 added; previous 6.1.3 deleted	JP	SE
6	2/0	16.04.19	All	Generally Revised	SE	DM
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7	1/1	01.10.11	34	Clause 7.1 amended	JP	SE
7	2/0	16.04.19	36	Clause 7.2 h added	SE	DM
8	1/0	01.06.11	All	New SPS	JP	SE
8	2/0	16.04.19	37	Clause 8.3 Added	SE	DM
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REVISION STATUS						
SECT.	**VER./ REV.**	**DATE**	**PAGES REVISED**	**REVISION DESCRIPTION (Section, Clause, Sub-Clause)**	**RVWD.**	**APRV.**
10	1/0	01.06.11	All	New SPS	JP	SE
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12	2/0	16.04.19	44-50	Generally Revised	SE	DM

Strategic Product Specification
SPS 263
Butterfly Guard Valves

CONTENTS

1 Scope and General

1.1 Scope

This Specification sets out requirements for the manufacture, supply, handling, testing and delivery of double-flanged, double-eccentric, resilient seal-on-disc, butterfly valves. It is specifically intended for the procurement of Counterweight Operated Dam Guard Valves, but may be modified for non-counterweight guard valves, where automatic emergency closure is not required, by prior approval of the Senior Principal Engineer.

This Specification additionally includes the requirements for the additional components which are included in the valve supply scope: counterweight-loaded hydraulic actuators; the associated electro/hydraulic valve actuation and control system; hydraulic reticulation pipework installation, cleaning, testing; and excessive flow detection instrumentation. Valves shall be in a new unused condition.

Dam guard butterfly valves (valves) shall comply with the relevant requirements of Section 1: Scope and General of AS 4795.2, except where varied below. The Specification details the requirements in lieu of specific clauses, or as clarification for options that exist within, or as additional requirements to AS 4795.2. Accordingly, unless otherwise specified in this Specification, the valves shall be manufactured, tested and supplied in accordance with the requirements of AS 4795.2 for seal-on-disc type butterfly valves. The Specification also details the means by which compliance with the Specification shall be demonstrated and the criteria for acceptance of Product.

1.2 Application

The valves detailed in this Specification are designed for use in high velocity, low to medium head, above-ground, dam guard valve applications; where safe closure into high emergency flow velocities is required. (refer Definitions below for further information on guard valves).

As specified in Table 11.1 of this Specification, valves are to be actuated by fail-safe type - counterweight-loaded electro-hydraulic actuator system which forms part of the valve supply scope.

The Purchaser/Designer must complete Table 11.1 of this specification.

Other butterfly valve types used by the Corporation are referred to in the notes below for guidance.

NOTES:

1. Wafer and Lugged style butterfly valves for general purpose non-buried service are specified in SPS 260, which references AS 4795.1 for wafer and lugged seal-on-body type valves.
2. Butterfly valves for waterworks purpose non-buried and buried service and for rated flow velocities ≤5 m/s and emergency flow velocities ≤7.5 m/s are specified in SPS 261, which references AS 4795.2 for double flanged seal on body type valves.
3. Butterfly valves for high performance non-buried and buried service, higher pressure applications and for normally closed trunk main service, are specified in SPS 262, which references AS 4795.2 for double flanged seal on disc type valves.

1.3 Referenced Documents

The Specification refers to the following standards, which are not already referenced in Appendix C of AS 4795.2:

Water Corporation "Strategic Product Appraisal Process Manual" (Internally controlled)

AS

1442 Carbon steels and carbon manganese steels – Hot rolled bars and semi-finished products

1450 Steel tubes for mechanical purposes

1874	Aluminium and aluminium alloys – Ingots and castings
2550.1	Cranes, hoists and winches – Safe use - General
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
2550.11	Cranes, hoists and winches – Safe use – Vehicle loading cranes
4041	Pressure piping
4795.1	Butterfly valves for waterworks purposes – Wafer and lugged
4795.2	Butterfly valves for waterworks purposes - Double flanged
60034.1	Rotating electrical machines – General requirements – Rating and performance

AS/NZS

1554.6.1	Structural steel welding – Welding of stainless steels for structural purposes
1594	Hot-rolled steel flat products
1734	Aluminium and aluminium alloys – Flat sheet, coiled sheet and plate
3678	Structural steel – Hot-rolled plates, floorplates and slabs

AS/NZS ISO

9001	Quality management systems – requirements

ASTM

A269	Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
A312M	Standard Specification for Seamless and, Welded and Heavily Cold Worked Austenitic Stainless Steel Pipes
A380	Standard Practice for Cleaning, Scaling, and Passivation of Stainless Steel Parts, Equipment and Systems
A743	Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application

DS

26.09	Type Specification for Low Voltage Switchboards – General Requirements.
26.41	Type Specification for an Electric Actuator for a Waterworks Valve

IEC

60085	Electrical insulation – Thermal evaluation and designation

ISO

945	Microstructure of cast irons – Part 1 Graphitic classification by visual analysis.
1083	Spheroidal graphite cast irons – Classification.

ISO/IEC

17000	Conformity assessment – Vocabulary and general principles
17025	General requirements for the competence of testing and calibration laboratories

SAA Guides

HB 18.23 (ISO/IEC Guide 23)	Guidelines for third-party certification and accreditation - Guide 23 - Methods of indicating conformity with standards for third party certification systems
HB 18.28 (ISO/IEC Guide 28)	Conformity assessment - Guidance on a third party certification system for products

SPS

260	Wafer and Lugged Butterfly Valves
261	Double Flanged Butterfly Valves for Waterworks Purposes
262	High Performance Butterfly Valves

Welding Specification

WS-1	Metal arc welding

1.4 Definitions and Notation

Reference should be made to the Clause 1.4 Definitions contained in AS 4795.2 and the following definitions and notations which are intended to clarify terminology used in this Specification.

1.4.1 Australian Standards®

Standards that are developed, published and maintained by Standards Australia.

1.4.2 Certificate

A formal certificate issued by a Certification Body in accordance with the third party product certification system described in HB 28 including associated Product licence schedules.

1.4.3 Certification Body

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

1.4.4 Certification Mark

A proprietary mark of product conformity issued in accordance with HB 18.23.

1.4.5 Certification Scheme

A third party product certification system operated in accordance with HB 18.28.

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.

1.4.6 Compliant Product

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

1.4.7 Corporation

The Water Corporation of Western Australia.

1.4.8 Critical Flow Velocity

The flow velocity as the valve closes which results in the Maximum Hydrodynamic Torque

1.4.9 Design Calculation Report

A report produced by the manufacturer, including where necessary Computation Fluid Dynamics and Finite Element Analysis output reports; to verify and record the design in relation to valve operating torques, actuator design and selection, and valve component stress levels. The report shall provide a historical record of all critical assumptions, calculations and parameters forming the basis of design of the valve.

1.4.10 Double Eccentric Butterfly Valve

A double eccentric butterfly valve is a resilient seated seal on disc butterfly valve which is configured so that the shaft is offset from the centre of the valve body waterway and also from the seating edge of the disc. This produces a cam type motion of the disc when entering and exiting the seat with reduced interference, less wear and reduced seating torque. Used for high performance butterfly valves for high pressure and/or high flow conditions (>6 m/s) e.g. guard valve.

1.4.11 Guard Valve

An isolating valve, generally located immediately downstream of a dam wall that is designed to operate in either the fully open or fully closed position and close safely under the maximum emergency flow velocity in the event of catastrophic downstream pipework failure. Guard valves are structurally more robust than standard butterfly valves and are normally fitted with higher rated actuators.

The fail-safe guard valve actuator comprises an electro-hydraulic power pack, and a single-acting hydraulic cylinder and counterweight assembly. The valve actuator is configured to open hydraulically and close the valve under hydraulic speed control and the action of the counterweight. No external power source is required to close the valve.

1.4.12 Hydrodynamic Torque

The torque required to operate the butterfly valve disc during operation as a function of the dynamic flow conditions and the valve disc position.

1.4.13 Lattice Blade Butterfly Valve

Lattice blade butterfly valves are designed for high operating heads and very high flow velocities. The lattice construction of the disc provides a rigid structure which allows water to flow through and around it without the consequent head loss, cavitation and higher hydrodynamic torques that are associated with the thicker, solid lenticular disc.

1.4.14 Lenticular Blade Butterfly Valve

Lenticular blade butterfly valves embody a solid disc that whilst suitable for medium heads and flows has limitations for high operating heads and high flows (refer lattice blade butterfly valve above).

1.4.15 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.

1.4.16 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 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.

1.4.17 Officer

A duly authorised representative or appointed agent of the Corporation.

1.4.18 Product

A single unit 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 a butterfly guard valve (or valves).

NOTES:

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

1.4.19 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 conformity of its production systems with specified standards and requirements. Product Appraisal includes verification of the extent of compliance in accordance with the requirements of a relevant 'Technical Compliance Schedule'.

1.4.20 Product Assessor

An organization, Officer or other person who, having demonstrated specialist product knowledge and competence acceptable to the Corporation, is appointed to evaluate Product, appraise the Product and issues one or more Product Verification Report(s).

1.4.21 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 specified product standards and tests, in accordance with Certification Scheme rules.

1.4.22 Product Verification Report

A formal report wherein a Product Assessor evaluates the extent of Product compliance with the specified 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.

1.4.23 Product Warranty

A formal express undertaking by a supplier that indemnifies the Corporation against the consequences of supplied Product failure to comply with specified fitness for application and in-service life expectancy performance requirements.

1.4.24 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.

NOTE: Table 11.1 of this Specification represents a component of the Purchasing Schedule.

1.4.25 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.

1.4.26 Standards Australia

The peak non-government standards development body in Australia which develops Australian Standards®.

1.4.27 Strategic Product

An essential infrastructure component whose performance is critical to the elimination of 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 but offers exceptional enhancements in operational performance or personnel safety may be deemed strategic.

1.4.28 Strategic Product Appraisal Process

The process described in the Strategic Product Appraisal Process Manual whereby manufactured products and equipment are evaluated and, where they comply with specified requirements, authorised for use in Corporation infrastructure.

1.4.29 Supplier

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

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

1.4.30 Testing

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

1.4.31 Valve

The term valve (or valves) referred to in this Specification shall mean butterfly guard valve including primary and secondary actuating systems comprising (as required):

a) Gearboxes, extended spindle, spindle cap, handwheel or electric actuator, or

b) Counterweight-loaded hydraulic actuator.

1.5 Designation of Size

Valve sizes shall be of a size as specified in Clause of 1.5(a) of AS 4795.2 and as shown in Table 11.1 of this Specification.

1.6 Allowable Operating Pressures

Table 1.1 contained in AS 4795.2 shall be amended as follows:

Table 1.1 – Classification and Rating for Butterfly Guard Valves

PN (Note 1)	Allowable Operating Pressure, kPa	Max. Allowable Operating Pressure, kPa	Allowable Site Test Pressure, kPa	Maximum Flow Velocity - m/s		
				Rated		Emergency
16	1600	1920	2000	Lenticular	6	~20
				Lattice	7.5	~20
21	2100	2520	2625	Lenticular	6	~20
				Lattice	7.5	~20
25	2500	3000	3125	Lenticular	6	~20
				Lattice	7.5	~20

NOTE:

Most of the Corporation's Guard Valves are, due largely to historical reasons, rated PN 21, which would often exceed the required pressure rating of the application. PN25 (drilled PN21) flanged valves may therefore be required for compatibility with existing installations.

2 Materials and Components

2.1 General

Valves shall comply with the relevant requirements of Section 2: Materials and Components of AS 4795.2, except where varied in the following.

2.2 Stainless Steel

Stainless steel castings, plate and bar subjected to welding during the manufacture of any component shall be a low carbon ≤0.04% or stabilized grade. Stainless steel components except fasteners shall be passivated in accordance with ASTM A380. Stainless steel castings shall be heat treated in accordance with AS 2074.

2.3 Weld Deposit Seat - Weld Overlays

The valve seat shall be Nickel Chrome weld overlay as specified in Section 3.

The weld electrode material shall be EN ISO 18274 S Ni 6082 (NiCr20Mn3Nb), material certificates shall be provided as required below.

2.4 Valve Materials

Valve components and materials contained in Table 2.1 of AS 4795.2 shall be varied by the components and materials shown in the following table.

Table 2.1 – Seal-on-Disc Butterfly Valve Material Requirements

Component	Material	Standard	Designation
Body	Ductile cast iron	AS 1831	ISO 1083/JS/500-7/U; ISO 1083/JS/400-15/U
Disc	Aluminium bronze	AS 1565	C95810
	Stainless steel	ASTM A743	Grade with PREN ≥22
Shaft	Stainless steel	ASTM A276	Grade with PREN ≥22 Grade 431 (allowed in AS4795.2) is not permitted.
Bearings	Leaded Tin Bronze	AS 1565	C92710, C93500, C93700
Seals and O-rings	Synthetic elastomer	AS 1646	EPDM, NBR

The use of ductile cast iron discs are not permitted. Cast stainless steel discs are preferred however fabricated discs may be considered where essential for the application.

2.5 Counterweight-Loaded Hydraulic Actuator Materials

The valve counterweight-loaded hydraulic actuator components and materials shall be suited for long term operation under damp and often condensing atmospheric conditions, without undue corrosion of key components. Accordingly critical actuator materials shall be corrosion resistant. Materials shall comply with Table 2.2 below.

Table 2.2 – Counterweight-Loaded Hydraulic Actuator Material Requirements

Component	Material	Standard	Designation
Actuator bracket, lever hubs, locking pin hubs	Ductile cast iron	AS 1831	ISO 1083/JS/500-7/S; ISO 1083/JS/400-15/S;
	Carbon steel	AS 2074	C4-1
Drive lever	Carbon steel	AS 2074	C4-1
Hydraulic Piston Cylinder	Stainless steel	ASTM A312	PREN =>22
Piston rod	Stainless steel	ASTM A 276	PREN =>30
Counterweight	Cast iron	AS 1830	ISO 185/JL/250
Oil reservoir	Stainless steel	ASTM A312	316
Control block	Aluminium	AS 1874	Appropriate grade
Control tubing, vales & fittings	Stainless steel	ASTM A269	316
Seals and O-rings	Synthetic elastomer	AS 1646	NBR

2.6 Material Certification

Material Certificates shall be provided to the requirements of EN 10204 on the basis of one certificate for each type of valve (same design and pressure rating, size may differ) supplied as part of the order, for acceptance by the Corporation prior to delivery:

Body, Disc, Shaft, Bearing, Weld Deposit Seat – Type 2 Batch.

3 Design and Manufacture

3.1 General

Valves shall comply with the relevant requirements of Section 3: Design of AS 4795.2, except where varied in this Specification.

Valves shall be actuated by a hydraulically operated system including a counterweight which is capable of holding the valve in the open position during an extended power outage and closing the valve at controlled speed under emergency flow conditions in the absence of an external power source.

3.2 Valve

Valves shall comply with the seal option detailed in Clause 3.3.6(a) of AS 4795.2 for seal-on-disc butterfly valves. Valves shall be suitable for unidirectional or bidirectional flow isolation as required in table 11.1, but are only required to provide emergency shut-off for unidirectional flow.

The valve design lifetime cycles of the bare shaft valve shall exceed the number of cycles relative to the valve application over a period not less than 50 years by a factor of 50% and in any event shall be designed for a minimum life of 1,000 cycles.

Valves shall provide drip-tight shut-off at AOP shall comply with the following:

3.3 Design and Selection

3.3.1 Mandatory Design Requirements

Guard valve applications are complex requiring a number of engineering design options and requirements to be addressed in order for the valve to be correctly specified. Accordingly this Specification shall not be used for purchasing until the designer has completed (as a minimum), Table 11.1 in Appendix A of this Specification, which forms an integral part of the Purchasing Schedule.

3.3.2 Maximum Rated and Maximum Emergency Flow Velocities

Valves shall be double eccentric type, designed to operate continuously in the open position at the maximum continuous flow velocity without vibration or flutter and safely close into the maximum emergency flow velocity. Valve component design shall be verified and recorded as described in section 3.4.

Note. The designer should provide the Maximum Emergency Flow Velocity associated with a catastrophic downstream pipe failure. A spreadsheet of system hydraulic losses and equivalent Kv values should also be provided to enable the critical flow velocity to be determined at the valve position associated with Maximum Hydrodynamic Torque.

3.3.3 End Connections

Further to Clause 3.2 of AS 4795.2 the following shall apply:

a) Valve end connections shall be compatible with mating flanges complying with AS 4087 unless otherwise specified in Table 11.1 of this Specification

b) Where valve sizes and/or pressure classes shown in table 11.1 of this specification are beyond the scope of AS 4087 (i.e. ≥ DN 1400, PN25); flanges shall be compatible with EN 1092 or Corporation designed mating flanges (based on EN 1092-1)

3.3.4 Shaft and Bearing Sealing

The valve shall be of the ‘dry shaft’ design with O-ring sealing located so as to prevent water ingress to the shaft, bearing and bearing housing.

3.3.5 Shaft End Marking of Disc Position

The drive end of the shaft shall be appropriately marked to show the angular position of the disc and the disc eccentric position relative to the shaft.

3.3.6 Adjacent Pipe Sizes

For all pipework materials the valve disc shall operate over its full range into the mating flange and pipework without fouling. The table below shows relevant internal diameters for MSCL pipe only. For other pipe materials the inside diameter of the mating flange or pipe shall be determined and disc clearance assured. Adjacent pipe size shall be specified in table 11.1

Table 3.1 – Adjacent Pipe Sizes (Mild Steel Cement Lined (MSCL) Pipe

Nominal Size - DN	Internal Diameter of Adjacent Pipe - mm
300	290
400	376
450	427
500	478
600	574
700	675
750	726
800	767
900	866
1000	968
1050	1019
1200	1161
1400	1352
1600	1538
1800	1767
2000	2089

3.3.7 Weld Deposit Seat

The Corporation has experienced a high rate of failures, of valves with seats that are pressed into a recess in the body. Accordingly, seats shall be of the *Weld Deposit Overlay* type only. A seat specific drawing showing details of the seat and degree of compliance with this clause shall be submitted with the tender documentation. Seats shall be designed and executed as follows:

3.3.7.1 Seat Preparation

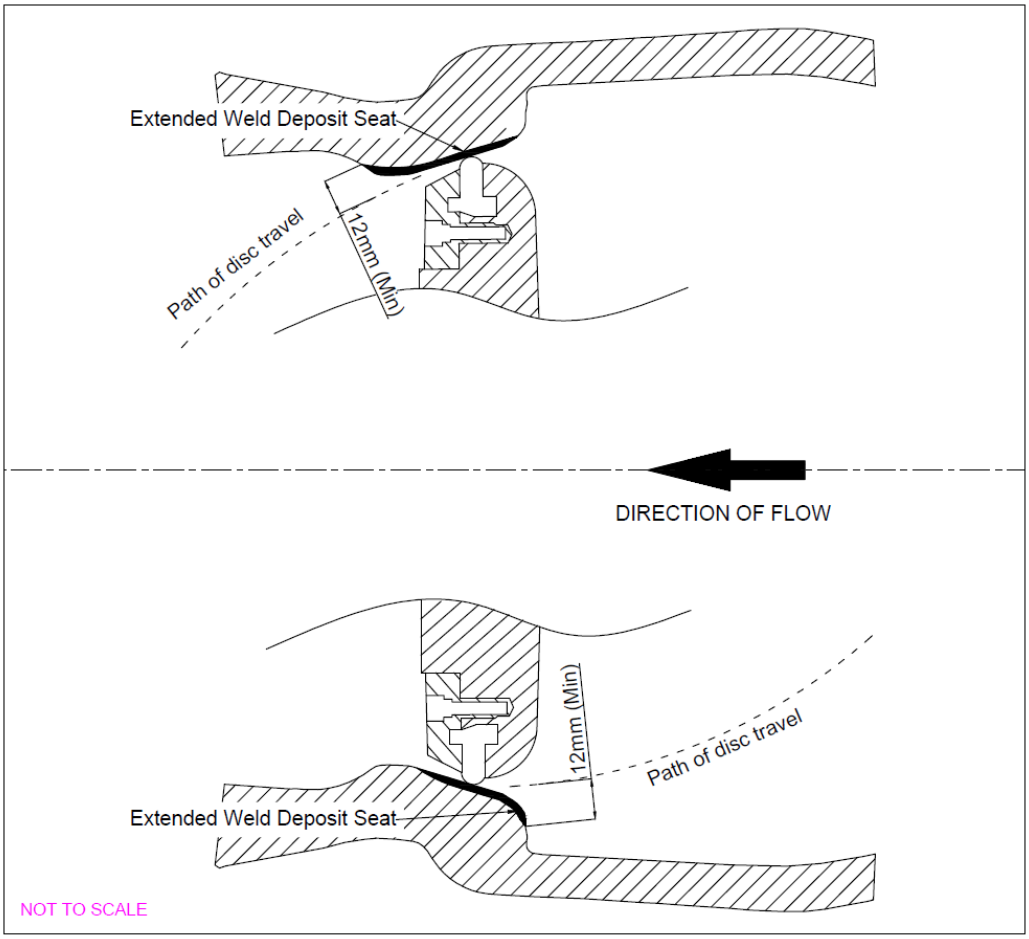
The body seat shall be subject to machining to remove surface impurities, to a minimum depth of 4 mm of material, prior to application of the weld overlay. Seat preparation shall be undertaken by an automated milling or boring process involving axial rotation of the body relative to the machine tool (or vice versa), to ensure a high degree of accuracy and concentricity. The machined surface shall be subject to the quality tests required in Clause 5.5.6.

3.3.7.2 Weld Deposit Overlay Seat – Extent of Overlay

The weld overlay used for the valve seat shall extend beyond the seat in the direction of opening of the disc to provide an area of continuous corrosion protection on the body of the valve. The extent of the overlay shall be such that a minimum distance of 12 mm is created, between the arc travelled by the resilient seal on the disc and the ferrous body of the valve, as the disc rotates to the closed position. This requirement is shown in the figure 3.1.

The manufacturer shall provide full details of the proposed weld deposit seat, including preparation, dimensions, material and finish, highlighting any non-compliances, as part of the tender response.

Figure 3.1 Weld Deposit Overlay Seat – Extent of Overlay



NOTES:

1. The water temperature and characteristics prevalent in Western Australia frequently result in the formation of ductile iron corrosion tubercles over time. This is often apparent, regardless of the type and quality of the coating system used. Extension of the Weld Deposit Seat overlay, as required above, is intended to mitigate the formation of tubercles and damage to the seal, as the valve operates to and from the closed position.
2. The extended weld overlay may be asymmetric (as shown) or symmetric, at the manufacturer's discretion.

3.3.7.3 Weld Deposit Overlay Seat – Weld Deposit Process

The process used for welding of the seat shall be based upon a constant feed electrode (refer section 2.3) with an inert gas shield. The weld shall be a robotic process involving axial rotation of the valve relative to the arc (or vice versa) to ensure a continuous weld deposit providing full, uniform and uninterrupted coverage of the machined body surface, with no visible discontinuities or defects.

3.3.7.4 Weld Deposit Overlay Seat – Finishing

Finishing of the seat shall be by an automated machining process, also involving axial rotation of the valve body relative to the machine tool (or vice versa). The surface finish shall ensure a drip tight seal and a high degree of corrosion resistance. Grinding of the weld using a hand held tool is not permitted. The finished seat shall be subject to the quality tests required in Clause 5.5.6.

3.3.8 Seal Retaining Ring

Further to Clause 3.3.6 (a) of AS 4795.2. Hexagon head retaining screws with locking tab washers or locking plates will be permitted for the resilient seal clamp ring screws;

3.3.9 Lifting Eyebolts

Further to Clause 3.6 of AS 4795.2, design of eyebolts and the valve body shall allow for lifting the total assembled mass of the valve and hydraulic actuator. Lifting may require the counterweight to be lifted separately if appropriate warning signage is provided.

3.3.10 Valve Direction of Rotation - Preferred

The Corporation's preferred direction of rotation for the valve is for the bottom of the disc to open in the direction of flow (promoting flushing of the seal) with the counterweight mounted on the downstream side of the valve. The manufacturer may propose an alternate installation, together with justification, where necessary for the particular application

3.3.11 Design Calculations – Operating Torque

The manufacturer shall provide in the tender response, details of the methodology that is proposed for the determination of valve shaft operating torques, specifically:

- Valve maximum seating and unseating torque at AOP.
- Valve hydrodynamic torque, including bearing friction, under maximum emergency flow (i.e. catastrophic downstream pipe failure) conditions, as specified in Table 11.1. Calculated hydrodynamic torque shall be plotted against valve position from 0 to 90 degrees.

Valve operating torques may be determined by a proprietary software system which is based on empirical data taken from similar valves under test conditions; or by Computational Fluid Dynamics analysis.

A *Design Calculation Report* shall be prepared and submitted for acceptance by The Corporation, following placement of the order and prior to manufacture of the valve.

3.3.12 Valve and Actuator Design – Normal flow conditions

The valve, actuator and control system design shall be capable of operating the valve during continuous maximum flow conditions through one complete cycle (open-closed-open) in the required opening and closing times, for the number of design lifetime operating cycles, and in any event shall be designed for a minimum life of 1,000 cycles.

The actuator shall be capable of delivering an operating torque to the shaft of the valve which is =>200% of the maximum seating/unseating torque at the maximum differential pressure. All components of the drive train including disc, shaft and pins, splines, etc., shall be rated for this torque, or for a higher value where required by the following section.

The continuous maximum flow velocity under normal conditions, required operating times and design lifetime operating cycles are specified in Table 11.1.

3.3.13 Valve and Actuator Design – Emergency Flow Conditions

The actuator shall be capable of closing the valve under Emergency Flow Conditions. The manufacturer shall provide in the tender proposal, details of the methodology that is proposed - to demonstrate that the actuator and drive train components are capable of transmitting the torque required to close the valve, in the required time, under emergency flow conditions.

Calculations shall utilize a computational Finite Element Analysis package and shall cover determination of the maximum stresses of the valve body, disc, shaft and all key drive-train components (pins, keyways, splines, etc.) in comparison to the material yield strength.

The calculations shall be based on the maximum hydrodynamic torque determined and are required to demonstrate that no component exceeds 60% of yield stress.

3.4 Counterweight-Loaded Hydraulic Actuator System

The bare shaft valve shall be fitted with a counterweight-loaded hydraulic cylinder type actuator and associated electro-hydraulic power unit and electro-hydraulic control system (described in the following sections), specifically configured and designed to:

- Operate the valve to the open and closed positions during normal and emergency flow conditions.
- Hydraulically latch the counterweight in the raised (valve open) position via the system hydraulics. Inadvertent oil leakage in the system causing counterweight creep shall be detected causing the electro-hydraulic power pack to automatically start and return the counterweight to the open position.
- Hold the valve in the open position without flutter, including through power outages of the duration specified in Table 11.1. Mechanical latching is not permitted.
- Lower the counterweight and close the valve via an adjustable damped hydraulic system at a steady controlled rate within the total maximum and minimum times specified in Table 11.1, including during emergency flow conditions and the coincident loss of external power supply.
- Automatically detect High Flow conditions (velocity specified in Table 11.1) and close the valve automatically.
- Enable the valve to be closed as above, by manual operation, in the event of a control system failure.
- Where specified in Table 11.1, enable the valve and counterweight to be raised to the open position by use of a lever operated hydraulic pump (for use in the event of a hydraulic system failure)
- Hold the valve closed in the 'low energy' state, i.e. with the counterweight lowered.
- Enable the valve to be locked in the fully open or closed position for maintenance purposes

Material requirements for the actuator and its associated hydraulic system are provided in Section 2.5. Other requirements are as follows:

3.4.1 Counterweight Location - Preferred

The Corporation's preferred Location for the counterweight is on the left side of the valve when viewed from the upstream side of the valve in the direction of flow. Counterweight location may be site dependent and is therefore specified in Table 11.1.

3.5 Actuator Control and Hydraulic Power System

The Actuator system and all components shall be suitable for continuous operation and shall perform to the specification when operating in an environment of 0°C to 60°C, 5% to 95% humidity. The system shall comprise the components detailed below and comply with the specifications as follows:

3.5.1 Hydraulic/Electrical Control Cubicle

The Hydraulic / Electrical Control Cubicle (the cubicle) shall have an IP56 rating and comply with the applicable requirements of the Corporation's standard DS26-03, including locking/security, earthing, lifting requirements and the following:

The cubicle shall be a two section, two door cubicle, with the upper electrical section separated from the lower hydraulic section. The cubicle shall be manufactured entirely from 2 mm thick grade 304 stainless steel sheet, with all welds passivated. Both sections of the cubicle shall have doors with door-switch activated operator lighting and alarms. Door sliding stops shall be provided in the 130 degrees open position and flexible earth links.

The upper section shall contain all necessary electrical components (contactors, relays, isolation switches, selector switch, push buttons, alarms, lamps, and position indication) and wiring for the required function and redundancy. Where specified in Table 11.1, operator controls, indicators and isolation shall be provided on an inner door panel which is secured by a robust outer cubicle door. The Electrical Control Cubicle associated with the cubicle is further specified below.

The lower section of the cubicle shall contain the Hydraulic Power Unit and be designed to provide a bund of at least 110% of the total hydraulic fluid volume and fitted with a stainless steel drain valve, with a threaded plug.

The cubicle shall be mounted on a carbon steel 150mm x 75mm PFC base which is provided with cut-out sections for fork-lift of the cabinet. Where necessary the base shall be welded to a 75mm x 75mm equal angle 'L' section carbon steel frame, to provide an accessible working height between 0.8m and 2.0m. The frame and base shall be hot dip galvanized and electrically isolated from the cubicle to prevent galvanic corrosion.

3.5.2 Hydraulic Power Unit Reservoir

The hydraulic power unit will consist of a grade 304 stainless steel reservoir mounted in the bund in the lower hydraulic section of the cubicle. The reservoir shall have: a minimum capacity of 150% of the total hydraulic fluid volume; internal baffles or diffuser to attenuate fluid turbulence and a sloping floor fitted with a valve at the lowest point to enable draining of fluid to the cabinet bund. The reservoir shall be vented via a replaceable desiccant air filter/drier which provides visual indication of desiccant moisture content and captures particles >3 µm size. The filter drier shall be sized to require not more frequent than annual replacement. Equipment fitted to the reservoir shall include:-

- A suitably sized removable top panel to facilitate internal inspection
- A filler connection with sieve filter
- Oil level indication
- Low Oil Level Switch
- High Oil Level Switch
- High Oil Temperature Switch
- Inline Return Line Filter and Inline Pressure Filter both fitted with electrical indication of the contamination level.

3.5.3 Hydraulic Reticulation System

Where required in Table 11.1, the supplier shall supply, install, clean and commission all reticulation related pipework, valves and accessories, between the cubicle and the Guard Valve Hydraulic cylinder. Reticulation pipework shall be manufactured from grade 316 cold drawn stainless steel tube and sized for a maximum fluid velocity of 4m/s. The connections should be thirty-seven degree JIC machine flared type, to ensure concentricity and burnishing of the seal face. The seal shall incorporate an insert.

Flexible hoses are not permitted, except for the connection to moving hydraulic actuators. Four wire hydraulic hose, suitable for applications up to 1000 bar shall be used, regardless of the hydraulic pressure required.

All pipe work should be adequately bracketed using Stauff type clamps. Cover plates, backing plates and fasteners shall be stainless steel.

A cleaning and testing plan shall be implemented with cleaning, flushing and verification testing performed to ISO 16431:2012 on the finished system. Appropriate documentation shall be provided.

3.5.4 Hydraulic System

The hydraulic system, also mounted in the lower section of the cubicle, shall comprise:

- Pumps - system duty and standby pumps. The pumps shall be direct coupled and bell house mounted to electric motors and be sized to meet the required operating speeds of the valve with minimal adjustment of the flow control valves. Hydraulic pump motors shall comply with the relevant section below.
- An emergency use lever-operated pump, capable of opening the valve in the event of a total electrical failure, under normal maximum flow conditions.
- Flow control valves. Flow control valves shall be provided for fine adjustment of valve operation timing and shall be positioned in the circuit so that they do not cause excessive actuator pressure and cannot be bypassed. All hydraulic valves shall be either circuit stacked or captive o'ring sealed manifold mounted cartridge valves.
- Solenoid operated directional control valves which shall incorporate a manual override function.
- Test fittings shall be provided on all hydraulic service lines as well as permanently piped system pressure gauge(s) as required to visually confirm operating pressures.
- Pipe work in the cubicle should be 316 grade stainless steel pipes sealing with thirty-seven degree flared connections. Hydraulic service lines should be piped through the wall of the control cubicle using thirty-seven degree JIC type, 316 grade stainless steel flared bulkhead fittings.
- A pressure switch installed in the system shall indicate system operation outside the design pressure range.
- Any other items that may be required to achieve the specified functionality, indication and integration.

3.5.5 Hydraulic Pump Motors

Hydraulic Pump motors shall:

- Comply with the requirements of AS 60034.1.
- Be rated for continuous operation from a power supply of voltage (±10%), 1 or 3 phase line to line 4 wire grounded neutral, 50Hz (±2.5%) with solidly earthed neutral. Details in table 11.1
- Have not less than Class 155 insulated windings in accordance with IEC 60085. The motor winding temperature rise shall be Class B as per AS 60034.1
- Be fitted with a nameplate stating the rating (A, V, kW) of the motor, degree of protection, manufacturer, model, number of poles, frequency, class of insulation and year of manufacture.
- Be rated at not less than 120% of the maximum operating load kW.
- Have a full load temperature rise of not more than 80ºC so as to allow full load operation of motors with the cabinet in full sun outdoors with shade ambient temperatures up to 55ºC.

3.5.6 Hydraulic Cylinder

Hydraulic cylinders shall comply with the relevant National Fluid Power Association Standard, with square end caps and tie rods; and be of a model commonly available to the Australian Market. Surface finish of the cylinder bore and piston rod should be Ra 0.4 or better or as specified by the seal manufacturer.

The cylinder shall be fitted with a restricted orifice to limit the speed of valve closure to that specified in Table 11.1 and prevent excessive surge in the event of a hydraulic system catastrophic failure. Counterweight operated valve closure time, using this restriction only, shall be verified during factory test.
All components shall be manufactured from a grade of stainless steel with a Pitting Resistance Equivalent Number (PREN) of =>22 and selected to provide adequate safety margin at the relief valve pressure.
The cylinder rod and bush materials shall have a high degree of corrosion resistance suited to long term reliability in the environment in which the valve is located.
The hydraulic cylinders should be tested as per the ISO Standard 10100 and test certificates issued.
Pressure drop through the return pipe should be considered when counterweight closing the valve during adverse conditions such as cold temperatures.
Hydraulic System design calculations shall be provided.

3.5.7 Electrical Control Cubicle

The Guard Valve shall be controlled locally from the Control Cubicle door panel or, where specified in Table 11.1 this shall be an inner door panel secured by a plain robust outer panel door. The following isolators, controls and indicators shall be provided, together with field instrumentation as required:

Isolation
Main Panel electrical isolation switch (lockable)
Hydraulic pump no1 isolation switch (lockable)
Hydraulic pump no2 isolation switch (lockable)

Control
Guard Valve Control – Open – Stop – Close

Guard Valve position indicator lamps
Open (green)
Transitioning (amber)
Closed (red)
High velocity closure (flashing red)

Hydraulic System and Valve Faults
Excessive creep/cylinder leak – indicator lamp
Valve fail to open – indicator lamp
Valve fail to close – indicator lamp
Pump 1 Fail – indicator lamp
Pump 2 Fail – indicator lamp
Low oil level - indicator lamp
High oil level - indicator lamp
Return filter clogged - indicator lamp
Pressure filter clogged indicator lamp
High oil temperature indicator lamp
High oil pressure - indicator lamp
System high pressure - indicator lamp
Light test - pushbutton
Fault reset - pushbutton

The system design shall be such that no single component failure prevents operation of the valve and all failures, including excessive cylinder leakage and creep, generate operator alarms which are easily diagnosed. All isolation and control switch positions, valve position indication and hydraulic system faults, shall be provided with volt free contacts wired to a terminal rail. Adequate provision

(cable tray space, cabinet penetration, etc.) shall also be made for third party wiring from this rail to the corporation's SCADA system (wiring and SCADA integration by others) for remote monitoring of the system.

3.5.8 Valve Position Sensing and Indication

Limit switches operated directly from the shaft of the valve shall be provided for remotely indicating the open and close position of the valve (refer Note 2). Analogue or digital position transmitters may also be provided. The switches or position sensor for remote indication shall not be actuated from the hydraulic cylinder or the counter weight.

a) The switches or position sensors shall be proximity type rated not less than IP68.

b) The switching range shall not be disturbed if the valve actuator should over-travel the travel limit switches.

c) The settings for the switches or position sensor shall not be disturbed when any of the components of the hydraulic actuator system are removed.

d) Unless specified otherwise, position sensors shall transmit a continuous 4-20mA signal for connection to the Corporation's SCADA system.

e) Limit switches for remote position indication shall provide voltage free contacts, rated at not less than 2A, 240V, 50Hz AC and 5A, 30V DC to ensure compatibility with the Corporation's PLC and telemetry equipment.

f) Signals for remote position indication shall be wired to a terminal strip within the control section of the switchboard. The terminals shall be clearly identified with sufficient space provided for the installation and connection of the external cables.

3.5.9 Counterweight

The lever-operated counterweight assembly shall:

a) Provide fail-safe closure of the butterfly valve by gravity;

b) Provide a closing torque =>1.5 times the maximum hydrodynamic torque;

b) Be fitted with manual lockout feature as further detailed in Clause 3.6 of this Specification;

c) Be fitted with a safety guard as required by Clause 3.6

3.5.10 Flow Sensing

The Supplier shall design and provide a flow sensing system to close the valve under abnormally high flow conditions. The design, its supporting technical documentation and data sheets shall demonstrate the suitability of the flow sensing system for the valve's intended purpose and location.

Any component of the flow sensing system that is required to be located upstream of the valve shall be capable of being fitted to and isolated by a flanged isolation valve of DN100 diameter or larger, for maintenance purposes.

The flow sensing system shall automatically close the valve only when the flow rate through the pipeline exceeds the value specified in Table 11.1. The Supplier shall give due consideration to the actual velocity profile across the pipeline and to the impact of any valves, fittings, bends and the pressure surges in the pipeline that may affect accurate measurement of the flow rate in the vicinity of the flow sensing instrument. The system shall not close the valve in response to brief transients which may be present at times in the pipeline.

The flow sensing system shall be robust and suited to the environment in which it will operate. All electronic instruments shall be provided with surge protection at the instrument and at the receiver. The Corporation will provide the sensor tappings and fittings as may be needed in the pipeline in accordance with the Supplier's requirements and design drawings.

Provision for periodic testing and calibration of the flow sensing system, shall be provided. As far as practical, the condition being sensed by the primary instrument(s) on the pipeline or valve shall be able to be simulated. For example, sensing systems based on pressure transmitters shall have facilities for readily applying test pressures to the sensing instrument. Due consideration shall be given to ensuring safe and practical access for maintenance personnel.

Mechanisms, available to maintenance personnel only, shall be provided in order to allow operation of the sensing and trip system to be tested and verified, without physically causing the valve to close.

3.5.11 Submergence

Where the valve will be potentially subject to submergence (as specified in Table 11.1 of this Specification) the cylinder and counterweight assembly shall be suitable for submergence to a depth of 5 m in accordance with AS 60529 (IP 68) for a period of 72 hours.

3.6 Lockout and Safety Devices

Valves shall be either fitted with lockout and safety devices to enable their secure isolation, or shall be capable of accommodating them, as specified in Clause 3.3.13 of AS 4795.2 and the following:

3.6.1 Hydraulic Actuator Lockout

The counterweight-loaded hydraulic actuator shall incorporate a mechanical pad-lockable locking pin to lock it in the open and closed positions to allow safe maintenance of the valve.

3.6.2 Hydraulic Actuator Guard

The counterweight-loaded hydraulic actuator shall be fitted with a robust guard which effectively prevents access and eliminates the risk of operator injury by any moving part.

4 Protective Coatings

4.1 General

Valves shall comply with Section 4: Protective Coatings of AS 4795.2, except where varied in the following.

4.2 Butterfly Valve

a) The valve shall be coated in accordance with Section 4 of AS 4795.2 except that flange faces shall be coated with a 50 µm inorganic zinc primer coating only.

b) Further to Clauses 3.3.6(a) and 4.1 of AS 4795.2 ductile iron and carbon steel valve bodies shall incorporate a full barrier coating of all surfaces and component interfaces subject to immersion and moisture. The following clauses represent a summary of specific areas of the valve where there shall be particular emphasis on providing a full and effective coating. Failure to provide the protection specified will be cause for rejection of the valve.

4.2.1 Shaft Bearing Housings

The shaft bearing housings forming part of the valve body shall be fully and effectively coated.

4.2.2 Interfaces

All wetted component interfaces including weld deposit seats and bearings shall be fully and effectively sealed against ingress of moisture that could otherwise promote corrosion and tubercle growth.

4.3 Hydraulic Actuator and Counterweight

All cast iron and steel components, including guards, shall be coated in accordance with Section 4 of AS 4795.2.

Corrosion Resistant Stainless Steel components (e,g, hydraulic vessels, cylinder, piping, valves, fittings, etc) shall be uncoated.

5 Performance Tests

5.1 General

Valves shall comply with Section 5: Performance Tests of AS 4795.2, except where varied in the following.

Valves and all associated equipment shall be tested in accordance with the test requirements of this Specification. Testing shall be deemed acceptable when test outcomes have been formally verified by a Certification Body or witnessed by a testing Officer. Product for which a test requirement has not been met shall be classified as non-compliant Product.

NOTES:

1. Testing should be carried out by an organisation accredited by NATA or in accordance with ISO/IEC 17025.
2. A testing Officer should normally be an Officer who has specialist knowledge of or training in product or materials testing appropriate to the Product characteristics to be tested.

5.2 Notification of Testing

The Corporation shall be notified in writing of each formal test proposal, allowing as a minimum the period nominated in Table 11.1 prior to the preparation of Product for testing except where a specified test has been the subject of a current valid Certificate issued by a Certification Body. 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 inspection and testing there as the Corporation deems appropriate to the inspection and 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 a local 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.

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

5.5 Production Tests - Valve

Valves shall be tested in accordance with:

a) The relevant production test requirements of Section 5.3 of AS 4795.2,

b) Tests which modify existing tests in Section 5.3 of AS 4795.2 as specified in Clauses 5.5.1 to 5.5.6 of this Specification (as applicable).

5.5.1 Coating Test

The coating shall be tested in accordance with Clause 5.3.1 of AS 4795.2 except that discontinuities at bolt holes, other external edges, hook holes, embossed lettering and scuff marks shall not be considered as defects.

5.5.2 Body Strength Test

The body strength test method outlined in the first paragraph of Clause 5.3.2 of AS 4795.2 shall apply and not the alternative test method specified in the second paragraph.

5.5.3 Disc Strength Test

The disc strength test specified in Clause 5.3.5 of AS 4795.2 shall be applicable to each valve supplied.

5.5.4 Free End Test

The free end test specified in Clause 5.3.6 of AS 4795.2 shall be applicable to each valve supplied

5.5.5 Operational Test

The operational type test specified in Clause 5.2.5 of AS 4795.2 shall be applicable to each valve supplied.

5.5.6 Non-Destructive Manufacturing Tests

During manufacture of the valve the following tests shall be conducted as applicable:

a) Cast valve bodies shall be visually inspected internally and externally. All section changes and internal and external transitions shall be subjected to magnetic particle examination.

b) The weld deposit overlay shall be subject to the following NDT requirements in lieu of Clause 5.3.7 of AS 4795.2:

- Following machining of the face to be welded dye penetrant testing shall be carried out to confirm freedom from casting defects.
- Following welding and machining, the weld overlay shall be inspected visually and by dye penetrant inspection. 100% Ultrasonic examination shall be carried out to confirm bonding and fusion between the stainless steel overlay and the cast steel base metal.
- The NDT testing and acceptance criteria shall be carried out to AS 4041 Class 1 piping.

5.6 Hydraulic System – Cleanliness Verification

The hydraulic system shall be cleaned and flushed in accordance with the supplier's agreed cleansing and verification plan:

- Prior to commencement of the Factory Acceptance Tests
- Following site installation where a risk of contamination may have occurred (e.g. draining/re-filling/re-connection of hydraulic system)

Documentation shall be provided in accordance with the agreed plan.

5.7 Factory Acceptance Tests – Assembled System

Upon completion of the Hydraulic System Cleanliness Verification, the following functional tests are required to be performed on the fully assembled valve, actuator, hydraulic and control systems, prior to shipping of the assembled system to site.
The tests shall verify that all:

a) hydraulic system parameters (levels, flows, pressures, temperatures, motor power, etc.) remain within their normal operating range

b) isolators, controls and indicators provide the required function;

c) Operation timings are within range, including closure with a hydraulic piping system failure

d) Travel stops provide a fully open and closed valve position

e) SCADA interface wiring to the terminal rail is present and correct.

The test shall be documented in Hydraulic System Factory Acceptance Test Plan which individually records each correct function. The tests shall be witnessed by a representative of The Corporation. The plan shall be submitted with the Inspection and Test Plan and include as a minimum:

5.7.1 Control System Tests

a) Check and test each of the electrical isolations, operations and fault indications required in section 3.5.7

b) The valve shall be run to the fully open position to check the operation of the hydraulic system, limit switches, indications and the travel time taken

c) Initiate normal closure of the valve to check that the fully closed position is reached, that the rate is steady and that the closure time is within range.

d) Simulate operation of the high velocity trip, check closure under gravity to ensure that the rate is steady and the closure time is within range.

e) Simulate a failure of the hydraulic piping system (bypassing the timing valve) and ensure that the time for closure of the valve, limited only by the hydraulic cylinder restriction, remains within the specified range.

f) Maintain the valve in the open position for 1 hour. There shall be no movement of the hydraulic cylinder and counterweight due to leakage of the hydraulic system.

g) Simulate cylinder leakage to demonstrate correct operation of the hydraulic control system in reinstating the position of the valve and counterweight to the fully open position.

5.8 Inspection and Test Documentation

5.8.1 ITP Documentation

The Manufacturer shall prepare an inspection quality plan (referred to as ITP) identifying relevant hold points and reporting requirements applicable to manufacture of the valve. Inspection and test reports, which represent output documents from the ITP, shall be provided for valves in accordance with the following table, as a minimum:

Table 5.1 – Inspection and Test Documentation

AS 4795.2 Clause	**SPS 263 Clause**	**Test Type**	**Valve Reporting Requirements**
Hold Point – Prior to Manufacture			
3.1	2	Verify materials for valve and actuator system	R – Material Certificates
	3.1-3.6	Verify clause by clause Compliance	R – Compliance Schedule Appendix B
	3.3.11	Provide Design Calculations	R- Design Calculations

Hold Point – Prior to Dispatch			
	2.4	Check Valve Material compliance	R – Each valve
-	2.5	Check Actuator Material compliance	R – Each valve
	3.3.3	Check End Connections	I
	3.3.4	Shaft Sealing	I
	3.3.5	Shaft End Marking	I
	3.3.7	Weld Deposit Seat – Extent as agreed	I
	3.3.9	Eyebolts	I
	3.3.10	Direction of Rotation as agreed	I
	3.4	Actuator Functions	I
	3.4.1	Counterweight Location	I
	3.5.1	Hydraulic Control Cubicle compliance	I
	3.5.2	Hydraulic Power Unit compliance	I,T
	3.5.4	Hydraulic System Compliance	I,T
	3.5.5	Hydraulic Motors Compliance	I
	3.5.7	Electrical Control Cubicle Compliance	I
	3.5.8	Position Sensing and Indication Compliance	I,T
	3.5.10	Flow Sensing Device Function	I,T
	3.6	Lockout Devices	I,T
	5.5.1	Coating thickness and continuity	T,R - Each valve
5.3.2	5.5.2	Body strength test, 1.5 x AOP	T,R - Each valve
5.3.3	-	Sealing test, 1.1 x AOP	T,R - Each valve
5.3.4	-	Reverse sealing test, 1.1 x AOP	T,R - Each valve
5.3.5	5.5.3	Disc strength test, 1.5 x AOP	T,R - Each valve
5.3.6	5.5.4	Free end test, 1.1 x AOP	T,R – Each valve

5.2.5	5.5.5	Operational test - General	T,R
-	5.5.6	Non Destructive Tests Body & Seat	I,T,R
	5.6	Hydraulic System Cleanliness	T,R
	5.7.1	Hydraulic System Tests	T,R (Hydraulic System FAT plan and witnessed FAT required)
-	5.6	Final Inspection and Documentation check	I, R – Each valve
6.1	6.1.1, 6.1.2	Marking	I

LEGEND: I - Inspection Required; T - Test Required; R – R Report required

NOTES:

1. Seating and unseating torques are to be recorded in the report.
2. This test may be waived subject to the Manufacturer providing documentary evidence of satisfactory completion of a previously identical test conducted for the Corporation.

For the purposes of acceptance, each test report 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. Acceptance of the inspection and test reports shall only be deemed to be complete when the Officer has advised in writing to that effect.

6 Marking and Packaging

Each Product shall be marked and packaged in accordance with Section 6: Marking and Packaging of AS 4795.2, except where varied in the following.

6.1 Marking

6.1.1 Body Markings

In addition to the requirements of Clause 6.1 of AS 4795.2 each valve and actuator component, which is designed to be lifted separately, shall be marked with their respective mass in kilograms.

6.2 Packaging

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

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.

6.2.3 Marking of Packaging

Each packaged 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

Each valve shall be supplied complete with appropriate installation, operation and maintenance instructions or manuals, in clear diagrammatic and text format, in English. Manuals shall be available in hard and electronic form and shall be supplied as detailed in the Table 11.1 of this Specification.

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) Recommended spare parts – hydraulic system and all related instrumentation.

8 Spare Parts and Special Tools

8.1 Spare Parts

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.

8.3 Recommended Spare Parts - List

The manufacturer shall provide a list of recommended spare parts covering the hydraulic actuator, control system and all associated components and accessories.

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 general principles of AS 1646 Clause 6. 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.

NOTES:

1. 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.
2. Guard valves will mostly be 'specials' which fall outside the requirements of AS 4795.2 QA procedures for manufacture and testing in a number of areas. In these instances certification of the valve will not apply however the Corporation will reserve the right to inspect the valves as required at the Manufacturer's works and undertake witness testing of the specified tests.

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:

- Substantive change in Product design, material formulation or performance
- 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 authorised for use in Corporation infrastructure.

NOTES:

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.

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:

- nominate applicable Product Warranty terms; and
- provide documentary verification in the form of a current valid Certificate or Product Verification Report as appropriate to the Product; and
- 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 inspection and test plans (ITPs) 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, generally not included elsewhere in this Strategic Product Specification shall apply as specified in the following Clauses. **The Purchaser/Designer shall not use this Specification without first completing Table 11.1 below which will form part of the Purchasing Schedule.**

11.2 Project Requirements

The following table details the design requirements for the butterfly valves to be procured.

TABLE 11.1: SCHEDULE OF PROJECT TECHNICAL REQUIRMENTS

Clause	Item	Requirement
	Valve identifier description / number	
	Application e.g. outlet guard valve, scour guard valve, etc.	
1.5	Nominal size DN	
1.6	Pressure class PN	
	Maximum upstream static pressure kPa	
	Maximum upstream dynamic (surge) pressure kPa	
	Maximum pressure differential kPa	
	Maximum downstream pressure kPa	
2.6	Material certificates required	Yes
3.2	Uni-directional or bi-directional sealing required	
3.2	Lifetime operating cycles	
3.3.2 / .12	Maximum normal continuous flow velocity m/s	
3.3.2/.13	Maximum emergency flow velocity m/s (Spreadsheet to be provided to enable Critical Flow Velocity to be determined)	
3.4/ 3.5.10	Flow rate to initiate emergency closure m/s	
3.3.3	Flange standard compatibility e.g. AS 4087, EN1092 or Corporation design.	
3.3.6	Internal Diameter of Adjacent Pipe mm	
3.3.7	Weld Deposit Seat – Detailed drawing and materials required	Yes
3.3.11	Operating Torque Determination – Methodology & Calculation Report required	Yes
3.3.12	Valve/Actuator opening time - max/min secs	

Clause	Item		Requirement
3.4			
3.3.12 3.4, 3.5.6	Valve / Actuator closing time - max/min secs		
3.3.13	Design Verification Required – Finite Element Analysis		Yes
3.4	Hydraulic Actuator – design power failure duration - Hours		
3.4	Lever operated hand pump required - Yes/No		
3.4.1	Counterweight location (viewed from upstream facing downstream) – Left side / Right side		
3.5.1/7	Hydraulic/Electrical control cubicle – inner door panel required - Yes/No		
3.5.3	Hydraulic reticulation installation and verification testing required - Yes/No		
3.5.5	Energy supply	Electrical (provide details e.g. 12V, 24V DC, 240V 1φ 50hz, 415V 3φ 50hz or solar)	
3.5.10	Emergency flow sensing device required – Yes/No (or provide details of signal provided by others)		
3.5.11	Submergence of Valve possible – Yes/No		
5.2	Witness Testing valve and notification of testing required - Yes/No Weeks		
5.7	Witness FAT of Valve/Actuator/Controls required		Yes
7.1	Manuals	Electronic copy required	Yes/No
		Number of hard copies required	

12 Appendix B: Technical Compliance Schedules (Normative)

12.1 Compliance Schedules

Suppliers shall demonstrate Product compliance with the Specification by completing Technical Compliance Schedules 1A and 1B as shown in **TABLE 12.1A** and **TABLE 12.1B** on an item by item basis. Table 12.1A refers to clauses contained in AS 4795.2 whereas Table 12.1B refers to additional clauses contained in SPS 263. For acceptance, the extent of scheduled technical item compliance shall be supported by verifiable documentary evidence. Each scheduled item nominates a Standard or 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 12.1A: AS 4795.2 -TECHNICAL COMPLIANCE SCHEDULE 1A

Butterfly Guard Valves					
Section/Clause		**Noted**	**Compliance**		**Comments**
			Yes	**No**	
1. SCOPE AND GENERAL					
1.1	Scope				
1.2	Application				
1.3	Normative References				
1.4	Definitions				
1.5	Designation of Size				
1.6	Allowable Operating Pressures				
2. MATERIALS AND COMPONENTS					
2.1	General				
2.2	Corrosion-Resistant Materials				
2.3	Contamination of Water				
2.4	Elastomeric Components				
3. DESIGN					
3.1	General				
3.2	End Connections				
3.3	Component Design				
3.3.1	Welding and Post-weld Heat Treatment				
3.3.2	Castings				
3.3.3	External Drainage Holes				
3.3.4	Face-to-Face Dimensions				
3.3.5	Supports				
3.3.6	Seal Options				
3.3.7	Shaft				
3.3.8	Shaft Sealing and Ingress				
3.3.9	Shaft Bearings				
3.3.10	End Thrust				
3.3.11	Input Stops and Torque Limiting Devices				
3.3.12	Position Indicator				
3.3.13	Lockout Devices				
3.4	Operation				
3.4.1	General				
3.4.2	Direction of Closure				
3.4.3	Spindle Cap. Extension and Key				
3.4.4	External Spindle Tube				

3.5	Gearboxes				
3.6	Lifting Devices				
3.7	Fasteners				
4. PROTECTIVE COATINGS					
4.1	General				
4.2	Components				
4.3	Continuous Immersion				
5. PERFORMANCE TESTS					
5.3	Production Tests				
5.3.1	Coating Test (Test 1)				
5.3.2	Body Strength Test (Test 2)				
5.3.3	Sealing Test (Test 3)				
5.3.4	Reverse Sealing Test (Test 4)				
5.3.5	Disc Strength Test (Optional)				
5.3.6	Free-End Test (optional)				
5.3.7	Weld Deposit Seat Test (Test 5)				
6. MARKING AND PACKAGING					
6.1	Marking				
6.1.1	On Body of Valve				
6.1.2	Nameplate or Label				
6.1.3	Secondary Marking				
6.2	Direction of Closure for Handwheels and Caps				
6.3	Packaging				
6.3.1	General				
6.3.2	Buried Service Valves				

TABLE 12.1B: SPS 263 - TECHNICAL COMPLIANCE SCHEDULE 1B

Butterfly Guard Valves					
Section/Clause		**Noted**	**Compliance**		**Comments**
			Yes	**No**	
1. SCOPE AND GENERAL					
1.1	Scope				
1.2	Application				
1.3	Referenced Documents				
1.4	Definitions and Notation				
1.5	Designation of Size				
1.6	Allowable Operating Pressures				
2. MATERIALS AND COMPONENTS					
2.1	General				
2.2	Stainless Steel				
2.3	Weld Deposit Seat - Weld Overlays				
2.4	Valve Materials				
2.5	Counterweight-Loaded Hydraulic Actuator Materials				
2.6	Material Certification				
3. DESIGN AND MANUFACTURE					
3.1	General				
3.2	Valve				
3.3	Design and Selection				
3.3.1	Mandatory Design Requirements				
3.3.2	Maximum Rated and Maximum Emergency Flow Velocities				
3.3.3	End Connections				
3.3.4	Shaft and Bearing Sealing				
3.3.5	Shaft End Marking of Disc Position				
3.3.6	Adjacent Pipe Sizes				
3.3.7	Weld Deposit Seat				
3.3.7.1	Seat Preparation				
3.3.7.2	Weld Deposit Overlay Seat – Extent of Overlay				
3.3.7.3	Weld Deposit Overlay Seat – Weld Deposit Process				
3.3.7.4	Weld Deposit Overlay Seat – Finishing				
3.3.8	Seal Retaining Ring				

3.3.9	Lifting Eyebolts				
3.3.10	Valve Direction of Rotation - Preferred				
3.3.11	Design Calculations – Operating Torque				
3.3.12	Valve and Actuator Design – Normal flow conditions				
3.3.13	Valve and Actuator Design – Emergency Flow Conditions				
3.4	Counterweight-Loaded Hydraulic Actuator System				
3.4.1	Counterweight Location – Preferred (i.e. LHS)				
3.5	Actuator Control and Hydraulic Power System				
3.5.1	Hydraulic/Electrical Control Cubicle				
3.5.2	Hydraulic Power Unit Reservoir				
3.5.3	Hydraulic Reticulation System				
3.5.4	Hydraulic System				
3.5.5	Hydraulic Pump Motors				
3.5.6	Hydraulic Cylinder				
3.5.7	Electrical Control Cubicle				
3.5.8	Valve Position Sensing and Indication				
3.5.9	Counterweight				
3.5.10	Flow Sensing				
3.5.11	Submergence				
3.6	Lockout and Safety Devices				
3.6.1	Hydraulic Actuator Lockout				
3.6.2	Hydraulic Actuator Guard				
4. PROTECTIVE COATINGS					
4.1	General				
4.2	Butterfly Valve				
4.2.1	Shaft Bearing Housings				
4.2.2	Interfaces				
4.3	Hydraulic Actuator and Counterweight				
5. PERFORMANCE TESTS					
5.1	General				
5.2	Notification of Testing				
5.3	Access to the Place of Manufacture				
5.4	Place of Manufacture other than WA				
5.5	Production Tests				
5.5.1	Coating Test				
5.5.2	Body Strength Test				
5.5.3	Disc Strength Test				
5.5.4	Free End Test				
5.5.5	Operational Test				
5.5.6	Non-Destructive Manufacturing Tests				
5.6	Hydraulic System – Cleanliness Verification				
5.7	Factory Acceptance Tests – Assembled System				
5.7.1	Control System Tests				
5.8	Inspection and Test Documentation				
5.6.1	ITP Documentation				
6. MARKING AND PACKAGING					
6.1	Marking				
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	Spare Parts				
8.1.1	Interchangeability				
8.1.2	Availability				
8.2	Special Tools				
8.3	Recommended Spares Parts List - provided				
9. TRANSPORTATION, HANDLING AND STORAGE					
9.1	General				

9.2	Preservation of Product in Storage				
10. QUALITY ASSURANCE					
10.1	Certification				
10.1.1	Certification of Product				
10.1.2	Quality System				
10.1.3	Product Re-verification				
10.2	Compliance and Acceptance				
10.2.1	Means of Demonstrating Compliance				
10.2.2	Acceptance Criteria				
10.3	Non-compliant Product				
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					
11.1	General				
11.2	Project Requirements				
12. APPENDIX B: TECHNICAL COMPLIANCE SCHEDULES					
12.1	Compliance Schedules				

The Supplier shall provide the information required by Technical Compliance Schedule 2 as shown in **TABLE 12.2**.

TABLE 12.2: TECHNICAL COMPLIANCE SCHEDULE 2

Butterfly Guard Valves					
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 supplied		(Yes/No)		
3.2	Details of the Manufacturer's inspection and testing plans supplied.		(Yes/No)		
3.3	Valve, extended spindle and actuator drawings supplied		(Yes/No)		
3.4	Details of servicing facilities in Perth supplied.		(Yes/No)		
3.5	Additional pamphlets and drawings in conjunction with the technical literature supplied.		(Yes/No)		
3.6	Weld Deposit Seat – detailed drawing and materials supplied		(Yes/No)		
3.7	Operating Torque Determination – Methodology & Calculation Report supplied		(Yes/No)		
4.	**VALVE DESIGN**				
4.1	Manufacturer's name				
4.2	Place of manufacture				
4.3	Valve model				
4.4	Valve seal type e.g. seal-on-disc				
4.5	Size (DN)				
4.6	Valve shaft and drive train is rated for safe closure into the maximum emergency flow velocity (e.g. no structural damage)		(Yes/No)		
4.7	Valve(s) rated for full end-of-line service without restraint at the free end.		(Yes/No)		
4.8	Flanges, valve body and components are all the same rating		(Yes/No)		
4.9	Valve lifetime design cycles				
4.10	Mass of valve (with actuator as applicable) kg				
4.11	Flange standard compatibility and PN rating				
4.12	Valve and gearbox IP Rating				
4.13	Actuator Type – Manual: Cap or handwheel; electric, hydraulic				
4.14	Valve AOP kPa				
4.15	Valve maximum rated flow velocity m/s				
4.16	Valve maximum emergency flow velocity rating m/s				
4.17	Valve maximum differential pressure kPa				
4.18	Coating test applied voltage kPa				
4.19	Body strength test kPa				
4.20	Sealing test kPa				
4.21	Disc strength test kPa				
4.22	Free end test				
4.23	Gearbox Strength test kPa				
4.24	Operational test No of cycles				
4.25	Flow coefficient (max opening) Kv				
4.26	Valve unseating torque Nm				
4.27	Published maximum operating torque (PMOT) Nm				
4.28	Uni-directional or bi-directional sealing				
5.0	**VALVE MATERIALS**	**MATERIAL**	**STANDARD**	**GRADE**	
5.1	Body				
5.2	Disc				

5.3	Shaft				
5.4	Shaft bearings				
5.5	Resilient seal (disc seal)				
5.6	Seals and O-rings				
5.7	Disc pins				
5.8	External fasteners				
6.0	**LOADED HYDRAULIC ACTUATOR MATERIALS**		**MATERIAL**	**STANDARD**	**GRADE**
6.1	Actuator bracket and lever hub				
6.2	Drive lever				
6.3	Cylinder				
6.4	Piston rod				
6.5	Counterweight				
6.6	Oil reservoir				
6.7	Control block				
6.8	Control tubing				
6.9	Pipe unions				
6.10	Seals and O-rings				
7.0	**HYDRAULIC CONTROL SYSTEM DETAILS**				
7.1	Control system to be supplied		(Yes/No)		
7.2	Control system type (provide details)				
7.3	Manufacturer				
7.4	Model/type				
7.5	Operating time valve open to valve closed	secs			
7.6	Operating time valve closed to valve open	secs			
7.7	Control cubicle to be supplied		(Yes/No)		
7.8	Enclosure IP rating				
7.9	Control cubicle details				
8.0	**LOADED HYDRAULIC ACTUATOR DESIGN**				
8.1	Manufacturer				
8.2	Model/Type				
8.3	Rated maximum output torque	Nm			
8.4	Motor details:				
8.4.1	Power supply and tolerance				
8.4.2	Enclosure protection rating IP				
8.4.3	Motor size	kW			
8.4.4	Motor full load current	A			
8.4.5	Motor rated voltage	V			
8.4.6	Motor starting current	A			
8.4.7	Motor efficiency – Full load	%			
8.4.8	Power factor – Full load				
8.4.9	Motor duty (Number of starts per hour)				
8.4.10	Motor protection				
8.4.11	Motor winding insulation PN and temperature rise				
8.4.12	Thermal sensor type				
8.4.13	Thermal sensor trip temperature				
8.5	Lever operated hand pump provided?				
9.0	**VALVE POSITION INDICATION**				
9.1	Manufacturer				
9.2	Model/Type (provide details)				
9.3	Enclosure IP rating				
13.0	**COATING**				
13.1	Coating manufacturer				
13.2	Product name				
13.3	Type of coating used e.g. FBE or 2-pack epoxy or other				
13.4	Valve seal facing ring mating surface treatment details				
13.5	Valve seal facing ring tapped holes treatment details				
13.6	Valve shaft bearing housing coating treatment details				
13.7	Valve interfaces coating treatment details				
14.0	**EMERGENCY FLOW SENSING SYSTEM**				
14.1	Emergency flow sensing system to be supplied		(Yes/No)		
14.2	Emergency flow sensing system type (provide details)				

Name of Supplier:	
Signature:	Date:

END OF DOCUMENT