



Assets Planning and Delivery Group  
Engineering

# Strategic Product Specification

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## SPS 262 High Performance Butterfly Valves

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VERSION 1  
REVISION 8  
MARCH 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 WSA 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.

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.

### Head of Engineering

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**REVISION STATUS**

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

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# Strategic Product Specification

## SPS 262

### High Performance Butterfly Valves

#### CONTENTS

<i>Section</i>	<i>Page</i>
<b>1</b>	<b>Scope and General ..... 10</b>
<b>1.1</b>	<b>Scope..... 10</b>
<b>1.2</b>	<b>Referenced Documents ..... 10</b>
<b>1.3</b>	<b>Definitions and Notation..... 12</b>
1.3.1	Australian Standards® ..... 12
1.3.2	Certificate..... 12
1.3.3	Certification Body..... 12
1.3.4	Certification Mark..... 12
1.3.5	Certification Scheme..... 12
1.3.6	Compliant Product ..... 12
1.3.7	Corporation ..... 12
1.3.8	Double Eccentric Butterfly Valve..... 12
1.3.9	Hydrodynamic Torque ..... 12
1.3.10	Manufacturer ..... 12
1.3.11	Notation..... 13
1.3.12	Officer ..... 13
1.3.13	Product ..... 13
1.3.14	Product Appraisal..... 13
1.3.15	Product Assessor ..... 13
1.3.16	Product Certification ..... 13
1.3.17	Product Verification Report ..... 13
1.3.18	Product Warranty ..... 13
1.3.19	Purchasing Schedule ..... 14
1.3.20	Quality System..... 14
1.3.21	Seal Retaining Ring ..... 14
1.3.22	Strategic Product..... 14
1.3.23	Strategic Product Appraisal Process ..... 14
1.3.24	Supplier ..... 14
1.3.25	Testing..... 14
1.3.26	Valve ..... 14

<b>1.4</b>	<b>Designation of Size .....</b>	<b>15</b>
<b>1.5</b>	<b>Allowable Operating Pressures and Flow Velocities .....</b>	<b>15</b>
<b>1.6</b>	<b>Service Pressures and Flow Velocities.....</b>	<b>15</b>
<b>2</b>	<b>Materials and Components .....</b>	<b>16</b>
<b>2.1</b>	<b>General.....</b>	<b>16</b>
<b>2.2</b>	<b>Stainless Steel.....</b>	<b>16</b>
<b>2.3</b>	<b>Weld Deposit Seat - Weld Overlays.....</b>	<b>16</b>
<b>2.4</b>	<b>Component Materials .....</b>	<b>16</b>
<b>2.5</b>	<b>Material Certification .....</b>	<b>17</b>
<b>3</b>	<b>Design and Manufacture .....</b>	<b>18</b>
<b>3.1</b>	<b>General.....</b>	<b>18</b>
<b>3.2</b>	<b>Valve.....</b>	<b>18</b>
<b>3.3</b>	<b>Design and Selection .....</b>	<b>18</b>
3.3.1	Mandatory Design Requirements.....	18
3.3.2	Design Calculations .....	18
3.3.3	Maximum Rated and Maximum Emergency Flow Velocities.....	18
3.3.4	End Connections .....	19
3.3.5	Adjacent Pipe Sizes.....	19
3.3.6	Weld Deposit Seat.....	20
3.3.6.1	Seat Preparation .....	20
3.3.6.2	Weld Deposit Overlay Seat – Extent of Overlay .....	20
3.3.6.3	Weld Deposit Overlay Seat – Weld Deposit Process.....	20
3.3.6.4	Weld Deposit Overlay Seat – Finishing.....	21
3.3.7	Seal Retaining Ring .....	21
3.3.8	Lifting Eyebolts.....	21
<b>3.4</b>	<b>Gearbox.....</b>	<b>21</b>
3.4.1	Gearbox Selection .....	21
3.4.2	Gearbox End-Stops .....	22
3.4.3	Direction of Rotation .....	22
3.4.4	Gearbox IP Rating.....	22
3.4.5	Gearbox Orientation.....	22
<b>3.5</b>	<b>Extended Spindle and External Spindle Tube.....</b>	<b>22</b>
3.5.1	Torque-limiting Device.....	23
3.5.2	Position Indicator .....	23
<b>3.6</b>	<b>Actuator .....</b>	<b>23</b>
<b>3.7</b>	<b>Lockout Devices.....</b>	<b>23</b>
3.7.1	Spindle Cap.....	23
3.7.2	Handwheel .....	23
3.7.3	Electric Actuator .....	23
<b>4</b>	<b>Protective Coating.....</b>	<b>24</b>
<b>4.1</b>	<b>General.....</b>	<b>24</b>
<b>4.2</b>	<b>Internal Coating .....</b>	<b>24</b>
<b>4.3</b>	<b>Valve.....</b>	<b>24</b>
4.3.1	Seat coating/sealing requirements.....	24
4.3.2	Tapped Holes .....	24
4.3.3	Shaft Bearing Housings .....	24

4.3.4	Interfaces.....	24
4.3.5	Buried Service Valves.....	24
<b>4.4</b>	<b>Inspection and Test Plan .....</b>	<b>25</b>
<b>5</b>	<b>Performance Tests.....</b>	<b>26</b>
<b>5.1</b>	<b>General.....</b>	<b>26</b>
<b>5.2</b>	<b>Notification of Testing .....</b>	<b>26</b>
<b>5.3</b>	<b>Access to the Place of Manufacture.....</b>	<b>26</b>
<b>5.4</b>	<b>Place of Manufacture other than WA .....</b>	<b>26</b>
<b>5.5</b>	<b>Production Tests.....</b>	<b>26</b>
5.5.1	Coating Test.....	27
5.5.2	Body Strength Test.....	27
5.5.3	Sealing Test.....	27
5.5.4	Reverse Sealing Test.....	27
5.5.5	Disc Strength Test.....	27
5.5.6	Free End Test .....	27
5.5.7	Gearbox/Shaft Strength Type Test.....	27
5.5.8	Operational Test.....	27
<b>5.6</b>	<b>Non-Destructive Manufacturing Tests.....</b>	<b>27</b>
<b>5.7</b>	<b>Inspection and Test Documentation.....</b>	<b>28</b>
5.7.1	ITP Documentation .....	28
<b>6</b>	<b>Marking and Packaging .....</b>	<b>30</b>
<b>6.1</b>	<b>Marking.....</b>	<b>30</b>
6.1.1	Body Markings.....	30
6.1.2	Secondary Marking .....	30
6.1.3	Direction of Closure for Hand-wheels and Caps .....	30
<b>6.2</b>	<b>Packaging.....</b>	<b>30</b>
6.2.1	General.....	30
6.2.2	Identification Tag.....	30
6.2.3	Marking of Packaging.....	31
<b>7</b>	<b>Manuals.....</b>	<b>32</b>
<b>7.1</b>	<b>Format and Language .....</b>	<b>32</b>
<b>7.2</b>	<b>Content.....</b>	<b>32</b>
<b>8</b>	<b>Spare Parts and Special Tools.....</b>	<b>33</b>
<b>8.1</b>	<b>Spare Parts.....</b>	<b>33</b>
8.1.1	Interchangeability.....	33
8.1.2	Availability.....	33
<b>8.2</b>	<b>Special Tools .....</b>	<b>33</b>
<b>9</b>	<b>Transportation, Handling and Storage.....</b>	<b>34</b>
<b>9.1</b>	<b>General.....</b>	<b>34</b>
<b>9.2</b>	<b>Preservation of Product in Storage .....</b>	<b>34</b>
<b>10</b>	<b>Quality Assurance.....</b>	<b>35</b>
<b>10.1</b>	<b>Certification.....</b>	<b>35</b>
10.1.1	Certification of Product.....	35
10.1.2	Quality System.....	35
10.1.3	Product Re-verification .....	35

<b>10.2</b>	<b>Compliance and Acceptance</b> .....	<b>35</b>
10.2.1	Means of Demonstrating Compliance.....	35
10.2.2	Acceptance Criteria.....	36
<b>10.3</b>	<b>Non-compliant Product</b> .....	<b>36</b>
10.3.1	General.....	36
10.3.2	Manufacturing Repairs (In-process) .....	36
10.3.3	Product Warranty .....	36
10.3.4	Product Repair.....	36
<b>11</b>	<b>Appendix A: Project Specific Requirements (Normative)</b> .....	<b>38</b>
<b>11.1</b>	<b>General</b> .....	<b>38</b>
<b>11.2</b>	<b>Project Requirements</b> .....	<b>38</b>
<b>12</b>	<b>Appendix B: Technical Compliance Schedules (Normative)</b> .....	<b>40</b>
<b>12.1</b>	<b>Compliance Schedules</b> .....	<b>40</b>
<b>13</b>	<b>Appendix C: Material Master Records (Informative)</b> .....	<b>47</b>
<b>14</b>	<b>Appendix D and E: Drawings (Informative)</b> .....	<b>48</b>
<b>14.1</b>	<b>Appendix D – Valve application Types</b> .....	<b>48</b>
<b>14.2</b>	<b>Appendix E – Valve locking device</b> .....	<b>48</b>

# 1 Scope and General

## 1.1 Scope

This Specification sets out requirements for the manufacture, supply, handling, testing and delivery of double-flanged, resilient **seal-on-disc**, high performance, double eccentric butterfly valves for waterworks purpose, and as further described in the following. The Specification also details the means by which compliance with the Specification shall be demonstrated and the criteria for acceptance of Product. Valves shall be in a new unused condition.

The high performance butterfly valves detailed in this Specification are designed for use in the typical application Types (Type A to F) shown in Appendix D, which may include buried service applications, and for pressure ratings up to PN35. This specification is not intended to cover general purpose or dam guard valves applications – refer Notes for further guidance.

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. 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.

### NOTES:

1. Butterfly valves for general purpose non-buried service, for pressure class  $\leq$  PN16 and 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 for pressure class  $\leq$  PN25 are specified in SPS 261, which references AS 4795.2 for double flanged seal-on-body type valves.
3. Butterfly valves for dam guard valve non-buried service, which may be required to close under extreme flow velocities, are specified in SPS 263, which references AS 4795.2 for double flanged seal on disc type valves.
4. The normal and maximum fluid velocity, against which the valve could be required to operate may be a key consideration in valve selection, manufacturer’s guidance should be used.

## 1.2 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

- 1565 Copper and Copper Alloys – Ingots and Castings
- 1646 Elastomeric seals for waterworks purposes
- 1831 Ductile cast iron
- 2074 Cast Steels
- 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
- 4795.1 Butterfly valves for waterworks purposes – Wafer and lugged
- 4795.2 Butterfly valves for waterworks purposes – Double flanged

### AS/NZS

- 1554.6 Structural steel welding set
- 3678 Structural steel - Hot-rolled plates, floorplates and slabs

4158 Thermal-bonded polymeric coatings on valves and fittings for water industry purposes

4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

#### **AS/NZS ISO**

9001 Quality management systems – requirements

#### **ASTM**

A276 Standard Specification for Stainless Steel Bars and Shapes

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**

26.41 Type Specification for an Electric Actuator for a Waterworks Valve

#### **ISO**

945 Microstructure of cast irons – Part 1 Graphitic classification by visual analysis.

1083 Spheroidal graphite cast irons – Classification.

#### **ISO/IEC**

17025 General requirements for the competence of testing and calibration laboratories

#### **EN**

571 Non-destructive testing. Penetrant testing. General principles

583 Non-destructive testing. Ultrasonic examination. Time-of-flight diffraction technique as a method for detection and sizing of discontinuities

1092-1 Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges

1092-2 Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 2: Cast iron flanges

1369 Founding – Magnetic particle testing

12454 Founding-Visual Examination of Surface Discontinuities-Steel Sand Castings

#### **SAA Guides**

HB18 Guidelines for Third-Party Certification and Accreditation

HB18.23 Guidelines for third-party certification and accreditation - Guide 23-Methods of (ISO/IEC) indicating conformity with standards for third-party certification systems

HB 18.28 Conformity assessment - Guidance on a third-party certification system for (ISO/IEC) products Guide 28)

#### **SPS**

260 Wafer and Lugged Butterfly Valves

261 Double Flanged Butterfly Valves for Waterworks Purposes

263 Butterfly Guard Valves

271 Gate valves for Waterworks Purposes – Metal Seated

272 Gate valves for Waterworks Purposes – Resilient Seated

### **Welding Specification**

WS-1 Metal arc welding

## **1.3 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.

### **1.3.1 Australian Standards®**

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

### **1.3.2 Certificate**

A formal certificate issued by a Certification Body in accordance with the third party product certification system described in HB 18 including associated Product licence schedules.

### **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 product Certification Schemes.

### **1.3.4 Certification Mark**

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

### **1.3.5 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.

### **1.3.6 Compliant Product**

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

### **1.3.7 Corporation**

The Water Corporation of Western Australia.

### **1.3.8 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.

### **1.3.9 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.

### **1.3.10 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.

### 1.3.11 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.

### 1.3.12 Officer

A duly authorised representative or appointed agent of the Corporation.

### 1.3.13 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 high performance butterfly 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.

### 1.3.14 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’

### 1.3.15 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).

### 1.3.16 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.

### 1.3.17 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.

### 1.3.18 Product Warranty

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

- In conformity with the nominated product specification and referenced standards;
- Fit for the nominated Product end use or application;

- Designed for sustained operation at the nominated service performance levels for the specified design life;
- Adequately packaged for intended transportation, handling and storage conditions;
- Supported by English language installation, operating and servicing instructions;
- 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.

### 1.3.19 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.

### 1.3.20 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.

### 1.3.21 Seal Retaining Ring

A ring used to retain and compress the seal on the disc.

### 1.3.22 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.

### 1.3.23 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.

### 1.3.24 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.

### 1.3.25 Testing

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

### 1.3.26 Valve

The term valve (or valves) referred to in this Specification shall mean double flanged, resilient seal-on-disc, high performance butterfly valve (or valves), their primary and secondary gearboxes, extended spindles and spindle tubes, and where specified electric actuators.

## 1.4 Designation of Size

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

## 1.5 Allowable Operating Pressures and Flow Velocities

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

**Table 1.1 – Classification and Rating for High Performance Butterfly Valves**

PN Class	Allowable Operating Pressure, kPa	Max. Allowable Operating Pressure, kPa	Allowable Site Test Pressure, kPa
16	1600	1920	2000
21	2100	2520	2625
25	2500	3000	3125
35	3500	4200	4375

**NOTE:** Maximum flow velocities required are shown in table 11.1 of this Specification. Manufacturer acceptance of project applicable maximum flow velocities must be confirmed.

## 1.6 Service Pressures and Flow Velocities

The pressures and velocities that the valve is expected to see in service are specified in Table 11.1 of this Specification.

## 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  $\leq 0.04\%$  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 Component 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. Materials are **subject to the accepted material / coating combinations** covered in section 4.

**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 $\geq 22$
Shaft and shaft extension	Stainless steel	ASTM A276	Grade with PREN $\geq 22$ , 431 (dry shaft design only)
Seals and O-rings	Synthetic elastomer	AS 1646	EPDM, NBR
Handwheel	Ductile cast iron	AS 1831	ISO 1083/JS/500-7/U; ISO 1083/JS/400-15/U
	Hot dip galvanized steel	AS/NZS 4680	-
Extended spindle external tube (for buried applications)	Stainless steel	ASTM A743	Grade with PREN $\geq 22$

The use of fabricated discs and pressed steel hand-wheels shall not be permitted. Bearing materials shall be strictly in accordance with AS4795.2 unless otherwise agreed in writing.

## 2.5 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 those requirements are varied in this Specification.

### 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 and when specified in Table 11 shall be suitable for flow regulating.

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

### 3.3 Design and Selection

#### 3.3.1 Mandatory Design Requirements

High performance valve applications are relatively 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, which forms an integral part of the Purchasing Schedule.

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.

#### 3.3.2 Design Calculations

Where specified in Table 11.1 of this Specification, the Manufacturer shall provide a summary of design calculations for the valve to the Corporation prior to any purchasing agreement being entered into. Calculations shall include but not be restricted to provision of the relevant shaft stresses, lifetime cycles and following hydro-dynamic torques in table form or as curves (0° to 90° disc opening):

- Valve maximum unseating torque at AOP.
- Valve hydrodynamic torque at the maximum emergency flow velocity.
- Actuator output torque required.

The Manufacturer shall indicate the basis used to develop this information (e.g. fluid dynamics modelling, flow testing, finite element analysis) and the relevant valve size applicable. The extent of extrapolation from the original valve size modelled to the related valve size shall be shown.

**NOTE:** Design calculations would only be required where the integrity of the valve was critical. E.g. for large valves, high flow velocities or high cycling requirements.

#### 3.3.3 Maximum Rated and Maximum Emergency Flow Velocities

Valves shall be double eccentric type, designed to operate continuously at the maximum continuous flow velocity and safely close into the maximum emergency flow velocity as specified in Table 11.1 of this Specification.

The hydro-dynamic torque required for emergency flow velocity closure of double eccentric valves may be relatively high. Accordingly, the actuator, drive train and valve shaft assembly shall be rated to safely withstand closure into the maximum emergency flow velocity without structural damage.

**NOTE:** 'Maximum emergency flow velocity' shall only be specified where valves may be required to close in such a scenario – e.g. trunk main burst pipe.

### 3.3.4 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.  $\geq$  DN 1400, PN25); flanges shall be compatible with EN 1092 or Corporation designed mating flanges (based on EN 1092-1);
- c) O-ring sealing of flanges shall not be permitted.
- d) Ring body style valves shall not be permitted;

### 3.3.5 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	1362
1600	1538
1800	1767
2000	2089

### 3.3.6 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. Seats shall be designed and executed as follows:

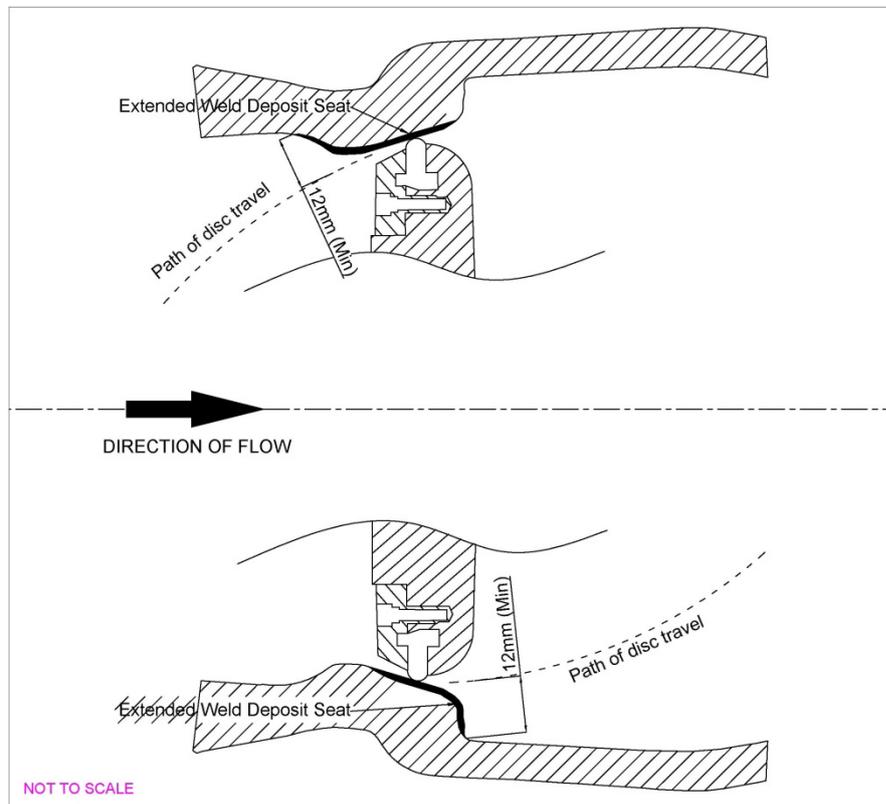
#### 3.3.6.1 Seat Preparation

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.

#### 3.3.6.2 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; as shown in the figure below.

**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, 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.

#### 3.3.6.3 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.

#### 3.3.6.4 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. Manual grinding of the weld using a hand-held tool is not permitted.

#### 3.3.7 Seal Retaining Ring

The seal retaining ring, and all fasteners and screws shall be made from corrosion resistant materials as required by section 2.

Unless specified otherwise in table 11.1, the Seal Retaining Ring shall be continuous, although provision for replacement of the ring in-situ may be required for larger valves ( $\Rightarrow$ DN1200).

Further to Clause 3.3.6(a) of AS 4795.2 the following shall apply:

- a) Seat retaining ring fasteners may be hexagon, socket head or countersunk
- b) Fasteners shall be locked and sealed from moisture ingress using a suitable proprietary thread-locking and sealing fluid.

#### 3.3.8 Lifting Eyebolts

Further to Clause 3.6 of AS 4795.2, the design of eyebolts and the connection to the valve body shall be designed and installed to:

- a) Lift the complete valve assembly including gearbox and any flanged matching pieces using one or more eyebolts under axial load.
- b) Where two or more eyebolts are used: ensure the lateral loading angle – i.e. the plane containing the eye of the eyebolt is parallel to the plane of the lifting sling to avoid lateral loading on the eyebolt (as per clause 4.8.1 in AS 2317.1).
- c) Permit lifting of the valve directly into position with the required flange orientation.
- d) Comply with AS 2317.1 or an equivalent recognised international standard, including marking with appropriate WLL, nominal size and thread type.

### 3.4 Gearbox

In addition to the requirements for actuators and gearboxes contained in Clauses 3.4 and 3.5 of AS 4795.2 the following shall apply:

#### 3.4.1 Gearbox Selection

The gearbox selection shall take into account (but not be limited to) the following requirements:

- (a) The gearbox and operator drive train shall be capable of withstanding the full stall torque of the actuator or 150% of the maximum torque required - to unseat the valve when subject to full unbalanced head at AOP.
- (b) The gearbox selection shall be based on lifetime cycles versus maximum output torque, e.g. 'gearbox lifetime characteristic curve' (curve), a copy of which shall be provided in tabular or graphical form for valves  $\geq$  DN 600. The lifetime cycles determined from the curve shall exceed the number of cycles appropriate 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.

**NOTES:**

1. One cycle relates to operating the valve from the closed to the fully open position and reverse, e.g. through 90 degrees of movement and return.
2. The gearbox lifetime characteristic curve is used to determine the lifetime cycles relative to the gearbox operating torque for the valve. The number of cycles attributed over the life of the valve depends on the application e.g. cycling once per day equates to ~ 18,000 lifetime cycles; twice per week is equivalent to ~ 5000 lifetime cycles etc. The vast majority of trunk-main valves will experience fewer than 1,000 lifetime cycles.

### 3.4.2 Gearbox End-Stops

The gearbox shall be fitted with end-stops which are integral, adjustable and capable of withstanding the greater of:

- An input torque of 250Nm
- The full stall torque of the actuator (where provided)

End-stops shall be set to ensure the correct disc position, following assembly of the valve.

For manually operated valves, disc end-of-travel position shall be within 1 degree of the pipe axis parallel and perpendicular positions, with the disc in the fully open and closed positions, respectively.

For electrically actuated valves, the ends stops shall be set at 1 degree past the valve disc fully open and closed positions – this is to ensure the disc position is set by the actuator and to avoid high stresses between the actuator and gearbox during normal operation.

### 3.4.3 Direction of Rotation

The valves and actuators shall be designed to close when the input shaft of the gearbox actuator or, where applicable the operator hand-wheel or key, is rotated anti-clockwise.

### 3.4.4 Gearbox IP Rating

Gearboxes shall have an Ingress Protection Rating (IP rating) equivalent to those defined in IEC/EN standard 60529.

Gearboxes for above ground valves shall have a rating of IP67 or higher.

Gearboxes for buried service valves and those mounted in below ground pits shall have a rating of IP68 based on possible submergence of 1.5m.

### 3.4.5 Gearbox Orientation

The gearbox, input shaft and actuator shall be located on the side of the valve as specified in Table 11.1 of this Specification and as viewed from upstream looking in the direction of flow.

**NOTE:** The Corporation's preferred gearbox orientation is for it to be located on the left-hand side of the valve when looking in the direction of flow. This is primarily to rationalize gearbox type for the Supplier. Orientation on the right-hand side may be accepted where required by space limitations or other factors.

## 3.5 Extended Spindle and External Spindle Tube

Further to Clause 3.4.4 of AS 4795.2 an extended spindle shall be provided where the operator is located remotely from the valve, e.g. pit service, or an extended spindle and external spindle tube for buried service.

Where the operator is unable to observe the valve mounted position indicator, e.g. pit service, or for an extended spindle application, the valve shall be supplied with a torque-limiting device and an additional position indicator in accordance with the following clauses.

The vertical distance from the valve Centre-line to the top of the valve spindle cap or handwheel shall be as specified in Table 11.1 of this Specification.

### 3.5.1 Torque-limiting Device

Manually operated valves  $\geq$ DN 600 incorporating an extended spindle shall be fitted with a torque-limiting device in accordance with Clause 3.3.11(b) of AS 4795.2 (refer note). The torque-limiting device shall be located above the position indicator.

For all electrically operated valves, torque limitation shall be provided within the electric actuator in accordance with the requirements of DS26.41 (refer clause 3.5 hereunder).

Torque limiting device settings shall be provided for each valve.

**NOTE:** A torque limiting device is required to protect the valve in the event that high torque is encountered in the travel range between the travel stops, e.g. in the event of the valve disc encountering an obstruction

### 3.5.2 Position Indicator

Manually operated valves with an extended spindle, or where the basic position indicator cannot be observed during manual operation, shall be fitted with an additional position indicator (remote) in accordance with Clause 3.3.12 of AS 4795.2.

Electrically operated valves shall have position indication provided within the electric actuator in accordance with the requirements of DS26.41 (refer clause 3.6 hereunder)

**NOTE:** Refer corporation standard drawings for buried service valve installations.

## 3.6 Actuator

Where specified in the Table 11.1 of this Specification the valve shall be fitted with either:

- a) A manually operated spindle key or handwheel, or
- b) An electric actuator complying with the relevant requirements of DS 26.41.

**NOTE:** Other actuator types may be specified by the Designer as required, e.g. hydraulic cylinder.

## 3.7 Lockout Devices

Valves shall be either fitted with lockout 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:

### 3.7.1 Spindle Cap

Spindle cap operators shall accommodate the Corporation's valve locking device in accordance with Drawing No EG20-11-2 attached at Appendix E of this Specification. The bottom plate of the locking device shall be capable of either being fitted under the spindle cap or alternatively locate into a groove in the body of the spindle cap. Other methods of accommodating the Corporation's valve locking device may be acceptable subject to approval by the Corporation.

### 3.7.2 Handwheel

Where the handwheel is the operator it shall be fitted with a pad-lockable lockout device.

### 3.7.3 Electric Actuator

Where the valve is electrically actuated it shall incorporate pad-lockable lockout devices in accordance with DS 26.41.

## 4 Protective Coating

### 4.1 General

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

### 4.2 Internal Coating

Valves shall be coated in accordance with Table 4.1:

**Table 4.1 Allowable Coating Combinations**

Option	Disc/Body Material	Disc Coating	Body Internal Coating
1A (Preferred)	Stainless Steel or Bronze disc with Ductile Iron body.	None	Fusion Bonded Epoxy (thermosetting) to AS 4158
1B	Stainless Steel or Bronze disc with Ductile Iron body.	None	Two-pack epoxy coating to AS 4795.2 Appendix D

Body external coating may be selected from any of the above.

Where practical for the coating process, flange faces shall be coated with a 50 µm inorganic zinc primer coating only.

### 4.3 Valve

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.

#### 4.3.1 Seat coating/sealing requirements

Where the valve body incorporates a weld-deposit seat, the coating shall overlap the seat to provide an effective barrier at the seat/body interface.

#### 4.3.2 Tapped Holes

Tapped holes in the disc shall be fully sealed during assembly to prevent ingress of moisture into the threads.

#### 4.3.3 Shaft Bearing Housings

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

#### 4.3.4 Interfaces

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

#### 4.3.5 Buried Service Valves

Buried service valves shall have a higher external coating performance than specified in AS 4795.2 Accordingly Section 4 Coatings of AS 4795 shall be modified to include the following additional requirement: The external coating of buried service valve bodies (excluding the gearbox) shall have no holidays and shall be subject to the same repair limitations and test requirements as for internal coatings complying with Table 3.3 of AS/NZS 4158.

## 4.4 Inspection and Test Plan

An inspection and Test Plan (ITP) for the valve, covering all process steps taken to ensure the design quality and integrity of the valve including the coating, and forming an integral part of the manufacturers quality system, shall be provided to The Corporation at the time of tender. Minimum ITP requirements are specified in Section 5.7.

## 5 Performance Tests

### 5.1 General

Valves shall be tested in accordance with Section 5: Performance Tests of AS 4795.2, except where varied in the following:

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 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 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

Valves shall be tested in accordance with:

- a) The relevant production test requirements of Section 5.3 of AS 4795,
- b) Tests which replace or modify existing tests in Section 5.3 of AS 4795 as specified in Clauses 5.5.1 to 5.5.6 and 5.5.8 of this Specification (as applicable).
- c) Additional test as specified in Clause 5.5.7 of this Specification (as applicable).
- e) Non-destructive tests as specified in Clause 5.67 of this Specification (as applicable).

**NOTES:**

1. The type tests specified in Section 5.2 of AS 4795.2 are “once off” tests required for product certification by a Certification Body e.g. to obtain Standards Mark or equivalent (refer also AS 4795.2 Clause 1.4.22). Currently only limited certification of butterfly valves (for sizes  $\leq$  DN 600) has been achieved by the manufacturers.
2. The production tests specified above are based on Section 5.3 of AS 4795.2 and are required to verify compliance with SPS 262 after manufacture. Additionally a gearbox strength type test and an operational test have been included.

### 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 Sealing Test

As per AS4795.2 Clause 5.3.3 Unchanged

### 5.5.4 Reverse Sealing Test

As per AS4795.2 Clause 5.3.4. Only where bi-directional sealing required.

### 5.5.5 Disc Strength Test

The disc strength test specified in Clause 5.3.5 of AS 4795.2 shall be applicable to valve sizes  $\geq$ DN 700 for one valve of each size and pressure class within the batch.

NOTE: This test may be waived subject to the Manufacturer providing documentary evidence of satisfactory completion of a test conducted for the Corporation on a valve of the same design, size and pressure rating.

### 5.5.6 Free End Test

The free end test specified in Clause 5.3.6 of AS 4795.2, Is not applicable or required.

### 5.5.7 Gearbox/Shaft Strength Type Test

The gearbox strength test shall be applicable to valve sizes  $\geq$ DN 700 for one valve of each size and pressure class within the batch.

Operate the valve from the fully closed to fully open position and record the number of turns of the input shaft and maximum input torque required during the operation.

With the disc temporarily fixed or wedged in a partially open position (refer Notes 2, 3), apply a torque in the closing direction of 50% greater than the PMOT to the gearbox input shaft for a period of 2 minutes.

At the conclusion of the test the valve shall be operated through to the fully open position and then fully closed. There shall be no distortion or damage and the valve shall run freely and smoothly. The maximum input torque required to operate the valve and the travel number of turns from the fully closed to fully open position shall be identical to the original values.

#### NOTES:

1. This test may be waived subject to the Manufacturer providing documentary evidence of a previously identical valve test conducted for the Corporation.
2. The method of restraining the disc is at the manufacturer's discretion; a number of soft wedges between the disc and seat are suggested.
3. The intention is to test the complete drive system including the valve shaft, keyway and disc pins. The disc is wedged partially open to ensure that the input torque acts on the drive train rather than the gearbox travel stops.

### 5.5.8 Operational Test

The operational type test specified in Clause 5.2.5 of AS 4795.2 shall be applicable to valve sizes  $\geq$ DN 700 for one valve of each size and pressure class within the batch. This test shall be carried out prior to the Sealing Test specified in Clause 5.3.3 of AS 4795.2.

## 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 to EN12454. All section changes and internal and external transitions shall be subjected to magnetic particle examination to EN 1369.
- b) For weld deposit seat overlays for seat rings, the following NDT requirements shall apply in lieu of Clause 5.3.7 of AS 4795.2:
  - For each valve - visual examination to EN12454 and dye penetrant testing to EN 571 Part 1 shall be undertaken on the machined valve body (prior to welding) and on the machined weld deposit seat;
  - The largest valve from each order – 100% Ultrasonic examination, to EN 583 Part 1, shall be carried out to confirm bonding and fusion between the machined weld overlay and the cast steel base metal.

## 5.7 Inspection and Test Documentation

### 5.7.1 ITP Documentation

For valves sizes  $\geq$ DN700 or where a significant number of valves are ordered, ITP documentation should be specified in Table 11.1.

The Manufacturer shall prepare an inspection quality plan (referred to as ITP) identifying relevant hold points and reporting requirements applicable to manufacture of the valves. 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 5.2 – Inspection and Test Documentation**

AS 4795.2 Clause	SPS 262 Clause	Test Type	Reporting Requirements
<b>Hold Point – Prior to Manufacture</b>			
3.1	-	Check drawing, materials, gearbox selection against purchase specification	R - Each valve size and type
	4.4	Check Inspection and Test Plan in accordance with this Table	R - Each order
	3.3.2	Check design calculations	R - Where specified in Table 11.1 (Critical Valves)
<b>Hold Point – Prior to Dispatch</b>			
-	2.5	Check Material Certificates	R - 5 components, each valve type
	3.3.4	End connections	I – Each valve
	3.3.6.2	Weld deposit seat – extent of overlay	I – Each valve
	3.3.8	Lifting eyebolts	I - Each valve

AS 4795.2 Clause	SPS 262 Clause	Test Type	Reporting Requirements
	3.4.2	Correct position of disc in the open and closed positions	I - Each valve
	3.4.3	Gearbox direction to close	I – Each valve
	3.4.5	Gearbox orientation	I – Each valve
5.3.1	5.5.1	Coating thickness / continuity	R - Each valve
5.3.2	5.5.2	Body strength test, 1.5 x AOP	R – Each valve
5.3.3	5.5.3	Sealing test, 1.1 x AOP	R – Each valve (Note 1)
5.3.4	5.5.4	Reverse sealing test, 1.1 x AOP	R – Each valve where specified
5.3.5	5.5.5	Disc strength test, 1.5 x AOP	R – Each type and size $\geq$ DN 700 (refer Note 2)
-	5.5.7	Gearbox /Shaft strength type test, 1.5 x PMOT	R – Each type and size $\geq$ DN 700 (refer Note 2)
5.2.5	5.5.8	Operational test	R - one valve of each size and pressure class within the batch for $\geq$ DN 700
5.3.7	5.6	Non-destructive manufacturing tests <ul style="list-style-type: none"> <li>• Dye pen test on machined body and seat bed</li> <li>• Ultrasonic Examination of seat</li> </ul>	R – Each valve R – Largest valve per order
-	5.7	Final ITP / Documentation check and valve inspection.	R – Each valve

**LEGEND:** I - Inspection - Manufacturer Internal Quality Assurance;  
 R – Reporting requirement to the Corporation

**NOTES:**

1. Seating and unseating torques for valves  $\geq$  DN 700 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 previous test on a valve/gearbox of the same design, size and rating.

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. Separate test certificates shall be provided for all valve sizes  $\geq$ DN 700.

## 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

Each valve shall have the following cast on the body of the valve or engraved on a stainless steel nameplate or permanent label:

- a) Manufacturer's name or trademark
- b) Nominal size (DN)
- c) Year of manufacturer
- d) Pressure Class (PN)
- e) An arrow denoting flow direction
- f) AS4795.2
- g) Serial number
- h) Gear ratio
- i) Operator type e.g. BV (Manual BV) or EBV (electrical BV)
- j) Water Corporation Valve Number
- k) Mass of valve in kilograms.

#### 6.1.2 Secondary Marking

For non-buried valves with extended spindles, an identical identification plate shall be attached to the spindle enclosure tube engraved with the same information as listed in Section 6.1.1 above.

For buried service valves, the identification plate shall be supplied with the valve and attached temporarily to the spindle extension tube.

NOTE: The additional identification plate attached to the enclosure tube is required to facilitate mating of the body to the correct enclosure tube and extended spindle assembly and to be installed permanently above ground for visual identification of the valve details.

#### 6.1.3 Direction of Closure for Hand-wheels and Caps

Further to Clause 6.2 of AS 4795.2 hand-wheels and spindle caps shall be marked for anti-clockwise closing.

### 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

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) Water Corporation Valve Number
- b) Contract number

c) Purchase order number.

Where valves are ordered with extension spindles, both the valves and the spindles are to be tagged with matching identification numbers.

### **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**

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) Drawing with Bill of Materials
- h) Complete list of parts and associated exploded views or sectional diagrams and reference part numbers.

## **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.

## **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.

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.

**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:

- 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 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.

## 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 REQUIREMENTS**

Clause	Item	Requirement/ Value
	Valve identifier/Description	
1.1	Application Type (A,B,C,D,E or F refer Appendix D)	
1.4	Nominal size DN	
1.5	Pressure class PN	
1.6	Maximum upstream pressure kPa	
1.6	Maximum pressure differential kPa	
1.6	Maximum downstream pressure kPa	
3.2	Flow Isolation – Unidirectional / Bidirectional (Uni / Bi)	
3.2	Application Duty – Isolation / Isolation and Regulating (I / I&R)	
3.3.1/.4.1	Frequency of operation - /day or /year	
3.3.1/.4.1	Lifetime Cycles	
3.3.1/.4.1	Opening/closing time	
3.3.3	Maximum continuous flow velocity m/s	
3.3.3	Maximum emergency flow velocity m/s	
3.3.4	Flange standard compatibility e.g. AS 4087, EN1092 etc.	
3.3.5	Adjacent Pipe Internal Diameter mm	
3.3.7	Seat Retaining Ring – One piece / Sectional	
3.4.3	Direction of Rotation to close	ACW
3.4.4	Gearbox IP Rating – IP67 or IP68	
3.4.5	Gearbox orientation facing downstream – L (normally) / R	
3.5	Extended spindle required (Manual/electric actuator) Y/N	Yes/No

3.5	Extended spindle - distance from valve centreline to top of spindle cap hand-wheel or electric actuator mm (Note 1,2)		
3.5.1 3.5.2	Torque limiting device and remote position indicator required (manual/electric actuator) Y/N		
3.6	Actuator type	Manual - Spindle cap or Hand-wheel	
		Electric Y/N	
3.7	Lockout device required		Yes
	Support feet required Y/N		
5.1	Witness testing required Y/N		
5.2	Prior notification period to appoint testing officer and arrange travel approvals. Days		
5.5.5	Disc strength test required Y/N		
5.5.7	Gearbox strength type test required Y/N		
5.5.8	Operational test required Y/N		
5.6	Non-destructive manufacturing tests required Y/N		
5.7	Inspection and test documentation	Inspection quality plan (ITP) required Y/N	
		Valve test certificates required	Yes
7	Manuals (Section 7)	Electronic copy required	Yes
		Number of hard copies required	

**NOTES:**

**1. Calculation for extended spindle - buried service valve with spindle cap operator:**

Provide the distance from valve centreline to finished surface level (FSL) minus 125 mm (to the top of spindle cap) e.g. FSL should be 125 mm ±25 mm above the spindle cap.

**2. Calculation for extended spindle - buried or pit service valves with handwheel or electric actuator:**

Provide the distance from valve centreline to finished surface level plus 900 mm (to the top of the manual handwheel or electric actuator handwheel) e.g. FSL should be 900 ±150 mm below the handwheel.

**3. Minimum period required for notification of tests:**

As a minimum travel approval may take 7 days for travel within Australia or 3 weeks for overseas travel.

# 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 whereas Table 12.1B refers to additional clauses contained in SPS 262. 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 -TECHNICAL COMPLIANCE SCHEDULE 1A**

High Performance Butterfly Valves					
Section/Clause		Noted	Compliance		Comments
			Yes	No	
<b>1. SCOPE AND GENERAL</b>					
1.1	Scope				
1.2	Application				
1.3	Normative References				
1.4	Definitions				
1.5	Designation of Size				
1.6	Allowable Operating Pressures				
<b>2. MATERIALS AND COMPONENTS</b>					
2.1	General				
2.2	Corrosion-Resistant Materials				
2.3	Contamination of Water				
2.4	Elastomeric Components				
<b>3. DESIGN</b>					
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 and Key				
3.4.4	Extension Spindle				
3.5	Gearboxes				
3.6	Lifting Devices				
3.7	Fasteners				
<b>4. PROTECTIVE COATINGS</b>					
4.1	General				
4.2	Components				
4.3	Continuous Immersion				
<b>5. PERFORMANCE TESTS</b>					
5.3.1	Coating Test				
5.3.2	Body Test				
5.3.3	Seating Test				
5.3.4	Reverse Seating Test				
<b>6. MARKING AND PACKAGING</b>					
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				

**TABLE 12.1B: SPS 262 - TECHNICAL COMPLIANCE SCHEDULE 1B**

<b>High Performance Butterfly Valves</b>					
Section/Clause		Noted	Compliance		Comments
			Yes	No	
<b>1. SCOPE AND GENERAL</b>					
1.1	Scope				
1.2	Referenced Documents				
1.3	Definitions and Notation				
1.4	Designation of Size				
1.5	Allowable Operating Pressures and Flow Velocities				
<b>2. MATERIALS AND COMPONENTS</b>					
2.1	General				
2.2	Stainless Steel				
2.3	Weld Deposit Seat – Weld Overlay				
2.4	Component Materials				
2.5	Material Certification				
<b>3. DESIGN AND MANUFACTURE</b>					
3.1	General				
3.2	Valve				
3.3	Design and Selection				
3.3.1	Mandatory Design Requirements				
3.3.2	Design Calculations				
3.3.3	Maximum Rated and Maximum Emergency Flow Velocities				
3.3.4	End Connections				
3.3.5	Adjacent Pipe Sizes				
3.3.6	Weld Deposit Overlay Seat				
3.3.6.1	Weld Deposit Overlay Seat - Seat Preparation				
3.3.6.2	Weld Deposit Overlay Seat - Extent of Overlay				
3.3.6.3	Weld Deposit Overlay Seat - Weld Deposit Process				
3.3.6.4	Weld Deposit Overlay Seat - Finishing				
3.3.7	Seal Retaining Ring				
3.3.8	Lifting Eyebolts				
3.4	Gearbox				
3.4.1	Gearbox Selection				
3.4.2	Gearbox End-Stops				
3.4.3	Direction of Rotation				
3.4.4	Gearbox IP Rating				
3.4.5	Gearbox Orientation				
3.5	Extended Spindle and External Spindle Tube				
3.5.1	Torque-Limiting Device				

3.5.2	Position Indicator				
3.6	Actuator				
3.7	Lockout Devices				
3.7.1	Spindle Cap				
3.7.2	Handwheel				
3.7.3	Electric Actuator				
<b>4. PROTECTIVE COATING AND WRAPPING</b>					
4.1	General				
4.2	Internal Coating				
4.3	Valve				
4.3.1	Seat Coating /Sealing				
4.3.2	Tapped Holes				
4.3.3	Shaft Bearing Housings				
4.3.4	Interfaces				
4.3.5	Buried Service Valves				
4.4	Coating Inspection and Test Plan				
<b>5. PERFORMANCE TESTS</b>					
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	Sealing Test				
5.5.4	Reverse Sealing Test				
5.5.5	Disc Strength Test				
5.5.6	Free End Test				
5.5.7	Gearbox Strength Type Test				
5.5.8	Operational Type Test				
5.6	Non-Destructive Manufacturing Tests				
5.7	Inspection and Test Documentation				
5.7.1	ITP Documentation				
<b>6. MARKING AND PACKAGING</b>					
6.1	Marking				
6.1.1	Body Markings				
6.1.2	Secondary Marking				
6.1.3	Direction of Closure for Handwheels and Caps				
6.2	Packaging				
6.2.1	General				
6.2.2	Identification Tag				
6.2.3	Marking of Packaging				
<b>7. MANUALS</b>					
7.1	Format and Language				
7.2	Content				
<b>8. SPARE PARTS AND SPECIAL TOOLS</b>					
8.1	Spare Parts				
8.1.1	Interchangeability				
8.1.2	Availability				
8.2	Special Tools				
<b>9. TRANSPORTATION, HANDLING AND STORAGE</b>					
9.1	General				
9.2	Preservation of Product in Storage				
<b>10. QUALITY ASSURANCE</b>					
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				
<b>11. APPENDIX A</b>					
11.1	General				
11.2	Project Requirements				
<b>12. APPENDIX B</b>					
12.1	Compliance Schedules				
<b>13. APPENDIX C</b>					
13.1	Material Master Records				
<b>14. APPENDIX D, E</b>					
14.1	Valve Application Types				
14.2	Valve Locking Device				

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**

<b>High Performance Butterfly Valves</b>	
<b>1. SUPPLIER'S REPRESENTATIVE</b>	
1.1	Full name
1.2	Postal address
1.3	Facsimile number
1.4	Email address
1.5	Phone number
1.6	Mobile number
<b>2. QUALITY ASSURANCE</b>	
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)
<b>3. TECHNICAL INFORMATION</b>	
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	Table or curve for lifetime cycles versus maximum output torque provided (Yes/No)
3.5	Details of servicing facilities in Perth supplied. (Yes/No)
3.6	Additional pamphlets and drawings in conjunction with the technical literature supplied. (Yes/No)
<b>4. VALVE DESIGN AND MANUFACTURE</b>	
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(s) rated for full end-of-line service without restraint at the free end. (Yes/No)
4.7	Flanges, valve body and components are all the same rating (Yes/No)
4.8	Valve lifetime design cycles
4.9	Mass of valve (with actuator as applicable) kg
4.10	Flange standard compatibility and PN rating
4.11	Valve and gearbox IP Rating
4.12	Actuator Type – Manual: cap or handwheel; electric; hydraulic
4.13	Valve AOP
4.14	Valve maximum rated flow velocity m/s
4.15	Valve maximum emergency flow velocity m/s
4.16	Valve maximum differential pressure kPa
4.17	Coating test applied voltage V
4.18	Body strength test kPa
4.19	Sealing test kPa
4.20	Disc strength test kPa
4.21	Free end test kPa
4.22	Gearbox strength type test Nm
4.23	Operational test kPa
4.26	Flow coefficient (max opening) Kv
4.27	Valve unseating torque Nm
4.28	Published maximum operating torque (PMOT ) Nm

5.0	VALVE MATERIALS	MATERIAL	STANDARD	GRADE
5.1	Body			
5.2	Weld Deposit Seat Overlay			
5.3	Disc			
5.4	Shaft			
5.5	Shaft bearings			
5.6	Resilient seal (disc seal)			
5.7	Seals and O-rings			
5.8	Disc pins			
5.9	External fasteners			
5.10	Extended input spindle			
5.11	External spindle tube			
5.12	Coating type - body			
5.13	Coating type- extended input spindle tube			
5.14	Alternative materials offered are equivalent or better than materials specified in Table 2.1 of AS 4795.2	(Yes/No or N/A)		
6.0	GEARBOX (Primary)			
6.1	Manufacturer			
6.2	Model/Type			
6.3	Gearing type			
6.4	Published maximum output torque (PMOT)	Nm		
6.5	Input torque for valve PMOT	Nm		
6.6	Torque rating $\geq 150\%$ of valve PMOT (for $\geq DN 700$ )	Nm		
6.7	Torque rating of gearbox travel stops	Nm		
6.8	Location of travel stops e.g. input shaft or quadrant			
6.9	Gear ratio			
6.10	Efficiency			
6.11	Mechanical advantage			
6.12	Type of gear reduction e.g. worm/quadrant, spur etc.			
6.13	Stroke (degrees of travel e.g. $-5^\circ$ to $95^\circ$ )			
6.14	Enclosure rating (IP rating to AS 60529)			
6.15	Mounting flange standard e.g. ISO 5211			
6.16	Materials:	STANDARD	MATERIAL	GRADE
	• Body and cover			
	• Shaft			
	• Quadrant			
	• Worm			
	• Bearings			
	• Fasteners			
	• Gaskets and O-rings			
	• Coating			
6.17	Lubricant			
6.18	Orientation			
7.0	MANUAL ACTUATOR (Secondary as required)			
7.1	Manufacturer			
7.2	Model/Type			
7.3	Gearing Type			
7.4	Published maximum output torque (PMOT)	Nm		
7.5	Input torque for valve at PMOT	Nm		
7.6	Torque rating $\geq 150\%$ of valve PMOT (for $\geq DN 700$ )	Nm		
7.7	Gear ratio			
7.8	Efficiency			
7.9	Mechanical advantage			
7.10	Type of gear reduction e.g. worm/wheel, spur etc.			

7.11	Stroke (degrees of travel e.g. -5° to 95°)			
7.12	Enclosure rating (IP rating to AS 60529)			
7.13	Mounting flange standard e.g. ISO 5211			
7.14	Materials:	STANDARD	MATERIAL	GRADE
	• Body and cover			
	• Shaft			
	• Gears			
	• Gear			
	• Bearings			
	• Fasteners			
	• Gaskets and O-rings			
	• Coating			
7.15	Lubricant			
7.16	Orientation			
<b>8.0</b>	<b>INPUT AT HANDWHEEL/CAP</b>			
8.1	Number of handwheel turns from valve fully open to fully closed			
8.2	Direction of handwheel rotation to close valve (from above)			
8.3	Spindle cap method of accommodating valve locking device			
<b>9.0</b>	<b>POSITION INDICATOR</b>			
9.1	Manufacturer			
9.2	Model			
9.3	Scale Marking e.g. fully open, intermediate and fully closed			
9.4	Enclosure rating in accordance with AS 60529			
<b>10.0</b>	<b>TORQUE LIMITING DEVICE</b>			
10.1	Manufacturer			
10.2	Model			
10.3	Torque setting			
<b>11.0</b>	<b>INPUT STOP</b>			
11.1	Manufacturer			
11.2	Model			
11.3	IP Enclosure rating in accordance with AS 60529			
<b>12.0</b>	<b>ELECTRIC ACTUATOR</b>			
12.1	Manufacturer			
12.2	Model			
12.3	Enclosure of protection rating IP			
12.4	Motor size		kW	
12.5	Motor full load current		A	
12.6	Motor rated voltage		V	
12.7	Motor starting current		A	
12.8	Motor efficiency – Full load		%	
12.9	Power factor – Full load			
12.10	Motor duty (Number of starts per hour)			
12.11	Operating time valve open to valve closed		secs	
12.12	DS26-41 Type Specification for Electric Actuator completed and attached.			(Yes/No)

Name of Supplier:

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Signature:

Date:

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## 13 Appendix C: Material Master Records (Informative)

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.

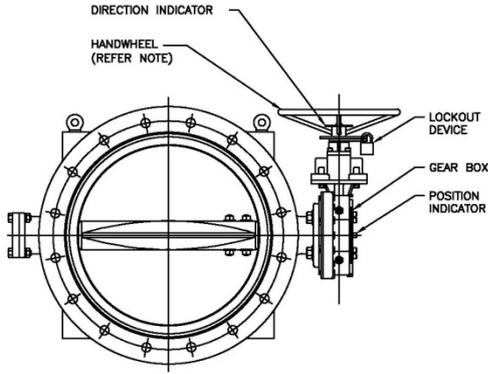
**NOTE:** These valves are considered to require engineering input to facilitate proper design and selection and therefore allocation of MMR numbers will not form part of this Specification.

## **14 Appendix D and E: Drawings (Informative)**

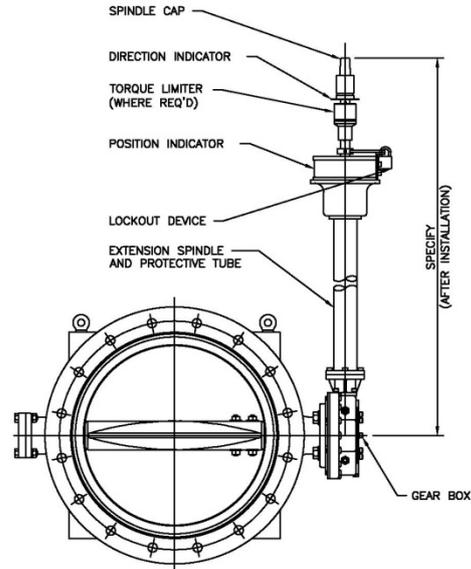
### **14.1 Appendix D – Valve application Types**

### **14.2 Appendix E – Valve locking device**

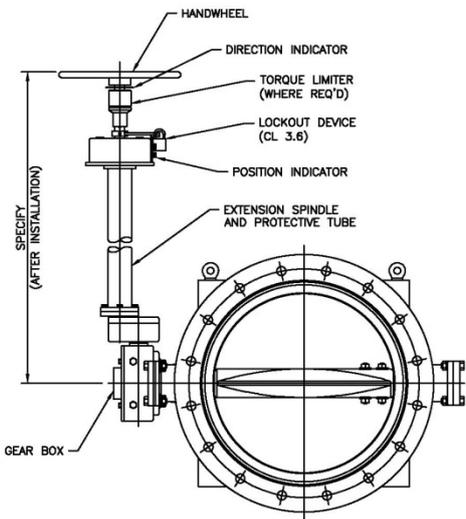
APPENDIX D



OPTION – TYPE A  
 ABOVE GROUND – LEVER/HANDWHEEL

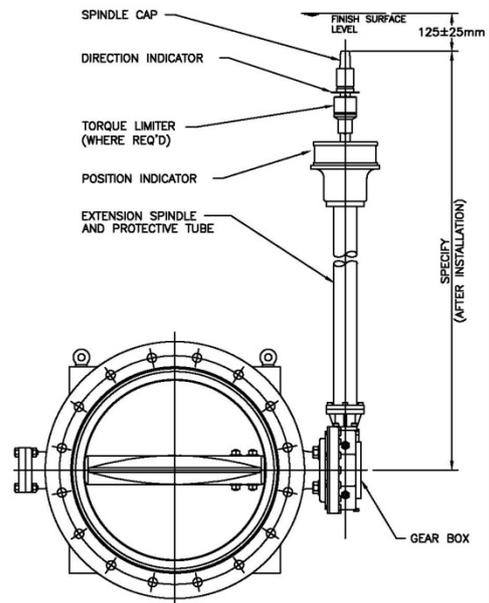


OPTION – TYPE B  
 ABOVE GROUND – SPINDLE CAP  
 & EXTENSION SPINDLE



NOTE:  
 1. CLAUSE REFERENCE RELATED TO SPS 261

OPTION – TYPE B  
 ABOVE GROUND – HANDWHEEL  
 & EXTENSION SPINDLE

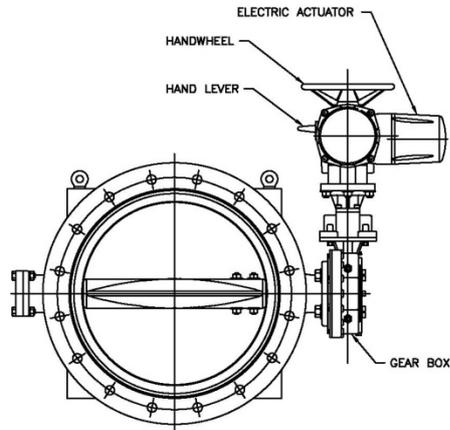


NOTE:  
 VALVE POSITION INDICATOR HOUSING BY OTHERS

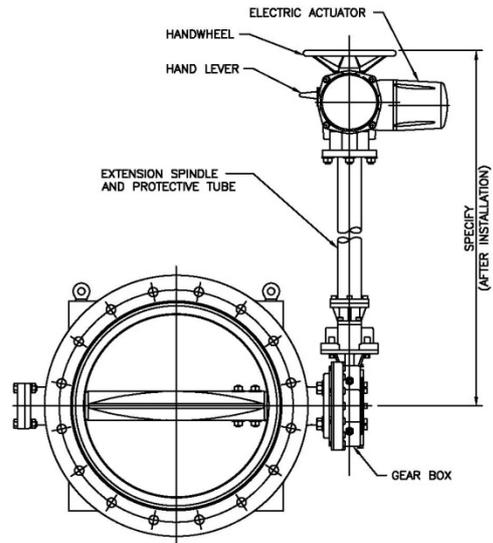
OPTION – TYPE C  
 BELOW GROUND – SPINDLE CAP  
 & EXTENSION SPINDLE

THIS DRAWING DERIVED FROM FS04-261

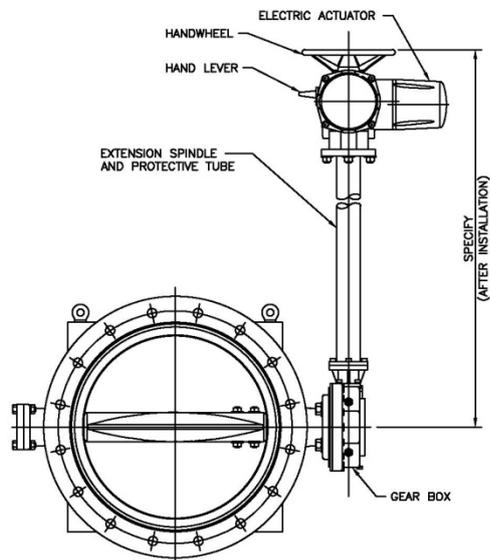
APPENDIX D (CONT'D)



OPTION – TYPE D  
 ABOVE GROUND – ELECTRIC ACTUATOR



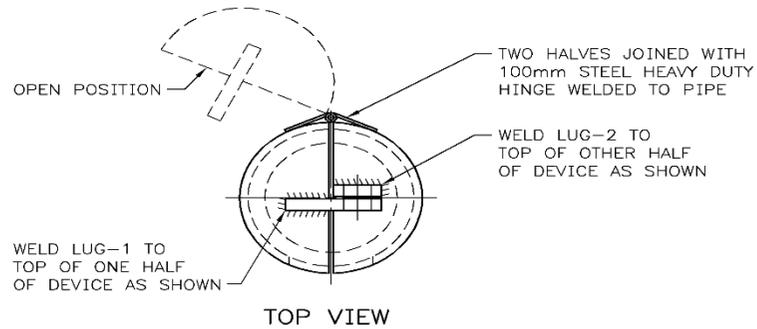
OPTION – TYPE E  
 ABOVE GROUND – ELECTRIC ACTUATOR &  
 EXTENSION SPINDLE



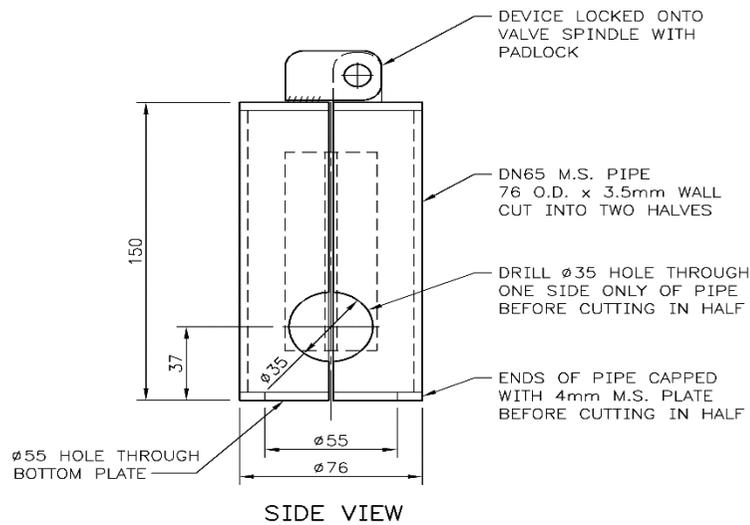
OPTION – TYPE F  
 BELOW GROUND – ELECTRIC ACTUATOR &  
 EXTENSION SPINDLE

THIS DRAWING DERIVED FROM FS04-261

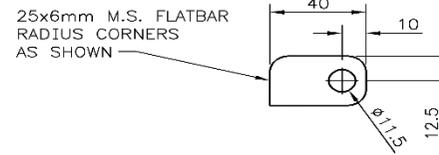
APPENDIX E



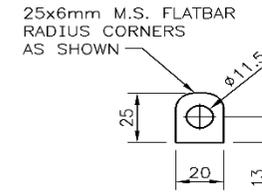
TOP VIEW



SIDE VIEW



LUG-1 DETAIL



LUG-2 DETAIL

VALVE LOCKING DEVICE SHALL BE USED IN CONJUNCTION WITH WATER CORPORATION LOCK AND TAG PROCEDURE "WC-OSH (109)"

GENERAL NOTES

1. UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE IN MILLIMETRES.
2. PAINT WITH INORGANIC ZINC SILICATE AFTER MANUFACTURE.

THIS DRAWING IS DERIVED FROM DRAWING EG20-11-2

**END OF DOCUMENT**