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TABLES

1. INTRODUCTION

This document specification supersedes GGSS 0423 and serves as the Eskom standard for specification, requirements and quality control measures for replacement or procurement of new isolation valves, non-return valves, standard hydraulically operated and self-regulated and pressure relief valves in low pressure and temperature systems as used in and procured for the Eskom fleet (Power Plants). The document specifies the minimum requirements and criteria that these valves are to comply with during design, manufacturing, installation and maintenance. This specification can also be used for refurbishment of such valves.

2. SUPPORTING CLAUSES

2.1 SCOPE

This specification covers the minimum requirements for the design, manufacture, inspection, testing and supply of valves at Eskom Power Stations on low pressure systems. The specification covers both new installations and replacement/refurbishment applications.

For the purposes of this standard, Low Pressure Valves are defined as valves that operate at less than 100°C and less than or equal to 2.0 MPa.

The requirements for low pressure valves in this document constitute a minimum standard which may be exceeded at the discretion of the Eskom Engineer.

This specification is not exhaustive insofar as detailed Items are concerned. The design of any item not mentioned is left to the discretion of the valve supplier or manufacturer, provided it is within the sound engineering practice or according to a relevant standard. It will then be for the acceptance of the Eskom Engineer.

There are two separate main groups of valves considered in the scope of this document:

Group A

Firstly, the normal cast iron and ductile iron products (which includes products such as butterfly valves, knife gates, resilient seal gate valves and certain non-return valves). The following valves are included:

Butterfly valve sizes up to but not including 600 NB. (Butterfly valve sizes 600 NB and larger, see 240-63094243 Standard for large bore resilient seal Butterfly valve for use as Cooling water Isolation valvesWedge gate (Flexi, equi and solid wedge) up to PN16.

- Non return valves (single door, double door, disc check, ball check, lift check etc.) all configurations.
- Resilient seal gate valves are all included up to 600mm.
- Flanged ball valves with resilient seats, such as PTFE, RTFE.
- Air release and vacuum breakers.
- Safety relief valves to maximum PN 16 rated.
- Pressure sustaining valves.
- Pressure reducing valves
- Diaphragm valves straight through (KB type) and weir (Type A).
- Pinch valves (closed and open cage).
- Plug valves (both lined and lubricated).
- Globe valves with screwed, flanged or welded ends.
- Penstock valves.
- Butterfly valves both wafer and lugged design

Group B

These are carbon steel or stainless-steel bodied valves and does not include cast iron or ductile Iron. This class rating will be up to and including ASME B16.34 class 150. Or PN 20 to BS5155, SABS1123 or ISO5752

They include but are not limited to general purpose ball valves typically with BSPT, BSPP, NPT, and Socket weld or butt weld ends. These are normally used in general water, oil and gas applications and are rated to 6.9 MPa. Valve body material for these is normally forged carbon steel ASTM A105 or Stainless steel 316/304 or as equivalent stainless-steel castings CF8(M), CF3(M), but the soft seats are normally of PTFE. These valves are used extensively on Low Pressure services systems.

Wedge, parallel slide, knife gate valves, safety relief valves, vacuum breakers and air vents in non-ductile / cast iron are also included

2.2 EXCLUSIONS

Specifically excluded from this specification are:

- Valves used for control purposes, other than the self-regulating pressure reducing and pressure sustaining valves as mentioned in Group A.
- Valves used in circuits containing flammable or explosive gases.(See 240-56227413 Hydrogen System Specification)
- Instrumentation and normal solenoid operated valves are also excluded.
- Fire Protection and Life safety. (See 240-54937450 Fire Protection & Life Safety Design Standard

2.2.1 Purpose

The purpose of this specification is to define and clarify minimum requirements and provide for the standard criteria of low-pressure valves and valve spares used in Eskom, to ensure maximum life expectancy and reliability and consistent quality and technical design.

The intention is that Suppliers should continuously adhere to Eskom requirements in respect of the supply of the relevant products.

2.2.2 Applicability

This standard applies to all Eskom employees, Business entities, Valves Suppliers and Contractors involved in Eskom new build projects and operating and maintenance programme on existing facilities (including activities such as plant refurbishment, engineering, procurement, manufacturing, installation, and commission works), however it excludes nuclear power plants.

This document is applicable to the Eskom Generation for the specification and procurement of low-pressure valves as installed in water, dust handling, slurry, chemical services and other auxiliary circuits.

This standard is applicable to all valve applications in the LP services as installed in Eskom be it new, refurbishment or replacement of existing valves. The Standard is also applicable where Eskom acts as project engineer, architect engineer as well as where Eskom appoints a third-party contractor/consultant to execute scope of work on their behalf (turnkey projects).

2.3 NORMATIVE/INFORMATIVE REFERENCES

In general, for ease of compatibility with existing pipelines installed in the Eskom fleet, SANS, BS, EN,ASME or ISO standards shall be preferred to other international standards. For refurbishment the plant design code will be made available by Eskom to the contractor

2.3.1 Normative

The following documents are referenced in the text. At the time of publication, the editions indicated were valid. All documents are subject to revision, and users of this standard are advised to use the latest editions of the documents listed below.

[1] Pressure equipment regulations as defined by OHS Act of 1983.

[2] 240-101712128 Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings

[3] 240-55864833 Chemistry for Auxiliary and Ancillary Cooling Water Systems Manual

[4] 240-56241933 Control of welding during construction, repair and maintenance activities standard

[5] 240-63094243 Standard for large bore resilient seal Butterfly valve for use as Cooling water Isolation valves

[6] 240-63154109 Standard for large bore metal seated Butterfly valve for use as Cooling water Isolation valves

[7] 240-71432150 Plant Labelling and Equipment Description Standard

[8] 240-86546783 Procurement Standard for Material Certification Requirements Applicable To Metallic Products Used on Low and Medium Pressure Applications

[9] API 598 Valve Inspection and Testing

[10] ASME/ANSI B16.34 Valves, Flanged, Threaded and Welded ends

[11] ASME/ANSI B16.47 Large Diameter Steel Flanges NPS26 through NPS 60 metric/inch standard.

[12] BS 10 Specification for flanges and bolting for pipes, valves and fittings

[13] BS EN 558 Industrial valves – Face-to-face and centre-to-face dimensions of metal valves for use in flanged pipe systems – PN and Class designated valves

[14] BS 5154:1991 Specification for copper alloy globe, globe stop and check, check and gate valves.

[15] BS 5353 Specification for steel plug valves.

[16] BS EN 593 Industrial valves - Metallic butterfly valves

[17] BS EN 1092-1: Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Part 1: Steel flanges

[18] BS EN 1092-2 Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Part 2. Cast iron flanges

[19] BS EN 1092-3 Flanges and their joints. Circular flanges for pipes, valves, fittings and accessories, PN designated. Part 3. Copper alloy flanges

[20] BS EN 1983 Industrial valves - Steel ball valves

[21] BS EN 1984 Industrial valves – Steel gate valves

[22] ISO 5211 - Industrial valves -- Part-turn actuator attachments

[23] ISO 5210 – Multi turn valve actuator attachments

[24] BS EN 10204 Metallic Products - Type Of Inspection Documents

[25] BS EN 12288 Industrial valves. Copper alloy gate valves

[26] BS EN 12516-1 Industrial valves — Shell design strength Part 1: Tabulation method for steel valve shells

[27] BS EN 12516-1 Industrial valves — Shell design strength Part 4: Calculation method for valve shells manufactured in metallic materials other than steel

[28] BS EN 13397 Industrial valves. Diaphragm valves made of metallic materials

[29] BS EN ISO 4126-1 Safety devices for protection against excessive pressure. Safety Valves.

[30] BS EN ISO 4126-4 Safety devices for protection against excessive pressure. Pilot-Operated Safety Valves.

[31] BS EN ISO 10497:2010 Testing of valves. Fire type-testing requirements

[32] BS ISO 7121 Steel ball valves for general-purpose industrial applications

[33] BS ISO 10631 Metallic Butterfly valves for general purposes

[34] ISO 5211 Industrial valves -- Part-turn actuator attachments

[35] ISO 9001 Quality Management Systems.

[36] OSH Act Occupational Health and Safety Act 85 of 1993

[37] Occupational Health and Safety Act, 1993 (Act No. 85 of 1993);, Pressure Equipment Regulations

[38] QM-58, Supplier Contract Quality Requirements

[39] SANS 191 Ed. 2.02 Cast steel gate valves

[40] SANS 347, Categorization and conformity assessment criteria for all pressure Equipment

[41] SANS 664-1 Wedge Gate and Resilient Seal Valves for Waterworks Part 1: General

[42] SANS 664-2 Wedge Gate and Resilient Seal Valves for Waterworks Part 2:Wedge gate valves

[43] SANS 664-3 Wedge Gate and Resilient Seal Valves for Waterworks Part 3:Resilient seal valves

[44] SANS 665-1 Wedge gate and resilient seal valves for general purposes – Part 1: General.

[45] SANS 665-2 Wedge gate and resilient seal valves for general purposes – Part 2: Wedge gate valves.

[46] SANS 665-3 Wedge gate and resilient seal valves for general purposes – Part 3: Resilient seal valves.

[47] SANS 776 Copper alloy gate valves – Heavy duty

[48] SANS 1056-1 Ball valves Part 1: Fire-safe valves

[49] SANS 1056-2 Ball valves Part 2: Heavy duty valves (not fire-safe)

[50] SANS 1056-3 Ball valves Part 3: Light duty valves (not fire-safe)

[51] SANS 1123 Pipe flanges

[52] SANS 1551-1 Check valves (flanged and wafer types) Part 1 PN series.

[53] SANS 1551-2 Check valves (flanged and wafer types) Part 2 Class series

[54] SANS 1808-13 Water supply and distribution system components Part 13: Diaphragm valve

[55] SANS 1808-15 Water supply and distribution system components Part 15: Mechanical backflow prevention devices

[56] SANS 1808-31 Water supply and distribution system components Part 15: Automatic control valves.

[57] SANS 1808-32 Water supply and distribution system components Part 32: Float valves (equilibrium type).

[58] SANS 1849 Butterfly valves for general purposes.

[59] SANS 1857 Copper allot gate valves light duty.

[60] SANS 10257 The reconditioning of valves for use with pipelines.

[61] The Preferential Procurement Policy Framework Act 2000 (Act No 5 of 2000), Preferential Procurement Regulations, 2011 issued in terms of section 5.

[62] BS EN 1983 Industrial steel ball valves

[63] BS ISO 7121 Steel ball valves for general purpose applications

[64] ANSI B16.34 American national standard for valves, flanged, threaded and welded ends.

2.3.2 Informative

[65] 240-57617975 Procurement of Power Station Low Voltage Motors Specification

[66] 240-83539994 Eskom NDT Personnel Approval (NPA) for Quality Related Special Processes on Eskom Plant Standard

[67] ANSI/API 600 Bolted Bonnet Steel Gate Valves for Petroleum and Natural Gas Industries (Modified National Adoption of ISO 10434: 1998.

[68] 240-53113712 Demineralised Water Production Using Ion Exchange Resins Chemistry Standard

[69] 240-55864764 Chemistry for Potable Water Standard

[70] 240-55864767 Chemistry for Cooling Water Standard

[71] ASME B16.34 Valves – Flanged, Threaded, and Welding End.

[72] BS EN 19 Industrial Valves – Marking of metallic valves

[73] BS EN 736-1 Valves Terminology – Part 1: Definition of types of valves

[74] BS EN 736-2 Valves Terminology – Part 2: Definition of components of valves

[75] BS EN 736-3 Valves Terminology – Part 3: Definition of terms

[76] BS EN ISO 8044 Corrosion of metals and alloys. Basic terms and definitions

[77] EPRI Valve Application, Maintenance, and Repair Guide.

[78] European Pressure Equipment Directive (PED), Directive 97/23/EC,

[79] ISO 10005 Guidelines for Quality Plans Standard

[80] ISO 10006 Guidelines for Quality Management Systems in Projects

[81] ISO 90003 Software Engineering Guidelines for the Application of ISO 9001

[82] ISO 9001 Quality Management Systems – Fundamentals and Vocabulary

[83] ISO 9001 Quality Management Systems Requirements

[84] MSS SP-70 Manufacturers Standardization Society of the Valves & Fittings Industry Standards

2.3.3 Forms and Templates

[85] 240-56227927 Electrical Load List Template

[86] 240-61379755 Control & Instrumentation Drive & Actuator Schedule Template

[87] 240-55864360 Mechanical Equipment List Template [MELT]

2.4 DEFINITIONS

2.4.1 Eskom Definitions

Term	Definition
Actuator	A device that operates a valve by utilizing electricity, pneumatics, hydraulics, or a combination of one or more of these forms of energy.
Approved Inspection Authority	South African organisation that is approved by regulatory authority in terms of SANS 10227.
Contractor	A group of people and facilities (corporation, firm, enterprise, institution etc.) with an arrangement of responsibilities, authorities and relationships. It also refers to supplier, consultant and service provider
Customer	The word customer refers to Eskom Holdings SOC Limited (in the context hereof referred to as Eskom)
Data Package	All documentation and certification required to be issued by the Supplier in order that the takeover can be certified by Eskom
Design Authority	When Eskom acts as the Design Authority on a project/package/ plant/system/asset, the reviewer(s) shall review the design documentation to ensure that: the design satisfies the design requirements; all relevant design standards, procedures and guidelines have been adhered to; the design is suitable and correct (calculations, philosophy, functionality, etc as per the ECM process practices were applied; the design is integrated by identifying all interfaces with other packages/plant systems/assets and ensuring that these interfaces are catered for.
Disc/disk/obturator	Movable component of the valve whose position in the fluid flow path permits, restricts or obstructs the fluid flow
Manufacturer	The word supplier refers to the Manufacturer or Contractor involved with the production and or design of the final product,
Quality Control Plan (QCP)	A document specifying the activities to be inspected throughout the execution of the project, inclusive of test methods, procedures and acceptance criteria. (This term is equivalent to QIP and ITP)
Refurbishment	Restoration to a sustainable usable state or as near as possible to new state (within agreed limits)
Subcontractors	An organization or legal entity that provides a product to the supplier and/or Principal contractor that enters into a subcontract and assumes some of the obligations of the supplier or principle Contractor
Supplier	Entity supplying the final product to the client.
Valve	A device that regulates the flow of gases, liquids, fluidized solids and slurries by opening, closing or partially obstructing various passageways.

2.4.2 Classification

Public Domain: Published in any public forum without constraints (either enforced by law, or discretionary).

2.5 ABBREVIATIONS

Abbreviation	Description
AIA	Approved Inspection Authority
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
AWWA	American Water Works Association
BS	British standard
BS EN	British Standard/European Norm
BSPP	British Standard Pipe Parallel thread
BSPT	British Standard Pipe Taper thread
CAD	Computer Aided Drafting or Computer Aided Design
Class	Alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system, which comprises the word “Class” followed by a dimensionless whole number - normally referenced in ANSI or ASME codes
CW	Cooling Water
DE	Drive End
DN	Nominal size an alphanumeric designation of size for components of a pipework system, which is used for reference purposes. It comprises the letters DN followed by a dimensionless whole number which is indirectly related to the physical size, in millimetres, of the bore or outside diameter of the end connections, as per German pipe or tube design standards
EPDM	Ethylene Propylene Diene Methylene
FAT	Factory acceptance test
ISO	International Standards Organisation
ITP	Inspection and Test Plan
MAWP	Maximum Allowable Working Pressure
MPI / MT	Magnetic Particle Inspection
MSDS	Material safety data sheet
NAMUR	User Association of Automation Technology in Process Industries", is an international association of user companies (established in 1949) and represents their interests concerning automation technology)
NB	Nominal Bore, similar in definition to that of DN (but for EN or BS designs)
NCR	Non-Conformance Report
NDE	Non-Drive End
NDE	Non-Destructive Examination
NDT	Non-Destructive Testing
NPS	Alphanumeric designation of size for components of a pipework system, which is used for reference purposes, and which comprises the letters NPS followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connections. The number following the letters NPS does not represent a measurable value and is not intended to be used for calculation purposes except where specified in the relevant standard

Abbreviation	Description
NPT	Nominal pipe thread/National pipe taper
O&M	Operating and Maintenance Manual
OD	Outside Diameter
OHSA	Occupational Health and Safety Act 85 of 1993
PCD	Pitch Circle Diameter
PED	Pressure Equipment Directive
PER	Pressure Equipment Regulation of the OHS Act 85 of 1993
PN	Pressure nominal (in Bar or MPa) an alphanumeric designation used for reference purposes related to a combination of mechanical and dimensional characteristics of a component of a pipework system. It comprises the letters PN followed by a dimensionless number.
PS	Maximum allowable pressure, is maximum pressure for which the equipment is designed, as specified by the manufacturer
PT	Dye Penetrant test
PTFE	Polytetrafluoroethylene
QCP	Quality Control Plan
QIP	Quality Inspection Plan
RT	Radiographic testing
SANS	South African National Standard
SAT	Site acceptance test
SCOT	Steering Committee of Technology
SI	International System of Units
SG	Spheroidal graphite cast irons
TS	Maximum allowable temperature, is the maximum temperature for which the equipment is designed, as specified by the manufacturer
UT	Ultrasonic test
VJ	Viking Johnson
WPQR	Weld Procedure Qualification Record
WPS	Welding Procedure Specification

2.6 ROLES AND RESPONSIBILITIES

2.6.1 Eskom

a) Eskom will define their role as Design Engineer, Project Engineer or Process Engineer Compile complete valve list/schedule to be issued for procurement of valve related product.
b) Supply the necessary operating parameters, and engineering information, material of pipeline and pipe design code (health and safety standard), and all related specification. Eskom to provide the process parameters (pressure, temperature, flow, material etc.) to enable the design engineer to create a valve schedule.
c) The Eskom plant system designer will note that different Valve Standards requires the user to provide certain plant related information. The designer (in house design) will create a valve requirements sheet Attachment 1 as well as the Valve Specification sheets particular to each type and size valve for the system.

d) Type of valve, end connection, temperature and pressure rating of the valve, trim requirements etc. will be specified by the end user as part of the enquiry document,
e) For valve selection refer to Valve Selection section 4.of this document
f) This standard is applicable to all designs be it new application, refurbishment or replacement of existing valves. The Standard is also applicable where Eskom acts as the projects engineer, design engineer and in the case of Eskom appointing a third-party contractor/consultant to execute on their behalf.
g) When used as part of a NEC contract referral to Eskom is to be interpreted as “the Employer”

2.6.2 Supplier

a) Provide Eskom with information as required for appraisal of the Supplier’s product performance, including but not limited to, copies of designs specifications & calculations, valve requirements sheet, data sheets, actuator etc.

b) Supply the necessary operating parameters, and engineering information, material of pipeline and pipe design code (health and safety standard), and all related specification to Eskom for Acceptance.

c) In the case of turnkey (design and construction) contracts the Contractor is responsible to define and list the information as indicated in this section in line with the contract specification.

d) Provide data book packages, as required, to permit prompt resolution of technical problems after installation. This must include material certificates, pressure test certificates, O&M manuals and design standard references.

e) Complete drawings of the valve and actuator assembly

f) The contractor will ensure that the valve is fitted with a name plate, that details design temperature, pressure, materials etc. and if applicable the actuator as well. This will include any adaptors or brackets between valve and operator where applicable.

g) Dimensioned, cross-sectional drawing indicating each part of the assembly

h) Label number as per section 6. A full item listing shall be supplied.

i) Detailed spare parts list with numbers. Recommended spares shall be identified.

j) Valve data sheet indicating pressure drop across valve (Cv or Kv values) loss coefficients,

k) Pressure-temperature ratings, materials of construction, valve design standard and mechanical interface (flange/thread/welding) standard.

l) Conformity assessment as per SANS 347, where applicable [40].

m) Shipping and storage requirements for the equipment.

n) Operation and maintenance manuals to be provided complete with suggested spare parts and spare part Identification number on a bill of material listing.

2.7 PROCESS FOR MONITORING

The document shall be reviewed every 3 years or as required via the relevant SCOT structures.

2.8 RELATED/SUPPORTING DOCUMENTS

This specification supersedes GGSS 0423 and serves as the Eskom standard for requirements and quality control measures for the procurement of new isolation valves to be procured for the Eskom fleet.

3. REQUIREMENTS

3.1 GENERAL REQUIREMENTS

3.1.1 Standards

Where differences exist between this standard and referenced standards, this specification shall take preference.

Only internationally accredited valve design and manufacturing standards will be tolerated, as referenced by the design codes in the OSH-Act regulation of acceptable Health and Safety standards .

Further to this document, the supplier shall adhere to the guidance notes to the purchasers, that are available for the relevant standard. Eskom shall include a valve requirement sheet along with this document and specific requirements for the project/tender. This list will contain the process data or in case of refurbishment/replacement the relevant rating information and any existing plant design standards where this valve has to be interfaced into.

3.1.2 Quality

Quality standards will be in line with the national and international standards listed in this document [35].

It is required that the Contractor/Supplier/Manufacturer is an ISO 9001 ISO 9001 Quality Management Systems.[35] or American equivalent accredited for manufacturing of valves. Also needs to comply with QM-58, Supplier Contract Quality Requirements [38]

Should any welding activities be performed on the pressure envelope of the valve the manufacturer will have a quality management system in accordance to ISO 3834

3.1.3 Metrication

Dimensions and ratings in documents and on drawings shall be in SI units. Where published data such as standards or codes, are in imperial units, the metric equivalents shall be provided.

3.1.4 Material Certification

As most of the LP services valves are manufactured in batches on a production line, the minimum material certification will be in accordance to BS EN 10204 Metallic Products - Type Of Inspection Documents[24]. Inspection certificate 2.2 for cast iron and ductile iron batch produced valve products. For all other refer to requirements of Eskom 240-86546783 Procurement Standard for Material Certification Requirements Applicable to Metallic Products Used on Low and Medium Pressure Applications [8]

The certificate will reference all pressure envelope materials such as body, end connection and bonnet. The certificate will also state the pressure test requirements as per relevant design code.

Standardization of valves and valve components is required to minimize spares holdings. 'Off the Shelf' items are preferred provided they comply fully with the specifications and standards.

All similar parts are required to be interchangeable without additional machining or modification General technical requirements

3.1.5 Seals

Isolating valves shall be capable of being opened against the maximum unbalanced head of fluid corresponding to design pressure, and the leakage rate shall comply with the associated shutoff class as per valve design incorporating the sealing components (trim).

Where valve trim is of a resilient material, it shall have non-stick and non-weathering properties.

3.1.6 Indicators

All valves other than air release valves and non-return valves, self-operating control valves or safety valves shall be fitted with mechanical indicators which will clearly and accurately indicate the degree to which the valves are open or closed.

3.1.7 Materials

In general, materials selected by the Contractor, where not specified herein or elsewhere in the contract, shall be suitable for use with the process fluid and be compatible with the pipeline material, and will have no effect on dissimilar material corrosion possibilities (Galvanic corrosion). Eskom Engineering will review, and material proposed by the contractor, and manufacturing can only commence after approval is granted by Eskom before manufacturing of special valves not available of the shelf.

The Eskom preference is for non-cast iron valves. Valves of cast iron shall be approved by Eskom not withstanding being referenced in the applicable standards.

3.1.8 Flanges

Flanges selected will comply with the requirements of the piping design code as installed or will be designed (new plant), and as per details provided by system engineer.

3.1.9 Bolts, studs, nuts, washers and threads

All internal bolting will be of similar material to the actual item bolted together, stainless bolting in carbon steel bodies will not be tolerated,

All other external threaded components shall be of steel. The grade shall be stamped on the ends of high tensile bolts and studs. Washers shall be provided under all bolt heads and nuts and shall be of compatible material to the bolt and nut. The threads of bolts and studs shall be coated with an anti-seize compound before assembly. Bolt lengths shall be selected so that 1.5 to 2.5 clear threads shall protrude beyond the nut. In the case of stainless-steel bolts, nuts and washers the contractor shall consider galvanic corrosion. For any fastener that screw into a blind hole, the hole depth will be at least 1.25 times that of the OD of the bolt

3.1.10 Markings

All valves shall be permanently marked with the pressure rating and nominal bore of the valve at minimum, as well as design standard. Valve Standards specify marking requirements to be adhered to for valves on the body and where not possible an identification plate marking attached to a valve. Valves manufactured to BS EN standards to comply with [72] Where required conformity assessment; markings will meet the requirements as listed in said conformity assessment.

Handwheels and operating levers shall be marked with an identification of the closing direction and shall also carry the word "CLOSE:" This shall not be covered by the identification plates. Where valves are suitable for one direction of flow only, the valve body shall be permanently marked with an arrow to indicate the direction of flow.

Valve will be of the Clockwise close (handwheel operation) design.

Uni directional Butterfly valve bodies shall be stamped to indicate the preferred pressure sealing direction

The following mandatory information is required to be on the valve body and/or identification plate marking, where the valve body is too small for the information to be attached to the body physically a steel name tab with be attached to the valve handle with the information as depicted below:

- The name or trademark of the manufacturer
- Design pressure PN or Class

- Design temperature range
- Serial / Batch number
- Body and disc material
- Nominal Size DN
- Design code/Standard (Health and safety standard)
- Manufacturers model number
- Typical end connection

The following information is also preferred and can be given in the returnable / data sheet.

- Valve type (rubber lined or not as well as grade of rubber)
- Maximum allowable operating pressure
- Flange specification
- Mass of the valve (kg)
- Date of manufacture

The requirement for all these markings needs to be evaluated by the supplier. Any requirements not specified by the valve standard and could result in extra cost need to be approved by Eskom.

3.1.11 Locks

All manually operated valves shall be fitted with a locking device, allowing for pad locks with shackle size of 5mm. Padlocks will be supplied by others. Locking must be possible in open and closed positons.

3.1.12 Valve closing direction

Valves shall be closed by turning the handwheel or lever in a clockwise direction when viewed from the operating position.

3.1.13 Handwheel

Handwheels shall be removable or replaceable when necessary.

The Handwheel shall be securely fitted with the direction of closure indicated.

Material selection is to be provided by the manufacturer or as allowed in the standard.

Hand wheels shall not deform in any way while being used as per design intend.

Maximum operating force will be 20kg on handwheel rim to operate the valve

For lever operated quarter turn valves the handle will be fitted such as to indicate the trim position (perpendicular to the pipeline if valve is closed, and lever in direction of pipeline flow if valve is open)

4. VALVE SELECTION

Eskom or the appointed contractor will provide a valve schedule indicating specific requirements operating conditions, and line media requirements. The design and operating conditions to be considered are the flow rate, temperature, pressure and the specific volume of the fluid or gas to be transported and the pipeline in which the valve will be installed.

Supplier recommendations and supplier valve data sheets should be supplied to Eskom for acceptance before erection and manufacture.

Testing

All testing must be done in accordance with the applicable valve design code (health and safety standard), certificates will be in compliance with requirements of EN10204 relevant certification.

Eskom requires that the following test be carried out as a minimum requirement:

4.1 PRESSURE TEST

It is the responsibility of the manufacturer to perform a pressure test before delivering the valves to the supplier/contractor or Eskom to ensure that the valves are capable of perform under the specified operating conditions. Pressure test result and certificates will form part of the final data book and be reviewed and accepted by Eskom.

All valves in new pipeline installations, Will comply with the requirements of the pipeline design code requirements for testing after erection.

4.2 FIRE TEST

Valve that are installed in potential applications that will require fire safe designed valves, will be accompanied on delivery with proof that this particular valve was prior tested and is approved for fire safe applications. Proof of that fire safe test certificate will be issued.

The fire testing of valve assemblies in pipelines used in fire-hazardous situations in respect of leakage and the operability (if applicable) of soft seated, quarter-turn valves, shall be according to ISO 10497. ISO 14313 shall be adhered to when testing ball, plug, gate and check valves.

4.3 HAZARDOUS APPLICATIONS

SANS 1056-1 also sets standards for ball valves used in hazardous applications.

4.4 BODY TEST

Valve bodies shall be tested at a pressure as defined in the design code. The valve body test shall be carried out, where possible, before any protective coatings or linings are applied. Both ends of the valve shall be blanked off during the test and no visible leaks may be detected.

For fully coated valves the body test to proof test values will be done in accordance to the relevant design code.

4.5 SEAL TEST

Valves shall be tested for leakage at the specified working pressures. Each valve shall be tested according to their own design to ensure compliance with standards. If the tested leakage rate is acceptable in all flow directions (bi or uni directional as per requirements), the valve is fit for use.

Floating ball valve designs shall undergo a seat air trap test rather than a full seat leakage test at the rated pressure differential, as for resilient seal ball valve of floating design the higher the pressure during seat test the better the valve will seal as imperfections are hidden.

4.6 TESTING OF ELASTOMERS

The elastomers will be tested as specified in the valve design standards.

The supplier is required to submit the elastomer test certificates (shore hardness testing etc.) to Eskom as part of the data pack.

5. PACKAGING, TRANSPORT AND DELIVERY

The safe, undamaged delivery of the valves is the responsibility of the supplier or the contractors responsible for the installation of the valves.

All valve components, especially the valve stem shall be securely packed with the correct packaging to prevent damage in transit. The gate, butterfly and globe valves shall be in the closed position for transportation, whereas ball and plug valves shall be in the open position. Any actuated valves shall be transported in the fail-safe position. Electric actuators are to be fitted and Torque/limit set during the seat leakage test and then transported as a complete unit (valve and actuator). A Site acceptance test is the to be performed to demonstrate no damage during transportation.

The ends of the valves (flanged, socket welded, threaded, butt welded) shall be blanked off with the appropriate rigid materials to prevent damage to the valve trim and prevent foreign materials from entering the internals of the valves. The blanked off ends will remain blanked off until final installation. Before dispatch, flange faces of non-coated valves shall be coated with heavy grease or other suitable corrosion preventative.

All valves will be inspected upon delivery and any valve / valve actuator unit that maybe damaged or that does not comply with the stipulation of this standard will be rejected. If a damaged valve is delivered, it is the responsibility of the contractor or supplier to replace/correct the valve deficiencies, at the contractors own cost; this might entail replacement of damaged valves with an undamaged valve according to the original valve specification.

6. VALVE LABELS

Each valve shall be identified on the system P&ID diagrams, where KKS numbers are provided or for Turnkey projects, drawings and valve schedules by a unique alpha-numeric position code in accordance with the Eskom coding system specific to the particular turnkey contract. Vales that are ordered for stock holding will have the stock description number as per order marked as such.

Each valve shall also be identified with a label which shall be generally in accordance with Eskom Plant Labelling and Equipment description Standards [7]. For Turn key projects all valve labels must be strapped on pipe next to the valve and if not possible consult Eskom Configuration Management. This KKS/AKZ label does not apply to a valve that is bought for spare or stock.

Responsibility for the supply and fitting of labels shall be either the installer or Turnkey contractor, as determined by the specific contract. The label will be attached such that it will not be displaced during transport or storage.

7. ACCESS FOR INSPECTION

Inspections during manufacture will be required and will be indicated on the QCP intervention points at contract award. Visual inspections of all valves are required after manufacture and after installation. The nature of the inspection is specific to each valve and should be according to the relevant standards

The valves are required to be installed in such a manner that maintenance personnel can easily access it for inspection or maintenance when necessary.

8. CORROSION PROTECTION

All non stainless-steel bodied valves shall be protected against corrosion. The type of corrosion protection will be specific for the valve material, the working environment of the valve as well as the type of fluid passing through or in contact with the valve.

The corrosion protection shall correspond with the applicable material corrosion protection standards as required by the valve manufacturing standard.

Non stainless-steel valves used in cooling water systems containing raw water shall be lined internally unless otherwise specified by Eskom. (The type of lining is contract specific and will be specified during the tender stage.)

Stainless steel bodied valves shall be delivered in pickle and passivation state and thus require no further coating.

Corrosion Protection shall conform to [1] 240-101712128 Specification for the Internal Corrosion Protection of Water Systems, Chemical Tanks and Vessels and Associated Piping with Linings

9. DOCUMENTATION

On delivery of the valve, operating and maintenance manuals, the required certification, and data pack will be supplied (requirements as stated in section 2.6.2. Drawings indicating valve placements in the pipeline are also required for new installations.

All certification as required by Eskom and the various standards used (materials certificates, pressure tests, fire safe test, coating, etc.) must accompany the valves when they are delivered to site.

Valve data sheets (OEM) containing the valve characteristics and operating conditions are required for each valve. This should also include the stability criteria.

10. AUTHORISATION

This document has been seen and accepted by:

Name	Designation
Anasen Pillay	Senior Engineer Low Pressure Services/Chairperson – General Mechanical Care Group
Bruce Tyson	Chief Engineer Low Pressure Services - Chairperson – Fuel Handling Systems Care Group
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11. REVISIONS

Date	Rev.	Compiler	Remarks
July 2013	0.1	Anasen Pillay	Review of GGSS 0423
January 2016	0.2	Anasen Pillay	Draft Document for Comments Review
March 2016	0.3	Anasen Pillay	Draft Document for Comments Review (2nd Round)
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December 2016	0.5	Anasen Pillay	Final Document for Comments Review (2nd Round)
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Aug 2022	1.1	Anasen Pillay	Draft Document for Comments Review
October 2022	1.2	Anasen Pillay	Updated Final Draft after Comments Review Process
October 2022	1.3	Anasen Pillay	Additional updates completed
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12. DEVELOPMENT TEAM

The following people were involved in the development of this document:

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Sinki Seloana	Turbine - Valves
Nkosi Ndika	Senior Engineer Low Pressure Services
Hanlie Joubert	Senior Engineer Low Pressure Services

13. APPENDIX A: BUTTERFLY VALVES

13.1 GENERAL SPECIFICATION

Butterfly valves should conform to either BS EN 593 Industrial valves - Metallic butterfly valves [16], BS ISO 10631 Metallic Butterfly valves for general purposes [33] or SANS 1849 Butterfly valves for general purposes. [58].The service applications of butterfly valves are one or a combination of the following: tight shut-off, low leakage or regulating of a fluid or gas within a pipeline.

13.2 LARGE BUTTERFLY VALVES

For the purpose of this specification, large butterfly valves are taken as being larger than 600 NB.

The cooling water valves shall comply with [5] 240-63094243 Standard for large bore resilient seal Butterfly valve for use as Cooling water Isolation valves or [6] 240-63154109 Standard for large bore metal seated Butterfly valve for use as Cooling water Isolation valves.

13.3 SMALL BUTTERFLY VALVES (BELOW 600 MM NB)

For the purpose of this specification, small sized butterfly valves are taken as being smaller than 600 NB.

Small butterfly valves shall where possible be installed with the disc shafts horizontal. Any deviation shall be communicated to Eskom for approval. Alternative positions shall be subject to Eskom written approval on recommendation from valve OEM.

Preference will be given to valves where the disc to spindle arrangement is an integral drive. Valves utilising pinned disc and shaft configuration will not be allowed.

13.4 COMPONENTS SPECIFICATION

13.4.1 Body

13.4.1.1 General

Body shall be from one continuous casting without any seams or joints. Body style can be double flanged, wafer or lugged design.

Cast iron / ductile iron body pressure class will be 1.6MPa. Valves with a pressure rating of 1000 kPa are acceptable for lower pressure applications.

Carbon steel bodied will comply with ANSI class 150.or at less a PN20 pressure rating

The body will have an integral flange for an actuator mounting to ISO 5211 Industrial valves -- Part-turn actuator attachments [34] mounting platform.

Valve body shall be designed in accordance to the requirements as indicated in the selected standard in 13.1

For sizes 600mm and smaller, the valve body and disc will be of centric design

13.4.1.2 Valve bodies -- Small Butterfly Valves (Smaller than 600 mm NB)

The valves shall be of grey cast iron to and shall comply with the requirements of the selected standard. Lifting lugs or eye bolts shall be provided for valves above 200 mm NB.

13.4.2 Flanges

Valve body can be flangeless (Wafer pattern) lugged or flanged and must fit between the indicated flanges of the installed pipe and flange standard as specified in enquiry.

When valve is used as a block type isolation valve at the end of a line only lugged and flanged versions will be considered.

Should valve be supplied double flanged, the flanges will be raised face and be integral with the body casting in case the body is carbon steel but will be flat face for cast iron or ductile iron.

For new applications preference is given for locally manufactured. Flange or end connection will be specified and flange conforming to EN1092 [51]. For replacement valves the flange criteria will conform to that of the installed plant.

13.4.3 Discs

13.4.3.1 General

The discs shall be of hydrofoil section with smooth continuous surfaces. Valves disc to spindle connection will not be of pinned design, but drive end shaft will have an integral drive connection such as a keyway, square, splined or hexagon drive. The bottom shaft may be held in place by a body pin or end stop connection.

According to Standard BS EN 593 Industrial valves - Metallic butterfly valves, the manufacturer's technical documentation shall specify trim see 4.1.2.2 of reference [16]

13.4.3.2 Small Butterfly Valves

Discs for small butterfly valves shall comply with the requirements of the selected standard and be of a material suitable for the fluid or gas being handled. Applications where neither stainless nor carbon steel will resist the effects of chemical attack, the disc will be supplied fully .coated. Media properties will be supplied as part of enquiry.

13.4.4 Rubber lining

The Supplier shall note the roles and responsibilities as indicated in reference [1]

Rubber lining will be selected based on the media flowing through the valve. For Compressed air or pneumatic systems EPDM will not be used for liners, as the dry air tends to dry the natural oils out of the EPDM consistency, causing the liner to become brittle.

Preference will be given designs where the liners that are vulcanised to the body or liners that is of replace-able cartridge design, (This cartridge design allows a liner to be vulcanised to a backing ring, and thus provide the benefits of a vulcanised liner, with the extra benefit that the liner cartridge can be replaced. Loose liner valves shall be the last resort, and will only be used on water applications, - all applications where loose liners are offered will be agreed in writing by Eskom.

Loose liner valves must never be used on vacuum service, compressed air system, or any system that uses pneumatic or air as the conveyance media, as the air tends to resonate the liner that will lead to premature failures.

Should a butterfly be used as a block valve at the open end of a pipeline, again only vulcanised or cartridge type liners will be accepted, and then the valve body will be lugged or flanged, thus no wafer pattern will be used on end of line. The liner will also be constructed in such a manner that the liner forms the first (gland packing) seal to the atmosphere between the disc and spindle.

If the applicable Valve Standard is silent or allows for various options the table below shall be enforced and done according to [1]

The preferred liner material specifications are given in table 1 below. Alternative shall be subject to Eskom written approval on recommendation from OEM. Eskom is to give approval of the liner material.

Table 1 – Liner Material Specification

Liner Type	Suitable Media	Temperature Range
Nitrile liner/ Natural black rubber liners	Oils, fuel oils and hydrocarbons	-10°C to 80°C
	Seawater, brines, raw water, cooling water, potable water, air services	-10°C to 80°C
EPDM liner	Steam, hot water, wet air, abrasive slurries	-10°C to 120°C
Viton liner	Most chemicals (refer to chemical resistance charts), hot water, demin water, air services and steam	-10°C to 180°C
Stainless steel 316 / 304 disc	Abrasive slurries, hot water, steam, powder with air transportation system, hydro vac, low concentration ash slurries, air services	-10°C to 120°C for wet applications and -10°C to 100°C for dry application.
SG iron Nylon coated / Carbon steel nylon coated discs	Oils, fuel oils and hydrocarbons Seawater, brines, raw water, cooling water, potable water, air services	-10°C to 80°C

13.4.5 Materials

Materials for the valve components to be as stated in the Standard for the specific fluid.

13.4.6 Spindle

The drive shaft top works will be of square or hexagon drive to facilitate the connection of an actuator by means of a NAMUR (connection, by mounting the actuator directly onto the ISO 5211 Industrial valves -- Part-turn actuator attachments [34] platform.

Shafts shall be of stainless-steel complying with the requirements of the selected standard and may be of the continuous shaft or stub shaft type. When stub shafts are used the disc to drive shaft interface will still be integral drive such as keyway, pinned connections will not be allowed. For full length spindles integral drives are not always utilised, however for these the common is to use pins to assembly disc to shaft. Full details of pinning will be disclosed as part of the tender. Pins will need to be encapsulated if a coated disc is used. For stainless discs the pinning will be such that no dissimilar material corrosion will occur.

Where stub shafts are used, each section shall be securely located on the disc for a minimum distance of 1, 5 times the shaft diameter. The shafts shall be secured to the disc in such a way as to be capable of transmitting at least 75 % of the torsional strength of the minimum required shaft diameter.

13.4.7 Manual Operation

Butterfly valves with sizes up to and including DN 200 can be fitted with a flow control wrench of ratchet type. The ratchet plate must be designed as such so that the valve position can be controlled in 10-degree increments from fully closed to fully open. In fully open and closed the ratchet / wrench must be able to be locked in position.

13.4.8 Gearboxes

All butterfly valves from 250mm upwards will be fitted with a gearbox. The gearbox will be self-locking in design, thus preventing the disc to turn unless the hand wheel or input shaft is operated. Gearbox selection and hand wheel size will be such that no more than 20kg needs to be exerted on the hand wheel perimeter to operate the valve.

Gearing where specified, shall be supplied with a ratio of at least 3:1 and complying with BS 436-5 Cylindrical gears — ISO system of accuracy. Gearboxes shall be mounted on support brackets. If the valve body comprise of a gland stuffing box, where the gland sealing is done by means of the liner and no external gland packing is used the gearbox can be directly mounted (NAMUR).

13.4.9 Bearings

Bearings will be provided for valves of DN 350 or larger. The function of the bearing is to carry the axial thrust and therefore spring retaining clips shall not be used.

Self-lubricating sleeve bearings, of a type with a proven record of service, shall be fitted in the valve body hubs, and resilient seals fitted to prevent contact between the bearings and the fluid flowing through the valve. Alternatively, self-lubricating PTFE bearings may be offered.

13.4.10 Seats

Where the design is of a clamp in disc seal design offered the seal will be replaceable without having to remove the valve from the pipeline.

Where vulcanised lined valve is used, the complete valve will be replaced, as it is not cost effective to replace the vulcanized liners.

13.4.11 Electric actuators

For all butterfly valves where electric actuators are required, these actuators, which have the facility for manual override. During manual operation the actuator motor shall be disengaged from the actuator gearbox.

Electric actuators shall be fitted with both local and remote continuous position indication facilities and shall be capable of being started both locally and remotely.

Adjustable torque sensing mechanisms and limit switches shall be provided, with back-up mechanical stops which will offer sudden 'infinite' resistance at the limits of disc travel. These mechanical end stop shall be designed such that it will provide adequate resistance to ensure that the actuator will trip on torque without mechanical damage to gearbox housing.

Where torque limiting devices are fitted, these shall be set to slip only when the applied torque at the input shaft reaches 160 % of the maximum torque required to operate the valve under normal conditions. Such devices shall have prior written approval of Eskom.

The actuator motors shall be rated at least 33 % in excess of the maximum torque required to operate the valve and/or gearbox combination under the most adverse conditions which can be established from this specification. The rated torque shall be at least 20 % less than the stall torque, allowing for a 10 % fluctuation in voltage. All actuator motors shall be protected against thermal overload.

All gearbox or actuators and gearbox combination shall be self-locking and capable of holding the disc in any position under all operating conditions, and shall not, under any circumstances, become self-motorized as a result of torque loading on the disc. It shall be possible to fit all actuators with provision for setting the opening and closing times, for various ranges of the valve travel.

Gears shall be manufactured to BS 436-5 Cylindrical gears — ISO system of accuracy and shall be machine cut. All components requiring lubrication shall be totally enclosed in a cast iron weather-proof casing.

All actuators shall be suitable to allow for the process operational requirement for the valve.

13.4.12 Pneumatic actuators:

Due to the varying available air pressure on site an available air pressure of 400kPa will be assumed for sizing of such pneumatic actuator unless site defines a pressure less than 400kPa.

In event of a double acting actuator, the sizing criteria will be such that during the full stroke (open or close) the actuator will be sized to ensure that a minimum safety factor of 30% excess torque is available to the actual “break out torque” (torque to open the disc from the valve seat when in closed position against full design line pressure).

For single acting actuator (either open or close cycle, meaning either open or close stroke by spring force, and the opposite cycle will be the air stroke. As the air stroke compress the spring the available torque to the valve is thus also decreased.

Based on this principle above, two aspects shall be considered for spring return actuators.

For break out the cycle to open the valve (either air or spring stroke) must be such that it has a “start of cycle” torque of the actuator must be 30% higher than the valve required break out torque.

Then during the cycle whilst valve is not in closed position is called the “running” or “operational” torque. The actuator spring and air stroke will be considered, and the lowest torque through the cycle will still exceed the “running” torque requirements by a margin of 30%.

All actuators shall be suitable to allow for the process operational requirement for the valve.

14. APPENIX B: GATE VALVES

14.1 GENERAL SPECIFICATION

Gate valves for new low pressure systems shall comply with SANS 664-1 Wedge Gate and Resilient Seal Valves for Waterworks Part 1: General 2 and 3 [41][42][43] (waterworks) For existing applications the face to face dimension will be same as that of the installed plant, and thus to the relevant valve design standard that will satisfy the required face to face dimensions. Gate valves shall generally be of the rising spindle type. Where non-rising spindles are required, these shall be fitted with double acting plain thrust collars, unless otherwise specified.

Unless otherwise specified, facilities shall be provided to repack glands under pressure, such as backseating of valve trim onto valve bonnet to “isolate” the gland from direct pressure. Gate valves shall be used in either the fully open or fully closed position and shall not be used to regulate flow.

14.2 COMPONENT SPECIFICATION

Preference of gate valves shall be as specified below:

- Up to 300 NB – Rising spindle resilient seal and flanges integral to valve body (or non-rising spindle if headroom is inadequate), Where media, such as oil etc. or aggressive water that might attach the rubber components of an RSV is present, RSV will not be used, for these a solid wedge gate will be used.
- Above 300 NB- As above but wedge gate with solid or flexi wedges and with geared spindle drive, where the operating requirements on the handwheel rim to operate the valve exceed 20kg pulling force on the handwheel rim.
- Should the preference not be followed based on the specific application, these will then be considered by Eskom for acceptance.

14.3 BODY

Cast valve bodies shall be of continuous casting with a straight, unobstructed passage. Where possible, disc guides will form an integral part of the valve body.

For pressure rating below 2MPa body maybe ductile iron, however Eskom is phasing out cast iron bodied valves. For Class 150 bodies will be non-cast iron or ductile iron, and be castings of carbon or stainless steel, material selection based online media.

No weld repairs will be performed on the casting to repair casting defects, unless approval is sought and obtained from the Employers welding specialist.

14.4 BONNET

The bonnet for valves 50mm and smaller can be screwed, union or bolted type. For valves 65mm and larger the bonnets will be of bolted or pressure seal design, the material of the bonnet shall be the same as the material of the valve body.

No weld repairs will be performed on the casting to repair casting defects, unless approval is sought and obtained from the Employers welding specialist.

14.5 FLANGES AND OTHER END CONNECTIONS

Valves of sizes ≤ 50 DN shall have threaded or flanged ends. Valves larger than 50 DN shall have flanged or butt weld connections. The flanged ends shall be flat faced (for ductile iron or cast iron) and raised face for carbon or stainless bodied valves. All flanges shall be integrally cast or forged with the valve body.

Flanges shall be to fit the existing plant valve flange if it is a replacement, but for all new installations shall be according to EN 1092.

14.6 GATE (DISC)

The gate (disc) of the gate valve shall not obstruct flow when the valve is in the fully open position, the gate will be fully retracted from the flow passage, and also reduced bore gate valves will not be used unless agreed to by Eskom. Reduced bore maybe used for compressed air service

Disc designs maybe Solid-wedge, flexible-wedge or split-wedge discs (also called double discs). Solid-wedge discs shall be used for turbulent flow applications, or where pipeline flow velocities will exceed 3m/s

All valves isolation peer Rate A as per table A.5.as specified for Rate A as EN12266-1. (No visible leaks)

14.7 GATE GUIDE

The gate (disc) of the valve shall fit tight enough between the gate guides to prevent any vibrations due to high velocity fluids. Gate guides shall be integrally cast with the gate body.

The wedge guides shall not obstruct the flow through the valve except when valve is used for flow restriction such as the venturi gate valve.

14.8 SPINDLE (STEM)

14.8.1 Extension Spindles

Where extension spindles are required, they shall be supplied complete with wall brackets, headstocks and handwheels. Two universal joints shall be fitted which may be either of the lubricated type with grease retaining and moisture - excluding neoprene gaiters, or of the non-lubricated PTFE or bronze type. Where stem extensions are in excess of 2 meters, the extended spindle design will be such that the weight of the stem extension will not damage the valve.

Headstocks and extended valve spindle handwheels shall be provided with markings showing "OPEN" and "CLOSED" in order that the valve position may be clearly seen. No thrusts shall be taken on the headstocks, which shall act as guides only.

14.8.2 Rising Stem

Rising stems shall have an external stem drive nut and valve yoke. Rising stems shall have a position indicator if visual indication of the valve position is inadequate.

14.8.3 Non-rising Stem

Non-rising stems shall be used where the vertical space is limited.

14.9 SEAT RING

In the case of a separable seat ring, the seat ring can be either threaded or pressed these separable seat rings must be located by means of locking pins to prevent turning out. For any pinned disc, - shall be designed such that the pin such that no vibration or pressure fluctuation shall remove the pint

14.10 SEALING (VALVE TRIM)

The sealing of any gate valve will be bi-directional and shall seal in either direction. All gate valves spindles are required to be fitted with a back seating arrangement that permits the replacement of gland packing when under pressure.

15. APPENDIX C CHECK (NON-RETURN) VALVES

Check valves for low pressure systems shall comply to SANS 1551-1 Check valves (flanged and wafer types) Part 1 PN series.[52] for new installations, for existing installations, the valve design will be dictated by the face to face dimensions of the existing system.

Single or multi-door type check valves, with or without spring loading, may be of the flanged or wafer type. Ball check and piston lift check valves may also be offered for applications in viscous fluids

Piston type check valves must always be spring loaded.

Flanged valves of cast or ductile iron shall be fitted with flat face and be installed with full face gaskets Carbon steel or stainless-steel flanged valves may be raised face. An exception is that if the valve bolts onto an item such as filter, pump etc. that is cast iron, the valve flange will be flat face and full-face gaskets. Cast iron has no ductility and by using a raised face flange will cause breakage of the relevant cast iron flange when it is connected to a raised face flange.

15.1 COMPONENT SPECIFICATION

Check valves shall be as follows:

- Up to 300mm valves can be counterweight and lever, double or single door, or in sizes smaller sizes piston or ball check maybe used. In low pressure systems axial type of NRV such as axial disc check valves in line type will also be allowed,
- 350 mm to 600 mm NB – Integrally flange swing door or wafer type spring loaded (single or double door) or ball type. To ensure that the valve disc is stable in very low-pressure applications axial disc check valves should be used to ensure that the valve is stable at very low pressure differential applications.
- Above 600 mm NB - Integrally flanged inclined seat swing check valve or spring-loaded wafer type with tapped fixing lugs and lifting luge (single or double door), or counterweight and lever on pump discharge. On Ash Water Return Systems and Ash lines etc. Ball checks can also be used.

Check valves shall be installed where the flow in the pipeline is fully developed; where at all possible it should be minimum 5 pipe diameters, but it is preferable to have it installed 10 diameters after last bend or pump discharge.

When installing NRV's directly after the pump it should be at least 5 pipe diameters (10 pipe diameters are preferred if space allow) downstream of the pump where possible, as the pump discharge might be turbulent that will cause the NRV door will not be in a stable position and lead to premature failure if the valve seats.

Check valves shall be specified according to the flow conditions in the pipeline as well as the pipe size.

Check valves shall have a flow direction arrow indicated on the body. During selection care should be taken to ensure that for the available differential pressure that NRV flap / disc is in a stable position.

15.2 TYPES

15.2.1 Swing Type Check Valve

Swing check valves shall be fully closed when the pressure differential across the valve is zero. The valves shall be designed in such a way that slamming during closure is minimized.

Swing check valves can be used in slight to moderate turbulent flow regimes.

Swing type with counterweight and lever is used to ensure smooth pump operation due to the gradual damped operation (depending on system design the counterweight and lever might be eliminated) on pump discharge

15.2.2 Lift Check Valve

Lift check valves with or without springs can be installed in horizontal lines. If lift check valves are installed in vertical or inclined lines, the valve will be spring assisted and will be installed in an upward flow installation, to ensure proper closure.

Typical applications are clean water, oil, or laminar flow regimes.

15.2.3 Wafer Swing Check Valves

Wafer swing check valves (single or double door) can used when long pattern flanged swing and lift check valves are too bulky and in low pressure applications. When using these valves, it is required that the valve is assessed according to the OEM's requirements that the disc will be stable. For vertical pipeline installations for valves where the disc is not be spring assisted it will only be installed in lines with flow upwards.

15.2.4 Wafer axial Check Valves (Disc check)

These valves are inherent stable in very low differential pressure applications. These valves are also common in air lines when fitted with resilient seats such as Viton. EPFM seated valves should not be used in air service as the air tend to dry the natural oils in EPDM and cause the resilient membranes to become brittle and effecting the sealing of the valve.

15.2.5 Ball Check Valves

Ball check valves are preferred for use in lines containing viscous fluids or slight slurries.

15.3 END CONENCTIONS

All valves can flangeless (wafer) or double flanged. Flanges must be integrally cast with the valve body and adhere to the standards as specified in section 3.1.8 of this document. Only flat faced flanges will used when bolted to mating cast iron flanges.

Flangeless (wafer) check valves are required to fit between flanges as specified in section 3.1.8 of this document.

For sizes ≤ 50mm BSPT screwed ends can be used. Socket welded ends will not be allowed, unless upon Approval from Eskom. Screwed connection shall not be permitted.

The cast and ductile iron flanged ends shall be flat faced and according to the relevant standards as set out in section 3.1.8 of this document.

15.4 BEARINGS

On valves equipped with bearings self-lubricated bearings are preferred. The bearings shall be designed to be able to sustain unbalanced thrust on doors at maximum rated pressure.

Bearings are required to retain a low coefficient of friction and offer a long service life.

15.5 DISC / FLAPS

Discs shall be cast with integral hinge lugs / bearing hubs. The travel of the flaps/ doors shall be restricted by integral stops.

15.6 PINS

The required continuous hinge pins shall be supported at their ends with bearings, on designs where the shaft is solidly fixed to the disc and rotate as a unit. On designs where the pin is fixed and the rotation occur between the disc and pin, the dish bearing hub will thus be equipped with a bearing. Shafts that

protrude through the valve such as counterweight and lever type required to have flanged and bolted bearing cover plates. They will be equipped with shaft sealing to prevent leakage to the atmosphere. The continuous hinge pins and bearing cover plates shall be the same material as the valve body.

Where shafts enter castings, they shall be provided with corrosion resistant bushes to prevent galvanic corrosion.

15.7 DAMPING

Damping is required for certain check valves when specified. Lift or double door types cannot be dampened.

15.8 SEATS

Resilient valve seats are preferred the shut off class VI can be achieved. For lines that can have deposit formation or solids in the line metal to metal seats will be preferred.

16. APPENDIX D BALL VALVES

16.1 GENERAL SPECIFICATION

Ball valves shall be designed to standard as defined under section

16.2 COMPONENT SPECIFICATION

16.3 TYPE

The design of a ball valve shall be such that it is acceptable and shall incorporate a combination of the following alternatives:

- full bore or reduced bore
- hollow ball or solid ball;
- one-piece construction or split-body construction ;
- floating or trunnion-supported ball/stem configuration.
- End Connection type, flanged, screwed, welded

16.4 BODY

Stainless steel or carbon steel as per line material and media chemistry requirements. The body material shall be suitable for the service and selected from the materials as indicated in this Standard

16.5 BODY END CONNECTIONS

Valves 50NB and below shall be either threaded, butt weld end as indicated in valve schedule supplied by Eskom. Flanged valves for sizes below 50mm are an option but will be stated clearly in the tender enquiry document.

Valves above 50NB shall be flanged to the plant flange standard and respective drilling table or for new plant to standards referenced in 3.1.8 Flanges.

16.6 BALL

The ball material will be either 304, 316 stainless steel regardless if the body is carbon steel, stainless steel.

16.7 STEM

The stem shall be manufactured from stainless steel grades or 17.4PH. Stem design will be ant blowout design. Stem will be fitted with stem thrust washer.

16.8 SEATS

For resilient seated valves the seats shall be of PTFE or PTFE composites and designed to maintain sealing geometry under all stated temperature and pressure conditions. Virgin PTFE seats will not be used for pressures in excess of 0.69MPa or temperatures in excess of 120ºC.

16.9 FIRE AND ANTI STATIC DESIGN

Where the valve will be used in a fire risk area or in explosive environment the valve design will comply with a fire safe tested design such as BS EN 10497 or similar approved