



**Bayu Undan / Darwin LNG Facilities**  
**Technical Delivery Terms**

<b>Material Description:</b>		<b>Ball Valves</b>	
<b>Doc No:</b>	TDT 010	<b>Rev:</b>	0
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## **1 SCOPE**

This document outlines the general technical requirements for the supply of Ball Valves for the Santos Bayu-Undan and Darwin LNG Facilities.

This document applies to:

- manually operated valves with handles, hand wheels and gear operators and;
- valves mounted with actuators and controls.

This document shall be read in conjunction with accompanying valve data sheets.

Suppliers shall comply fully with the requirements specified in this document for the supply of Ball Valves. The exception to this is for orders issued with an accompanying Material Requisition (MR); the requirements stated in the MR shall hold precedence over this document. Additional requirements for valves in specific services such as category M-Fluid service, blowdown service etc. may be detailed in the Materials Requisition.

## 2 REFERENCES

ALL/SUP/LOG/PRO/2000	Santos Export Packing & Marking Procedure
ANSI/ISA S93.00.01	Standard Method for the evaluation of external leak of manual and automated on-off valves
API 6A	Specification for Wellhead and Christmas Tree Equipment
API 20A	Castings for use in Petroleum and Natural Gas Industry
API 20B	Forgings for use in Petroleum and Natural Gas Industry
API 598	Valve Inspection and Testing
API 607	Testing of Valves – Fire Type Testing Requirements
API 6D / ISO 14313	Pipeline Valves
ASME Boiler and Pressure Vessel Code – Section VIII, Divisions 1 and 2.	ASME Boiler and Pressure Vessel Code – Section VIII, Divisions 1 and 2.
ASME B16.34	Valves – Flanged, Threaded and Welding End
ASME B16.10	Dimensional Standard
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.47	Large Diameter Steel Flanges
ASTM	Material Specifications such as ASTM A106, 352, etc.
ASTM G48	Standard Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution
BS EN 10204	Metallic materials. Types of inspection documents
BS EN 12266-1	Industrial Valves. Testing of Metallic Valves. Pressure Tests, Test Procedures and Acceptance Criteria. Mandatory Requirements
DOC/CMP/PRO/002	Supplier Quality Requirements
DOC/CMP/SPE/001	Suppliers Drawing and Data Instructions
DOC/ENG/SPE/0008	Engineering Requirement for Lifting
DOC/ENG/SPE/0010	Project Coating Specification for New Offshore and Onshore Structures
H8-GEN-00-000-S01-2025	Supplier Quality Requirements Manual Valves
H8-GEN-00-020-S01-2025	Supply of Manual and Actuated Valves
H8-GEN-00-050-S01-0104	Supply of Actuated Valve Assemblies
H8-GEN-00-000-S01-0107	Traceability and Certification
IEC 60529	Degrees of Protection Provided by Enclosures (IP Code)
ISO 15848-1	Industrial valves - Measurement, test and qualification procedures for fugitive emissions - Part 1: Classification system and qualification procedures for type testing of valves
ISO 15848-2	Industrial valves - Measurement, test and qualification procedures for fugitive emissions - Part 2: Production acceptance test of valves

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ISO 5211	Industrial Valves – Part-turn Actuator Attachments
JIS 2031	Gray Cast Iron Valves
JIS 2071	Steel Valves
MSS SP-61	Pressure Testing of Valves
NACE MR 0175/ ISO 15156	Materials for use in H <sub>2</sub> S Containing Environments in oil and gas production
NORSORK-M650	Qualification of Manufacturers of Special Materials
PED	European Council (EC) Pressure Equipment Directive (97/23/EC)
TDT 01	Technical Delivery Terms - Gaskets
TDT 02	Technical Delivery Terms – Austenitic Stainless Steel and Super Duplex Stainless Steel Bolting
TDT 03	Technical Delivery Terms – Coated Alloy Steel Bolting

### 3 GENERAL REQUIREMENTS

#### 3.1 Pressure Containment Integrity

The valves shall have proven pressure/temperature rating integrity in line with European Council (EC) Pressure Equipment Directive (PED) 97/23/EC or ASME VIII Div 1 or ASME B16.34 or equal. JIS valves shall be design to JIS B2031 or JIS B2071 or equal. Ni-Al-Bronze Valves, to be installed in Cu-Ni Piping System and Glass Reinforced Plastic (GRP) Piping System OR otherwise, shall be hydrostatic pressure tested at 30.0 barg and hence inferred to be rated for 20.0 barg at ambient temperatures.

#### 3.2 General Supply Integrity Requirements

- a. The valves shall comply with data sheet specified requirements and additional supplemental requirements specified in this TDT.
- b. Valves manufactured from forged bar are acceptable, up to bar size  $\leq$ DN350 (14”) or valve size  $\leq$ DN100(4”NB)
- c. The valves shall be certified fire rated per API 607 or equal and suitable for use in Oil & Gas Industry fluid services specified in the data sheets. The valve assembly shall be electrically continuous to ensure avoidance of accumulation of static charges.
- d. The supply shall be new and unused.
- e. Valve body fabricated from plate is not acceptable.
- f. Butt-weld ended valves shall permit in-situ disassembly and servicing of trim/components.
- g. Butt-weld ended valves shall be provided with pup pieces at the ends as specified in the data sheet. (Note: material mechanical properties and thicknesses shall be same or equivalent to adjacent pipe). If not specified in the data sheet, pup piece length of 2 x diameter of the valve shall be considered, limited to the maximum of 500mm.
- h. Valve body assembled by threaded end-closures not acceptable.
- i. Valves stem assemblies shall be of anti-blow out type, one piece design.
- j. Stem extension and or vapor space height where specified shall be min 150mm.
- k. It shall not be possible for a leaking valve stem seal to cause pressurization of the actuator or operator.
- l. Valves shall be provided with Vents and Drains – per manufacturer’s standard.
- m. Lifting lugs if provided shall have been certified by design/proof load testing refer document DOC/ENG/SPE/0008, Engineering Requirement for Lifting.
- n. Where no exception is taken, the quotation for the supply will be interpreted as being in full compliance with the requirements specified.

### **3.3 Component Specific Requirements**

#### **3.3.1 Ball**

The ball shall be a one-piece casting or forging. The ball port shall be cylindrical.

Full-bore valves shall be capable of being pigged, sphered and scraped regularly without debris being pushed between the valve seats and ball or into the seat ring assembly, or obstructing free movement of the seat rings reducing spring action.

#### **3.3.2 Operating Mechanisms - Hand-Wheel, Lever, Gear Operator and Actuator**

Valve operators and levers shall be to Manufacturer's standard, reviewed and accepted by the Company. Hand wheel sizes shall be limited to 800mm.

Actuator and gearbox mounting to be in accordance with ISO 5211

The maximum force required to be applied to operating mechanisms shall be limited to 200N for hand wheel operators and 350N for lever operators.

Gearboxes assembled on valves to be installed offshore shall have certified ingress protection to ingress protection (IP) Code IEC 60529-IP65, as a minimum.

For actuator specific technical compliance requirements, refer to H8-GEN-00-050-S01-0104. Actuator shall be sized for torque capacity 1.5 times the maximum long term break torque required for operating the valve at the maximum shut off differential pressure or line fluid design pressure whichever is greater.

Design torque for the drive train calculation of API 6D valves shall be at least two times breakaway torque, using the maximum design pressure differential.

#### **3.3.3 Body Cavity Relief**

For valves identified as cryogenic service in data sheets, thermal relief of fluid that could be trapped in the ball volume in closed condition shall be provided.

For valves in cryogenic application, a pressure equalizer path be provided, connecting the cavity and upstream of the valve when in closed position

#### **3.3.4 Sealant Injection Point**

Requirement to provide Seat and Stem Sealant Injection Point shall be as per Manufacturer standard. However, for "Unit" and "Facilities" shutdown/isolation valves, the emergency sealant injection shall be provided as per the data sheet. If data sheet doesn't indicate the requirement, the following shall be considered. Similarly, valves in hydrocarbon service and size  $\geq$ DN200, pressure class  $\geq$ 600# shall be provided with a sealant injection facility.

This connection shall incorporate an:

- internal non-return valve,
- giant button head,
- cover with vent holes, which seals-off the connection by plugging the sealant port.

### **3.4 Materials of Construction**

Materials for valve body and components shall be as indicated in the data sheets. For components such as glands, pins, stem key, etc, not identified in the data sheets, materials of construction shall be equivalent or superior to those specified in the data sheets for the body and shall be reviewed and agreed by the Company.

The gear box shall be made of a suitable grade of a ductile (nodular or spheroidal graphite) cast iron or valve body equivalent material.

Substitution of materials shall be as reviewed and accepted by the Company.

Valves size >DN100 (4"NB) manufactured from machining forged bar or valves machined from forged bar of size >350mm is not acceptable.

Duplex Stainless Steel materials shall be sourced from NORSOK –M650 qualified - certified suppliers or equal.

#### **3.4.1 Castings & Forgings:**

Castings shall meet the quality requirements of API 20A, casting specification levels (CSL) 3 or 4 as established by the Manufacturer – reviewed/accepted by the Company. Castings qualified to CSL level 2 or lower are not acceptable.

Repair of cast iron, ductile iron or bronze not permitted.

Repair of castings, if agreed by the Company, shall be as per procedure reviewed and approved by Company.

Forgings shall meet the quality requirements of API 20B, forging specification levels (FSL) 3 as will be established by the Company or as established by the Manufacturer – reviewed/accepted by the Company.

For forging, repair welding of material defect is not permitted.

#### **3.4.2 Bolting and Gaskets:**

Bolting / fasteners / gaskets used in construction of the valves shall be in compliance with TDT-02 for CS Alloy Bolting, TDT-03 for SS and Duplex SS Bolting and TDT-01 for gaskets.

#### **3.4.3 Elastomeric Seal Materials:**

Special elastomers, suitable for specific fluid services and resistant to explosive decompression (ED) shall be used for 'O' rings for valves in pressure ratings of Class 600 and above. For the valves in Methanol service 'O' ring seals shall be made of HNBR, James Walker Elast-O-Lion-985 or equal. Acceptability of ED resistant elastomeric materials for the range of service / temperatures for the valves is subject to review and approval of the Company.

#### **3.4.4 Applicability of NACE MR 0175**

Metallic materials for the body and wetted components of the valves in hydrocarbon service shall meet the requirements of NACE MR 0175 / ISO 15156 inclusive of HIC requirements for valve pup pieces.



### 3.4.5 Carbon Steel and Low Temperature Carbon Steel Materials

Supplemental Requirement to Materials Specifications Carbon Steel (CS) and Low Temperature Carbon Steel (LTCS):

Carbon Equivalent (CE) for CS and LTCS shall be less than 0.23% defined as per CE equation – refer ASTM A106. Impact value for LTCS @ -46Deg C shall not be less than 27J average of 3 specimen / not more than one value being lower than the same. Where asked, impact value for the CS materials shall be made available as @-29Deg C or @0Deg C or nominated material design minimum temperature (MDMT)

### 3.4.6 Austenitic and Duplex Stainless Steels:

Supplemental Requirements to Materials Specifications Stainless Steel (SS):

Non-molybdenum stainless steel grades e. g 304 are not acceptable - this applies to NON - WETTED components not identified on the data sheets

Austenitic Stainless Steel e. g. SS316/SS316L shall be used as supplied in solution annealed condition (and shall be in compliance with NACE MR0175 / ISO 15156)

Supplemental Requirement to Materials Specifications Duplex Stainless Steel:

Duplex Materials shall be sourced from NORSOK–M650 qualified certified suppliers or equal. Use UNS S31803 with min 0.14% Nitrogen or UNS S32205

Pitting resistance number (PREN) for the 22 Cr Duplex SS material shall not be less than 33 and shall not be less than 40 for the 25Cr Duplex SS as per the formula:

$$\text{PREN} = \%Cr + 3.3 * \%Mo + 16 * \%N$$

For pressure envelope components and power transmission components, impact testing shall be performed on specimens taken from mid-thickness samples representative of the maximum thickness of the actual component being qualified. Impact testing shall be performed on each combination of steel heat and treatment batch at the minimum design temperature indicated for the valves. For sub-size CVN specimens the test temperature shall be reduced in accordance with ASME Section VIII Table UG-84.2. Impact testing shall be performed per ASTM A923 with acceptance criteria per Table 2.

Corrosion testing shall be performed per ASTM G48 practice A at 22 °C for 22Cr Duplex SS and at 40°C for 25Cr Duplex SS.

#### **Nickel- Aluminium Bronze**

The body material shall (as a minimum) be cast Ni-Al bronze – ASTM B 148-C95800. Aluminium Content shall be limited to 10% maximum.

#### **Titanium**

Castings shall be ASTM B367 Grade C2, Supplementary Requirement S1 and S2 shall be applicable.

#### **Alloy 825**

Material shall be capable of passing Practice C inter-granular corrosion test as specified in ASTM A262, corrosion rate not exceeding 3.0mm per year. Any additional requirements specified in valve data sheets shall be met.

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**3.5 Non Destructive Examination (NDE) Requirements – Manufacturing Phase –Pre-Assembly**

A prototype casting shall be (or shall have been) fully inspected and tested by the manufacturer in accordance with ASME B16.34 Section 8.0. Also, subsequent type test of the valve shall be readily available for review.

Extent of Production NDE of body and components (also refer appended NOTES 1, 2 and 3):

<b>Castings and Forgings – Body and Components</b>							
	<b>Pressure Class</b>	<b>Size Range</b>	<b>Materials of Construction</b>	<b>NDE (Type and Extent)</b>			
				Visual	RT or UT (refer Notes 2,3)	MPI (for CS, LTCS and Duplex SS Materials)	DPI (for Ferrous /Non Ferrous Materials)
<b>Valves Category 1</b>	Class 150# Class 300#	≤ DN400	CS, LTCS & Duplex SS	100%			
	Class 600# Class 900#	≤ DN40	SS & Non-Ferrous Alloys	100%			
<b>Valves Category 2</b>	Class 150#, Class 300#	≥ DN450	CS, LTCS & Duplex SS	100%		100% body and components	
	Class 600#, Class 900#,	≥ DN50	SS & Non-Ferrous Alloys	100%			100% body and components
	Class 1500# Class 2500#	All Sizes					

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<b>Weld Joints– Body, Components, Weld Ends, Pup Pieces and Extensions</b>							
	<b>Pressure Class</b>	<b>Size Range</b>	<b>Materials of Construction</b>	<b>NDE (Type and Extent)</b>			
				Visual	RT or UT	MPI (for CS, LTCS and Duplex SS Materials)	DPI (for Ferrous/Non Ferrous Materials)
Fillet Weld	All Classes	All Sizes	All Matls	100%			100%
Butt Weld	All Classes	All Sizes	All Matls	100%	100%*		
Weld Overlay	All Classes	All Sizes	All Matls	100%	100% UT		100%

Notes:

1. HT- per Material Specification and NACE MR 0175 ISO 15156 applicable for all Sour Service Components.
2. Actuated valves in general to be considered similar to Category 2 valves and 100% Stress Critical Area to be RT or UT in lieu.
3. Supplier to check, if additional requirement for RT and or UT of stress critical areas if applicable per data sheet and the Materials Requisition

### 3.6 Inspection and Testing Requirements

#### 3.6.1 Pressure Integrity Tests

##### Minimum Testing Requirements

The following testing requirements describe minimum compliance points. The project specification may provide requirements in addition to the following:

- a. All valves shall be tested in accordance with the applicable standard specified in the valve data sheet.
- b. All valves specified to API 6A, shall follow the requirements given by the design code and the referenced Product Specification Levels (PSL) and Performance Requirements (PR). COMPANY is responsible to establish applicable Performance Requirement (PR) and Product Specification Level (PSL).
- c. Hydrostatic seat test for bi-directional valves shall be carried out in both directions.
- d. Pressure testing shall not be conducted through a connection in the bonnet of the valve.
- e. After pressure testing, test water shall be immediately drained and valves shall be dried by blowing with oil-free dry air or dry nitrogen ( $-20^{\circ}\text{F}$  [ $-28.9^{\circ}\text{C}$ ] dew point) at a temperature not to exceed  $140^{\circ}\text{F}$  ( $60^{\circ}\text{C}$ ).
- f. Valves not subject to an applicable international standard shall be tested in accordance with the procedure in MSS SP-61, except that test pressure shall be as shown in Table 3 below.

Test Type	Test Pressure
<b>Shell</b>	<b>1.5 x RWP</b>
<b>Seat</b>	<b>1.1 x RWP</b>
RWP = Rated Working Pressure	

The assembly shall be functioned at least 3 times before commencing the test.

Shell Test: Min test duration will be 15 minutes.

Seat Test: Min test duration will be 5 minutes.

- Permissible leak rate: Shell test = zero
- Seal leak rate for resilient seat = BS EN 12266-1-Rate A
- Seat leak rate for metal seat = BS EN 12266-1-Rate B

##### Specific Requirements Related to Pressure Tests:

1. In case of large scale orders, the Supplier shall provide a matrix indicating the valves (item no. and quantity) that undergo various integrity tests.
2. Low Temperature Type Tests, High Temperature Type Tests and Fugitive Emission Tests, if specified in the Material Requisition, the details shall be as reviewed by the Company. Refer paragraph 3.6.3 for acceptance criteria for such

specific tests. The Principal may choose to accept historical data on review of production testing regime at manufacture.

3. The duration of pressure integrity tests shall be minimum 15 minutes post stabilization of pressure or as agreeable by the Principal representative to conclude satisfactory witness of the tests.
4. Water for hydrostatic shall be clean and chlorine content shall not exceed 50ppm for use on CS and Alloy Valves and 2.0ppm for use on SS and Duplex SS Valves
5. The valves shall be dried post hydrostatic tests
6. Torque levels shall be reported during the seal integrity test / functional test operations.
7. Additional test requirements in reference to API 598 – Table 1 and Table 2 - options:

<b>Ref. API 598 Table 1</b>	<b>Extent of Tests</b>	
<b>Test Descriptions</b>	Floating Ball	Trunnion Mounted Ball
High Pressure Closure Test – Pneumatic	Min 1 valve + additional 1 per every 5 valves in Hydrocarbon Service.  All actuated shut down / isolation valves in Hydrocarbon Service	All valves in Hydrocarbon Gas Service.  All actuated shut down / isolation valves in Hydrocarbon Service
<b>Ref. API 598 Table 2</b>		
High Pressure Closure Test – Pneumatic	All valves in Hydrocarbon Service.  All actuated shut down / isolation valves in Hydrocarbon Service	All valves in Hydrocarbon Service  All actuated shut down / isolation valves in Hydrocarbon Service

### **3.6.2 Post Pressure test Torque Check of Bolting**

All valve pressure retaining bolting shall be torque checked post High Pressure Hydrostatic and Gas testing activities. Manufacturer’s Inspection and Test Plan (ITP) shall incorporate the post pressure test torque check.

Manufacturer’s ITP to be submitted for client review post Purchase Order award and to be incorporated into the Manufactures Materials Data Dossier (MDD). Results of post pressure test torque check shall be incorporated in the MDD, along with calibration test certificates of the torque checking tool. These calibration certificates shall be less than 1 year old.

### **3.6.3 Specific Type Tests and Acceptance Criteria**

#### **3.6.3.1 Fugitive Emission Test**

**Procedure:**

Manufacturer's written standard in conformance to ANSI/ISA 93.00.01 or ISO 15848-1 and ISO 15848-2 or equivalent.

Following variations are permitted:

- Thermal Cycling Not Required
- 45 of mechanical cycles in ambient conditions are considered. Each mechanical cycle consists of pressurize the test section, operate the closure member, depressurize the downstream of the closure member, operate the closure member (against differential pressure) to half open condition, pressurize the test section to test pressure level. Number of such mechanical cycles may be restricted to 45 only. Obtain fugitive emission reading at intervals through to completion of mechanical cycles.

**Acceptance Criteria:**

All hydrocarbon service – 100ppm

Category M Fluid Service and all monoflange valves – 20ppm

Toxic/Lethal Service, bellow sealed valves– 0 ppm

#### **3.6.3.2 Temperature Type Tests – low temperature / high temperature**

**Procedure:**

Per Manufacturer's written standard as reviewed and approved by the Company

**Acceptance Criteria:**

Operating performance shall be evaluated similarly as for tests conducted at ambient temperatures.

#### **3.6.3.3 Mechanical Integrity Test for Facility ESD Valves**

For top entry valves, the Company may choose to request demonstration of feasibility of disassembly and retrofit of the valve components, while holding the valve under the simulated piping bending moment load condition on the test rig. There shall not be any obvious injurious distortion of the components.

#### **4 GENERAL QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)**

Supplier shall have in place a Quality System that is can be shown to be conforming to the requirements specified in document DOC/CMP/PRO/002 and OR H8-GEN-00-000-S01-2025

Inspection and test plan (ITP) shall be submitted by the Supplier covering all the steps of manufacture and the likely QA/QC procedures planned for being implemented. The ITP will be marked up and returned by the Company, confirming the extent of witnessing and review those QA/QC procedures planned to be implemented.

##### **4.1 Traceability and Certification**

Traceability requirements are specified in BUGEN-00-000-S01-0107.

- Pressure containment parts body / trim components and torque transmission parts – per BS EN 10204 type 3.1 Level A
- All other parts – per BS EN 10204 type 2.1 Level B
- Pressure integrity and Functional Integrity tests – per BS EN 10204 type 3.1 Level A
- Non Destructive Examination tests - per BS EN 10204 type 3.1 Level A

NOTE: seat seal and metallic ring gaskets shall be considered as similar to trim components.

##### **4.2 Marking**

Marking as per Manufacturer's standard.

For each valve the charge number or heat number of the castings or forging of the body shall be cast in or stamped on the material.

The pup pieces if provided shall carry stamp of heat number, material identification, size and thickness details.

Preferred flow direction, if applicable shall be clearly and permanently marked

##### **4.3 Name Plate and Tagging**

A permanently attached stainless steel tag, stamped with the following information shall be provided on each valve:

- Tag Number
- Manufacturer's name or Trademark
- Model Number
- Serial Number
- Nominal Size (DN) of valve
- Body and Trim material
- Pressure / Temp rating
- Code Stamp

NOTE: An additional tag sheet made of SS316 shall be supplied mounted wired on to the valve. The tag sheet shall read the tag no., PO No., item no and serial number of the valve.

#### **4.4 Drawing and Documentation Requirements**

The minimum drawings and documentation requirement is as stated below;

- Outline/General Arrangement Drawing
  - Require General Arrangement drawing showing arrangement, key dimensions, weight and utility connection.
- Cross Sectional Drawing
- Mechanical Test Report
- Material Test Certificate
- Pressure Test and Function Testing Report
- Surface Preparation and Coating Report (where applicable)
- Shipping and Packing Certificate

Additional drawings and documents shall be provided in accordance with the requirements contained within the Material Requisition (where issued).

#### **4.5 Drying, Painting and Preservation Requirements**

Post completion of successful testing, the valve shall be drained and vented and then thoroughly dried free of wet surface and moisture. Where required the valve shall be thoroughly purged.

Preservation shall be applied to all the trim components post drying of the valve internals. The Volatile vapour preservative is preferred. Preservation shall be applied so that, provided the package remains unopened, undamaged and handled in accordance with the Supplier's marking and shipping instructions, negligible degradation will occur for a minimum period of twelve months from the date of dispatch from the Supplier's works.

Painting and Protective coating shall be provided to the external of the valve body assembly as specified in, "Project Coating Specification for New Offshore and Onshore Structures - DOC/ENG/SPE/0010.

#### **4.6 Packaging and Shipping Requirements**

Refer to Purchase Order standard document "Santos Export Packing & Marking Procedure - ALL/SUP/LOG/PRO/2000".



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SUPPLY OF BALL VALVES

**Appendix A – Tag numbers for Valves**

Object - Valve	Valve Type Code	Pressure Rating Code (ASME B16.5/ ASME B16.7)	Body Material Code	End Connector Type Code	Internal Diameter Type Code	Operator Type Code
<b>V</b>	<b>B, C, etc. - - Y</b>	<b>A, B, C, D, E, F</b>	<b>B, C, etc. - T</b>	<b>F, J, etc. - - W</b>		
	B- Ball Valve	A-Class 150#	B-Ni-Al Bronze	F-Flanged, RF or FF, Series A for Size >=DN700	01, 02- RB - - Regular/ Reduced Bore	Blank – Lever
	C-Check Valve	B-Class 300#	C-Carbon Steel	J – Flanged – RF RTJ	03, 04-Full Bore /Through Bore	B – Bare Shaft
	G-Gate Valve	C-Class 600#	D-Duplex Stainless Steel (22Cr)	N – Threaded NPT		G- Gear Box
	H- Knife Gate Valve	D-Class 900#	L-Low Temperature Carbon Steel	P – Hub Connector		AC HYD- Hydraulic Actuator
	L-Globe Valve	E-Class 1500#	M- Monel	R – Series B Flange for Size >= DN700		PC PNE- Pneumatic Actuator
	N-Needle Valve	F-Class 2500#	N-Alloy Steel 825	T-Compact Flange		
	U-Customized		S-Stainless Steel Type 316, 316L	U–Customized		
	X-Modular Valve and Monoflanges		T - Titanium	W – Weld Ends		
Y-Butterfly Valve						
<b>Example of Valve Coding:</b>						
<b>VBDCP02G</b> – Valve, Ball, ASME B16.5 Class 900#, Carbon Steel Body, Hub Connector Ends, Reduced Bore, Gear Box Operator						
Note: In the SAP Catalogue, Nominal Size of Valve is added as suffix to the Valve Code, e.g. VBDCP02G-250 would mean Valve Tag No. VBDCP02G – Size DN250 (10”NB)						

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**Appendix B – Checklist to Be Filled in and Returned with the Tender**

<b>SI No.</b>	<b>Description</b>	<b>Yes / No*</b>	
1	Proposal includes a Bill of Material with correct Supplier Item Codes and Descriptions	YES <input type="checkbox"/>	NO <input type="checkbox"/>
2	All the items are in compliance with technical requirements specified in the relevant Data Sheets	YES <input type="checkbox"/>	NO <input type="checkbox"/>
3	All the items are in compliance with technical requirements specified in the “Technical Delivery Terms for Supply of Valves – TDT 010”	YES <input type="checkbox"/>	NO <input type="checkbox"/>
4	The quote includes sample General Arrangement Drawings of the Valves	YES <input type="checkbox"/>	NO <input type="checkbox"/>
5	Confirm Supplier Quality Requirements are well understood	YES <input type="checkbox"/>	NO <input type="checkbox"/>
6	The quote includes a sample ITP	YES <input type="checkbox"/>	NO <input type="checkbox"/>
7	The quote includes sample schedule (indicating supply cycle period from the date of placement of an order)	YES <input type="checkbox"/>	NO <input type="checkbox"/>

\*Deviation to be explained in the quote against any of the checklist items.