

Prefero™



**SPECIAL
DESIGN
BALL VALVES**

SUBSEA
CRYOGENIC
METAL SEATED

SUBSEA BALL VALVES

General

Brief Description

Main design characteristics and attributes of Perar sub-sea ball valves are generally similar to the topside valves, with additional features to withstand the external pressure and the sub-sea environment.

Perar do not recommend any particular design. Generally is the Engineering Companies that specify the ball valve design to be followed according with its specification. Indeed PERAR had experiences in supplying sub sea ball valves in all different design: split body side entry, fully welded designs and top entry.

Please consider the enclosed drawings relevant to previous supplies of sub-sea ball valves.

Generally the most frequent requirements include for double piston sealing system, special heavy coating, sub-sea gearbox or c/w ROV adapter receptacle connection. Perar is developing a new sub-sea gearbox that allows operating high torque with a small input force by mean of few hand wheel turns. This solution makes easier diver interventions. Moreover, PERAR can carry out hyper baric tests in a hyper baric chamber at their own premises. Please see Perar Hyper baric Test Procedure here enclosed.

Technical Details

Sizes: From 1/2" up to 60"

Classes: ANSI 150-300-600-900-1500-2500

API 2000-3000-5000-10000-15000

Materials: Low Temperature Carbon Steel, Stainless Steel, Duplex, Super Duplex Special Alloys.

Standard Design Features

ALL PERAR BALL VALVES INCLUDE THE FOLLOWING TECHNICAL FEATURES:

- Block & Bleed or upon request *Double Block & Bleed*.
- Anti blow out stem proof design.
- Anti-static device.
- Spring loaded seats.
- Soft or metal seated.
- Self-relieving seats or upon request *Double Piston effect*.
- Flanged RF & RTJ, BW, c/w transition pieces (pups) or Hub ends.

Please see the relevant sketches in technical details section.

Perar's valves are field repairable. All ball and seats are interchangeable

Stem Design

The stem is independent from the ball and is a blowout proof design.

The stem seals consist on a triple barrier of '**O**' Rings, located in the stem bushing.

Regardless of size and pressure rating the top 'O' Ring can be replaced with the valve installed on a pressurized line.

Please refer to Technical details.

Perar's Low Torques

The torque is transmitted to the ball by a generously mating joint, therefore the stem is not affected by the side thrust. Perar's valves are self-lubricated by means of DU Dry bearings located in the upper and lower trunnion. This enable the valve to be operated with minimum friction and therefore with low torque. Allowing a smooth run during open/close operation, Perar's design contributes to a substantial cost saving in the selection/sizing of the actuator.

Additional Features

Double Piston Effect Seat

Double Piston Effect seat system can be provided. The seat seal may be designed to provide additional sealing capability i.e. the cavity pressure is enhancing the contact pressure between seat and ball because of the differential areas which creates a piston effect, forcing the seats against the ball. In such a case it is recommended that a pressure **relief valve** be installed to protect the body cavity from excess pressure.

Emergency Sealant Injection System

If required, an Emergency Sealant Injection System is available at the Stem and Seat areas. An Emergency Sealant Injection System through the seat up to the ball contact circle may provide temporary sealing until the time when it will be possible to restore the primary seal. A grease injector at the stem is also available. These systems are usually fitted for valves 6" and above, although specific application on smaller valves are possible. Please refer to Technical details for sketches.

Stem Extension

Our customer to operate a valve, which is not easily accessible, requires stem extensions. Perar can provide any type of stem extension for manual, gear or actuated valves together with piping and fittings suitable to raise the body vent, the body drain, and the emergency sealant injection fittings to the required level.

Pup Ends

But welding ends valves may be supplied with transition pieces. Length of pups and matching details (i.e. pipe material and thickness) must be specified by the customer.

Hub Ends

For high-pressure valves in offshore development Perar's customers are increasingly requiring special hub ends, which can save weight and material. Customer to supply drawing/specification for hubs machining.

Reference List

Client / Contractor: **J.P. Kenny**
End User: Trinidad and Tobago
Project name: **mbax Pipeline Project**
Main Valve Size: 12", 20", 24", 26", 36", 40", 48" / 600#
Year of Supply: 2001
Note: Fully Welded and Bolted Body Construction, Sub-sea and Onshore Ball Valves, Soft Seated and Metal to Metal Seated achieved by Tungsten Carbide Coating, LF6 Body Material.
Please note that this is the biggest sub-sea manifold ever built in the world. Valves actuated by Dantorque for which concern the Sub-sea portion and by Bettis and Shafer for the onshore portion.

Client / Contractor: **PETROBEL**
End User: PETROBEL
Project name: **Temsah Gas Development Project**
Main Valve Size: 3" to 26" / 300#, 900#
Year of Supply: 2000
Note: Top Entry Construction. Metal seated (Tungsten Carbide)

Client / Contractor: **ESSO PRODUCTION MALAYSIA INC.**
End User: ESSO PRODUCTION MALAYSIA INC.
Project name: **Satellite Field Development**
Main Valve Size: 6" to 12" / 1500#
Year of Supply: 2000
Note: Top Entry Construction. Hyperbaric test has been provided. Metal seated.

Client / Contractor: **PETROBEL**
End User: PETROBEL
Project name: **Temsah Gas Development Project**
Main Valve Size: 3" to 26" / 300#, 900#
Year of Supply: 2000
Note: Top Entry Construction, Metal seated (Tungsten Carbide)

Client / Contractor: **BLUEWATER**
End User: SHELL
Project name: **Plem Project / Sri Lanka**
Main Valve Size: 10" / 300#
Year of Supply: 1998

Client / Contractor: **MÆRSK OLIE OG GAS**
End User: MÆRSK
Project name: **Tyra East**
Main Valve Size: 14" & 24" / 900#
Year of Supply: 1997
Note: Fully Welded Construction

Client / Contractor: **BLUEWATER**
End User: BP COLUMBIA
Project name: **Cusiana-Cupiaga Field Development / Covenas Terminal TLU-2**
Main Valve Size: 16", 36", 42" / 150#, 300#
Year of Supply: 1994
Note: Split Body & Fully Welded Construction

Sample Drawings of Perar Supplied Ball Valves

Please refer to the attached drawings.

CRYOGENIC BALL VALVES

General

Brief Description

Perar has specialized in Low Temperature and Cryogenic service to the extreme temperature of minus 196 Deg C, in accordance to the most stringent specifications.

Perar Ball Valves in cryogenic service are supplied with extended bonnet with a sufficient gas column length (vapour space) to keep the stem seals exposed only to vapour and not the cold liquid to ensure functional integrity. Suitable seals are selected considering the customer's process indication. PTFE lip seal spring energized or KEL-F O'Rings are commonly used. A large number of valves of different design, size and pressure have been tested at Perar's facilities at various temperatures with Helium/Nitrogen mixture. Certifications and procedure are available, duly stamped by different Third Party Authorities. Perar can offer a wide range of body materials as F316, F44, F51, XM-19 in order to meet the requirements of any application. Furthermore Perar has developed a long experience in providing the right seat and seals for all the different services required nowadays by the market, KEL-F, PTFE/Elgiloy, PTFE/AISI 302 and others are commonly utilized and our Engineering Department can assist our customer in selecting the correct material. Perar do not recommend any particular design. Generally is the Engineering Companies that specify the ball valve design to be followed according with its specification. Indeed PERAR had experiences in supplying cryogenic ball valves in all different design: split body side entry, fully welded designs and top entry.

Technical Details

Sizes: From 1/2" up to 60"

Ratings: ANSI 150-300-600-900-1500-2500

API 2000-3000-5000-10000-15000

Materials: LT Carbon Steel, Stainless Steel, Duplex, Super Duplex Special Alloys.

Standard Design Features

ALL PERAR BALL VALVES INCLUDE THE FOLLOWING TECHNICAL FEATURES:

- Block & Bleed or upon request *Double Block & Bleed*.
- Anti blow out stem proof design.
- Anti-static device.
- Spring loaded seats.
- Soft or metal seated.
- Self-relieving seats or upon request *Double Piston effect*.
- Flanged RF & RTJ, BW, c/w transition pieces (pups) or Hub ends.

Extended Bonnet

All valve designs that Perar can offer of its Cryogenic Ball Valves (Top Entry TE/TD, Split Body EC/EB, Fully Welded WC/WB, Floating Ball Valves FC/FA) will be supplied with extended bonnets/glands with a vapour space (condensing chamber) between valve body and stem packing / seals in order to maintain the packing and or seal material sufficiently near ambient temperature for optimum sealing characteristics and to permit normal operation.

Stem Design

The stem is independent from the ball and is a blowout proof design. The stem seals consist on a triple barrier of '**O**' Rings, located in the stem bushing. Regardless of size and pressure rating the top 'O' Ring can be replaced with the valve installed on a pressurized line.

Perar's Low Torques

Even if Cryogenic Ball Valves usually have higher torques than valves operating in standard condition, Perar's self-lubricated valves will enable the valve to be operated with minimum friction and therefore relatively lower torques. The torque is transmitted to the ball by a generously mating joint, therefore the stem is not affected by the side thrust.

Standard Materials utilized for general appliacion

We propose herewith three different standard material solutions for Perar Cryogenic Ball Valves suitable from -110°C up to +150°C.

ANSI Class 150#, 300#, 600#

Body:	ASTM A182 F316
Ball:	ASTM A182 F316+ENP or XM19 – Zerum 100
Stem:	ASTM A182 F316+ENP or XM19 – Zerum 100
Seat:	ASTM A182 F316+KEL-F Insert (for Trunnion Design)
O'Rings:	PTFE/Elgiloy
Gaskets:	Graphite

ANSI Class 150#, 300#, 600# Low Temperature Carbon Steel Ball Valves (-46degC)

Body:	ASTM A182 F44
Ball:	ASTM A182 F44
Stem:	ASTM A182 F44 or UNS S31254 or XM19
Seat:	ASTM A182 F44 + KEL-F Insert
O'Rings:	PTFE/Elgiloy
Gaskets:	Graphite

ANSI Class 150#, 300#, 600# Stainless Steel Ball Valves

Body:	ASTM A182 F304
Ball:	ASTM A182 F304+ENP
Stem:	ASTM A182 F304+ENP or XM19
Seat:	ASTM A182 F304+ENP + KEL-F Insert
O'Rings:	PTFE / AISI302
Gaskets:	Graphite

ANSI Class 900#, 1500#, 2500#

Body:	ASTM A182 F316
Ball:	UNS S 20910 (XM19)
Stem:	UNS S 20910 (XM19)
Seat:	UNS S 20910 (XM19)+KEL-F Insert (for Trunnion Design)
O'Rings:	PTFE/Elgiloy
Gaskets:	Graphite

Reference List

Client / Contractor	Score Europe
End User	BP/Amoco
Project name	Magnus Enhanced Oil Recovery / WoodGroup (Offshore) / Amec (Onshore)
Scope of Supply	2" to 12" / 150 to 2500 and 10.000psi
Operator	Manual
Year of supply	2001
Notes	CS / SS-316 / Duplex / SS Cryogenic
Client / Contractor	M.W. Kellogs
End User	Exxon Chemical Singapore
Project name	Exxon SOP (Singapore Chemical Complex) - Jurong Island.
Scope of Supply	1/2" to 12" class 150 to 1500
Operator	Manual and actuated c/w Biffi pneumatic.
Year of supply	1999
Note	Cryogenic valve down to -101 c/w Lip-seals, and High temperature up to 510 deg C. Metal seated and graphite seals c/w extended bonnet.
Client / Contractor	Kerr McGee (UK)
End User	Kerr McGee
Project name	Janice Offshore Platform.
Scope of Supply	2" to 16" class 150 to 2500 Split body & Top Entry.
Operator	Manual and Actuated c/w Bettis.
Year of supply	1998
Note	Cryogenic test at minus -106 Deg C were part of the scope of supply for valves up to class 2500. Top Entry 12"/1500 metal seated.
Client / Contractor	Amec Process & Energy
End User	Amec Process & Energy
Project name	Brae Project Alliance – Kingfisher
Scope of Supply	2" to 10" class 600 to 2500 Split Body
Operator	Manual
Year of supply	1997
Client / Contractor	Kværner Process (UK).
End User	British Petroleum
Project name	BP Bruce Phase II.
Scope of Supply	2" to 18" class 150 to 2500 & API 10000.
Operator	Manual and Bettis actuator
Year of supply	1997
Note	Cryogenic test at minus -101 Deg C (10"/2500). All tests with Nitrogen and Helium gas were performed in house, procedures are available. Materials such as ASTM A182 F44 (6Mo) and Duplex were the major material used.
Client / Contractor	Amoco Exploration Company
End User	BP-AMOCO
Project name	Cats Terminal Project
Scope of Supply	3/4" to 10" class
Operator	Manual
Year of supply	1996
Note	Cryogenic for -130 Deg C (10"/150).

Sample Drawings of Perar Supplied Ball Valves

Please refer to the attached drawings.

METAL SEATED BALL VALVES

General

Brief Description

Perar has developed a special design for high performance ball valves to be used in extreme conditions like abrasive, slurry and high temperature services.

Each Valve is designed according to the service conditions, however the basic design of Perar metal seated ball valves includes hard-faced ball and seat on sealing areas, improved seat sealing system with high performance springs, stem extension (in case on high temperature service), etc...

Perar metal seated valves has reached the astonishing target of assuring our customers bubble tight sealing in true metal to metal contact between ball and seat. Perar has already tested its metal-seated valves in accordance to the most stringent procedures (i.e. BS 6755 leakage rate) with excellent results. In addition, Perar has built an internal loop for testing metal-seated valves, where high content of sand is injected into the system at high pressure. The valve c/w a pneumatic actuator is then operated for up to 1000 cycles (open/close). This has brought a considerable amount of information to our Research & Development department that has been able to compare the different coating applied to the ball and seats. Perar metal-seated valves are available in different design: Top Entry, Split Body and Fully Welded, Cryogenic and Subsea.

Technical Details

Sizes: From 1/2" up to 60"

Ratings: ANSI 150-300-600-900-1500-2500

API 2000-3000-5000-10000-15000

Materials: Carbon Steel, LT Carbon Steel, Stainless Steel, Duplex, Super Duplex Special Alloys.

Standard Design Features

ALL PERAR BALL VALVES INCLUDE THE FOLLOWING TECHNICAL FEATURES:

- Block & Bleed or upon request *Double Block & Bleed*.
- Anti blow out stem proof design.
- Anti-static device.
- High Performance Spring loaded seats.
- Self-relieving seats or upon request *Double Piston effect*.
- Flanged RF & RTJ, BW, c/w transition pieces (pups) or Hub ends.
- True Metal to Metal contact achieved by specials coatings (Tungsten Carbide, Stellite, Nickel, etc...).

Metal to metal Seating

The ball and the seat rings are hard-faced on the sealing areas by using different coatings selected upon the service conditions i.e. Electroless Nickel Plating, Stellite hard facing, Chromium Carbide and above all Tungsten Carbide which assures, according to our experience, the best results in most applications. The sealing is assured by true metal to metal contact between the two hard-coated surface. Each coating is applied according to specific methodologies, i.e. Tungsten Carbide is applied by high velocity detonation gun.

Stem Design

The stem is independent from the ball and is a blowout proof design. The stem seals are designed according to the service conditions, i.e. for high temperature valves (above 250 degC) stem seals is composed of loaded graphite packing. Valves for high temperature conditions are designed with extended stem in order to maintain the maximum sealing capacity of the packing.

Reference List

Client / Contractor	J.P. Kenny (Houston – USA)
End User	BP Trinidad and Tobago LLC
Project name	BP Bombax Pipeline Project Block
Scope of Supply	20", 26", 36" and 48" class 600
Operator	Gear and Actuated
Year of supply	2001
Notes	Fully Welded Body & Bolted Body Construction – Soft Seated and Metal to metal. This is the biggest sub-sea manifold ever manufactured in the world.
Client / Contractor	Saipem Indonesia
End User	Conoco
Project name	Block B Natuna Sea Pipeline, Flowlines and Subsea Equipment for the Additional Dry Gas Fields
Scope of Supply	2" - 18" class 900 and 1500
Operator	C/W Sub-sea gearbox + ROV receptacle Sub-sea development.
Year of supply	2001
Notes	Fully Welded Body Construction – Metal to metal
Client / Contractor	Kellogg Brown & Root – Technip
End User	Phillips Petroleum
Project name	Q-Chem Petrochemical Complex
Scope of Supply	2" to 24" class 150 to 2500
Operator	Manual and Actuated
Year of supply	2000
Notes	The order included metal to metal ball valves for high temperature service up to 500 degC achieved with Tungsten Carbide hardfacing of the seats, ball and stem and cryogenic ball valves up to –101 degC provided with both soft sealing system and metal to metal sealing system.
Client / Contractor	Esso Production Malaysia Inc.
End User	Esso Production Malaysia Inc.
Project name	Satellite Field Development
Scope of Supply	6" - 12"/ 1500. Top Entry design.
Operator	Manual
Year of supply	2000
Notes	Metal to metal construction.
Client / Contractor	Total Oil & Gas (Venezuela).
End User	Total
Project name	Deep Josepin - Onshore
Scope of Supply	2" to 10" class 2500 & 1" ^{13/16} to 9" API 10000, Split body design.
Operator	Fluid System actuators.
Year of supply	2000
Notes	8" class 2500 & 9" API 10000. Total class 'E' type, metal to metal, Inconel 625 cladding at stem and seats areas.
Client / Contractor	Petrobel/ENPPI
End User	Petrobel
Project name	Temsah - Sub-sea Development.
Scope of Supply	3" to 26" class 300 to 900 - Top Entry Design.
Operator	Gear operated.
Year of supply	2000
Note	26" class 900 metal seated, sub-sea. Plus 12" & 4" class 900.

Project name	Captain Offshore Platform.
Scope of Supply	3/4" to 20" class 150 to 2500. Top Entry & Split body design.
Operator	Manual, as well as Bettis actuators.
Year of supply	1999 – 2000
Note	18" class 2500 metal to metal Top Entry and Split body design. The above project includes a wide range of design and materials: Top Entry, Split Body, double piston effect seats, metal seated, Inconel 625 overlay and Duplex material for a total project value of 5,000,000 US Dollars.
Client / Contractor	Kværner Process (USA)
End User	CONOCO
Project name	Conoco Dez-Gas Project - Syria
Scope of Supply	1/2" to 30" class 150 to 2500. Split Body design .
Operator	Manual
Year of supply	2000
Note	The order included Metal to Metal ball valves for high temperature service up to 700 degF and cryogenic ball valves up to –101 degC. The total value of the order exceed 2.5M USD.
Client / Contractor	Total Indonesie
End User	Total
Project name	Balikpapan - Indonesia
Scope of Supply	8" to 18" class 900 to 2500
Operator	Manual
Year of supply	1999
Note	Total class 'E' 18"/900 valve metal seated.
Client / Contractor	M.W. Kellogs
End User	Exxon Chemical Singapore
Project name	Exxon SOP (Singapore Chemical Complex) - Jurong Island.
Scope of Supply	1/2" to 12" class 150 to 1500
Operator	Manual and actuated c/w Biffi pneumatic.
Year of supply	1999
Note	Cryogenic valve down to -101 c/w Lip-seals, and High temperature up to 510 deg C. Valves were supplied metal seated and graphite seals c/w extended bonnet.

1.1 Sample Drawings of Perar Supplied Ball Valves

Please refer to the attached drawings.