DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. P-11303
This Certificate consists of 4 pages

This is to certify that the

Ball Valve

with type designation(s)

Super Star N.1, Master Star N.3, Standard

Manufactured by

Starline S.p.A.

S. Paolo D'Argon (Bergamo), Italy

is found to comply with

Det Norske Veritas' Rules for Classification of Ships and Mobile Offshore Units

Application

The valves may be used in the following systems: Fresh and sea water, Compressed air, Hydraulic oil, Fuel oil, Lubrication oil, Cargo oil and Saturated steam (see cert. for limitations)

Temperature range:	Depend on materials (see cert.)
Max. working press.:	68 bar to 138 bar (dep. on size, see cert.)
Sizes:	1/4 to 4" (see cert.)

Place and date
Høvik, 2002-09-24
for DET NORSKE VERITAS AS

Kjell Folge
Head of Section

DET NORSKE VERITAS * 1864 *

Local Office
DNV Milan

This Certificate is valid until
2006-12-31

Kristian Lindelof
Surveyor

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

The valve consists of body and two end pieces bolted together. The body is a swing out type. Full- or reduced port. The ball is a forged steel ball of the floating type.

End connection configurations:

Threaded, BSPP and BSPT acc. BS21 and NPT acc. ASME B1.20.1
Flanged, acc. ASME B16.5
Bevelled Weld Ends acc. ASME B16.25
Plain and Socket Weld Ends acc. ASME B16.11

Material combinations body/trim

Body and Flanges	Trim (Ball, Seats, Stem Trunnion and Springs)
ASTM A105	ASTM A182 F316
ASTM A350 LF2	ASTM A182 F316
ASTM A182 F316	ASTM A182 F316

Size ranges:

Master Star N.3:	¼" to 1½" full bore	½ " to 2" reduced bore
Super Star N.1:	¼" to 3" full bore	½ " to 4" reduced bore
Standard:	¼" to 1½" full bore	½ " to 2" reduced bore

Application/Limitation

Valve type Standard may not be used in systems for hydraulic-, fuel-, lubrication- and cargo oil.

Maximum working temperatures for valves with the following body and sealing materials:

Part and material	**Temp. range**
Body material:	
ASTM A105 *)	-29 to 260 °C
ASTM A350 LF2 *)	-45 to 260 °C
ASTM A182 F316	-55 to 260 °C
Sealing material:	
Virgin PTFE	-55 to 200 °C
Reinforced PTFE, 15% fibreglass	-55 to 220 °C
Reinforced PTFE 20% carbon and 5% graphite	-55 to 250 °C

*) - Carbon steel used in body and bonnet shall be charpy tested when the thickness exceeds 6 mm, and the minimum working temperature is -10 °C or lower. Acceptance criteria according to DNV Cert. Notes 2.9 No. 101, 3.3.

Maximum working pressure and flange rating is depending upon and bore and size:

DN		Max. Flange Rating	Max. Working Pressure
FB	RB		
1/4 - 3/8"	1/2"	800 lbs	138 bar
1/2	¾		
3/4	1"		
1"	1 ¼"		
1 1/4"	1 ½"		
1 1/2"	2"		
2"	2 ½"	600 lbs	99,3 bar
2 1/2"	3"		
3"	4"	400 lbs	68 bar

At elevated temperatures, the maximum working pressure has to be reduced with the following factors:

Temp	Carbon Steel	Stainless Steel
20 °C	1	1
50 °C	1	0,95
100 °C	1	0,85
150 °C	0,89	0,77
200 °C	0,81	0,71
260 °C	0,70	0,66

Valves with threaded end couplings may not be used for flammable fluids within machinery spaces of Category A. Of threaded end couplings may only tapered threads of sizes up to DN 25mm be used for in piping class I and II systems. In class III piping systems may sizes up to DN 50mm be accepted for both parallell and tapered threads.

All valves larger than DN 50 for hydrocarbon service shall be fitted with an anti-static device that will ensure electrical conductivity between the ball and the valve body. For valves DN 50 and smaller, only electrical conductivity between ball and stem is required.

The valve housing shall be subject to a hydrostatic pressure test at minimum 1.5 times the design pressure. Holding time: 2 minutes, no leakage permitted.

The approval does not include actuator and/or other equipment for remote control of the valves.

No product certificate is required.

Type Approval documentation

Manufacturers catalogue N.2/2000
Drawings no: DNV-TAC-12010000A, DNV-TAC-12010001A, DNV-TAC-12010001, DNV-TAC-12010000, DNV-0412010002, DNV-0412010002-A

Tests carried out

Fire test (Super Star and Master Star), Burst pressure test

Marking of product

For traceability to this type approval, each valve is at least to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Size
- Pressure class

Certificate retention survey

For retention of the Type Approval, DNV Surveyor shall perform a survey every second year, to verify that the conditions for the type approval are complied with.

END OF CERTIFICATE

DET NORSKE VERITAS

TYPE APPROVAL CERTIFICATE

CERTIFICATE NO. P-11307
This Certificate consists of 4 pages

This is to certify that the
Ball Valve
with type designation(s)
Multiport 8, Multiport 9

Manufactured by
Starline S.p.A.
S. Paolo D'Argon (Bergamo), Italy

is found to comply with
Det Norske Veritas' Rules for Classification of Ships and Mobile Offshore Units

Application
The valves may be used in the following systems: Fresh and sea water, Compressed air, Saturated steam (see cert. for limitations)

Temperature range:	Depend on materials (see cert.)
Max. working press.:	50 to 100 bar (Depend on size, see cert.)
Sizes:	1/4" to 3" (see cert.)

Place and date
Høvik, 2002-09-24
for DET NORSKE VERITAS AS

Kjell Folge
Head of Section

DET NORSKE VERITAS * 1864 *

Local Office
DNV Milan

This Certificate is valid until
2006-12-31

Kristian Lindelof
Surveyor

Notice: This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Multiport ball valves, 3-way and 4-way. Full or reduced port.

End connection configurations:

Threaded, BSPP and BSPT acc. BS21 and NPT acc. ASME B1.20.1
Flanged, acc. ASME B16.5
Bevelled Weld Ends acc. ASME B16.25
Plain and Socket Weld Ends acc. ASME B16.11

Material combinations body/trim

Body and Flanges	Trim (Ball, Seats, Stem Trunnion and Springs)
ASTM A105	ASTM A182 F316
ASTM A350 LF2	ASTM A182 F316
ASTM A182 F316	ASTM A182 F316

Size ranges:

¼" to 2½" full bore	½ " to 3" reduced bore

Application/Limitation

Maximum working temperatures for valves with the following body and sealing materials:

Part and material	**Temp. range**
Body material:	
ASTM A105 *)	-29 to 260 °C
ASTM A350 LF2 *)	-45 to 260 °C
ASTM A182 F316	-55 to 260 °C
Sealing material:	
Virgin PTFE	-55 to 200 °C
Reinforced PTFE, 15% fibreglass	-55 to 220 °C
Reinforced PTFE 20% carbon and 5% graphite	-55 to 250 °C

*) - Carbon steel used in body and bonnet shall be charpy tested when the thickness exceeds 6 mm, and the minimum working temperature is -10 °C or lower. Acceptance criteria according to DNV Cert. Notes 2.9 No. 101, 3.3.

Maximum working pressure depending on size:

Size	Pressure
1/4 - 3/8" ½" ¾" 1" 1 ¼" 1 ½"	100 bar
2" 2 1/2" 3"	50 bar

At elevated temperatures, the maximum working pressure has to be reduced with the following factors:

Temp	Carbon Steel	Stainless Steel
20 °C	1	1
50 °C	1	0,95
100 °C	1	0,85
150 °C	0,89	0,77
200 °C	0,81	0,71
260 °C	0,70	0,66

Valves with taper threaded end couplings of sizes up to DN 25mm, may be used in piping Class I and II. In class III piping systems may sizes up to DN 50mm be accepted systems for both parallell and tapered threads.

The valve housing shall be subject to a hydrostatic pressure test at minimum 1.5 times the design pressure. Holding time: 2 minutes, no leakage permitted.

The approval does not include actuator and/or other equipment for remote control of the valves.

No product certificate is required.

Type Approval documentation

Manufacturers catalogue No. 8-9-PZZ17-1.2002
Drawings no:
DNV-0412010000, DNV-0412010000-A, DNV-0412010001, DNV-0412010001-A
Test report GEN-02-277 dated 2002-05-22, DNV Genoa

Tests carried out

Burst pressure test

Marking of product

For traceability to this type approval, each valve is at least to be marked with:

- Manufacturer's name or trade mark
- Type designation
- Size
- Pressure class

Certificate retention survey

For retention of the Type Approval, DNV Surveyor shall perform a survey every second year, to verify that the conditions for the type approval are complied with.

END OF CERTIFICATE

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

This certificate is issued to:

PRODUCER	Starline S.p.A	
PLACE OF PRODUCTION	Via Francesco Baracca, 30 24060 San Paolo D'argon BG Italy	
DESCRIPTION	Cryostar forged steel ball valve	
TYPE	Floating and Trunnion	
RATINGS	Size (DN) Norminal pressure (bar) Min. Temperature (°C)	15 to 150 F.B. (200 R.B.) 16 to 420 -196
APPLICATION	Cryogenic forged steel ball valve	
SPECIFIED STANDARDS	Lloyd's Register Rules and Regulations for the Classification of Ships. Lloyd's Register Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk. BS 6364:1984 BS EN 1626:1999 BS EN ISO 10497:2004	
OTHER CONDITIONS	Valves are to be installed in accordance with the manufacturer's recommendations.	

Certificate No.	07/00072
Issue Date	17 December 2007
Expiry Date	16 December 2012
Sheet	1 of 2

P.A. Stanney
London Design Support Services
Lloyd's Register EMEA

Lloyd's Register EMEA
71 Fenchurch Street, London EC3M 4BS

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register EMEA of any modification or changes to the equipment in order to obtain a valid certificate."

The Design Appraisal Document No. ENG 127712 *and supplementary Type Approval Terms and Conditions form part of this Certificate.*

Supplementary Type Approval Terms and Conditions.

LR Type Approval certifies that a representative sample of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein. It does not mean or imply approval for any other use nor approval of any product(s) designed or manufactured otherwise than in strict conformity with the said representative sample.

LR Type Approval is based on the understanding that the manufacturer's recommendation s and instructions and any relevant requirements of the Rules of Lloyd's Register of Shipping are complied with.

This LR Type Approval does not eliminate the need for normal inspection and survey procedures required by the Rules and Regulations of Lloyd's Register of Shipping.

Lloyd's Register of Shipping reserves the right to cancel or withdraw this LR Type Approval Certificate in accordance with the LR Type Approval System Procedure.

Certificate No.	07/00072
Issue Date	17 December 2007
Expiry Date	16 December 2012
Sheet	2 of 2

P.A. Stanney
London Design Support Services
Lloyd's Register EMEA

Lloyd's Register EMEA
71 Fenchurch Street, London EC3M 4BS

Lloyd's Register Marine Design Appraisal Document

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London EC3M 4BS

Date
17 December 2007

Quote this reference on all future communications
LDSS/ENG/PKL/O-86245

LLOYD'S REGISTER TYPE APPROVAL SYSTEM, 2002.
Issued to: STARLINE S.P.A.
for: CRYOGENIC FORGED STEEL BALL VALVE
TYPE APPROVAL CERTIFICATE No. 07/00072

1. The documentation listed below has been examined in accordance with the Type Approval System for compliance with the design and testing requirements of Lloyd's Register's *Rules and Regulations for the Classification of Ships*, and other Codes and Standards as specified below, and is assigned an appraisal status as indicated, subject to the conditions stated.

Producer:	Starline S.p.A
Place of Production:	Via Francesco Baracca, 30 24060 San Paolo D'argon BG Italy
Description	Cryostar forged steel ball valve
Standards/Codes:	Lloyd's Register Rules and Regulations for the Classification of Ships Lloyd's Register Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk. BS 6364:1984 BS EN 1626:1999 BS EN ISO 10497:2004
Application:	Cryogenic forged steel ball valve
Approval Conditions:	Valves are to be installed in accordance with the manufacturer's recommendations

FINAL ACCEPTANCE OF ACTUAL ITEM(S) DEPEND(S) ON SATISFACTORY SURVEY AND TESTING

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London EC3M 4BS

Date
17 December 2007

Quote this reference on all future communications
LDSS/ENG/PKL/O-86245

Appendix

1. The documents listed below have been examined

Document No.	Rev.	Title	Status	Date
CRY-0001-LT	0	Cryogenic Test for Ball Valve – DN15 – PN250 /Class 1500 - Full Bore	B	17-Dec.-2007
CRY-0002-LT	0	Cryogenic Test for Ball Valve – DN20 – PN250 /Class 1500 - Full Bore	B	17-Dec.-2007
CRY-0003-LT	0	Cryogenic Test for Ball Valve – DN25 – PN250 /Class 1500 - Full Bore	B	17-Dec.-2007
CRY-0004-LT	0	Cryogenic Test for Ball Valve – DN40 – PN138 /Class 800 - Full Bore	B	17-Dec.-2007
CRY-0005-LT	0	Cryogenic Test for Ball Valve – DN50 – PN138 /Class 800 - Full Bore	B	17-Dec.-2007
CRY-0006-LT	0	Cryogenic Test for Ball Valve – DN80 – PN50 /Class 300 - Full Bore	B	17-Dec.-2007
CRY-0007-LT	0	Cryogenic Test for Ball Valve – DN100 – PN50 /Class 300 - Full Bore	B	17-Dec.-2007
CRY-0008-LT	0	Cryogenic Test for Ball Valve – DN150 – PN20 /Class 150 - Full Bore	B	17-Dec.-2007
CRY-0009-LT	0	Cryogenic Test for Ball Valve – DN15 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0010-LT	0	Cryogenic Test for Ball Valve – DN20– PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0011-LT	0	Cryogenic Test for Ball Valve – DN25 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0012-LT	0	Cryogenic Test for Ball Valve – DN40 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0013-LT	0	Cryogenic Test for Ball Valve – DN50 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0014-LT	0	Cryogenic Test for Ball Valve – DN80 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0015-LT	0	Cryogenic Test for Ball Valve – DN100 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
CRY-0015-LT	0	Cryogenic Test for Ball Valve – DN150 – PN420 /Class 2500 - Full Bore	B	17-Dec.-2007
STAR-0001-CRY	0	½" Class 1500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0002-CRY	0	3/4" Class 1500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0003-CRY	0	1" Class 1500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0004-CRY	0	1½" Class 800 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0005-CRY	0	2" Class 800 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0006-CRY	0	3" Class 300 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London EC3M 4BS

Date
17 December 2007

Quote this reference on all future communications
LDSS/ENG/PKL/O-86245

Appendix

Document No.	Rev.	Title	Status	Date
STAR-0007-CRY	0	4" Class 300 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0008-CRY	0	6" Class 150 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0009-CRY	0	½" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0010-CRY	0	¾" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0011-CRY	0	1" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0012-CRY	0	11/2" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0013-CRY	0	2" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0014-CRY	0	3" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0015-CRY	0	4" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
STAR-0016-CRY	0	6" Class 2500 Ball Valve Tested : "Floating Cryo Star" No. 5	B	17-Dec.-2007
MLN0700628/10A1	-	Fire Test For DN50 Class 150 Starline Forged Steel Ball Valve – Cryostar Floating Ball	B	17-Dec.-2007
MLN0700628/09A1	-	Fire Test For DN50 Class 600 Starline Forged Steel Ball Valve – Cryostar Floating Ball	B	17-Dec.-2007
MLN0700628/08A1	-	Fire Test For DN50 Class 1500 Starline Forged Steel Ball Valve – Cryostar Floating Ball	B	17-Dec.-2007
MLN0700628/07A1	-	Fire Test For DN150 Class 150 Starline Forged Steel Ball Valve – Cryostar Floating Ball	B	17-Dec.-2007
MLN0700628/06A1	-	Fire Test For DN50 Class 150 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
MLN0700628/05A1	-	Fire Test For DN50 Class 600 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
MLN0700628/04	-	Fire Test For DN50 Class 1500 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
MLN0700628/03	-	Fire Test For DN150 Class 150 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
MLN0700628/02	-	Fire Test For DN150 Class 600 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
MLN0700628/01	-	Fire Test For DN150 Class 1500 Starline Forged Steel Ball Valve – Cryostar Trunnion Mounted	B	17-Dec.-2007
STAR T.C. 01/2000	0	Internal Job and Inspection Plan	B	17-Dec.-2007
20 December 2006	-	Approval Services – Request for Quotation	B	17-Dec.-2007
21 December 2006	-	Inspection and Surveillance of Production Facilities	B	17-Dec.-2007

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London EC3M 4BS

Date
17 December 2007

Quote this reference on all future communications
LDSS/ENG/PKL/O-86245

Appendix

Appraisal Status Key

B Examined for compliance with the design and testing requirements of the Rules/Codes/Standards listed above and considered in order.

The date is the date with which the document is stamped.

Lloyd's Register EMEA
Engineering Systems
London Design Support Services
71 Fenchurch Street
London EC3M 4BS

Date
17 December 2007

Quote this reference on all future communications
LDSS/ENG/PKL/O-86245

Paul Lam
Principal Surveyor
Engineering Systems
London Design Support Services
Phone: +44 (0) 20 7423 2673
Fax: +44 (0) 20 7423 2053
Email: paul.lam@lr.org

Paul Stanney
Lead Specialist
Engineering Systems
London Design Support Services

Part 1A
Subject: Valves
Product: Valves - General (Part 1A)

Producer/Licence No.	Description of Product				Cert. No.
	Type	Details of Approval	Application	Remarks	
Starline S.p.A., **Via F Baracca, 30,** **24060 San Paolo D'Argon BG,** **Italy.**	Floating and Trunnion	Cryostar forged steel ball valve Size (DN) 15 to 150 F.B. (200 R.B.) Norminal pressure (bar) 16 to 420 Min. Temperature (^{0}C) -196	Cryogenic forged steel ball valve.	Expires: 16 December 2012 See Design Appraisal Document ENG 127712	07/00072

8/1/08.