DNV·GL

Certificate No:
TAP00001VS

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Butterfly Valves

with type designation(s)
GRW, GRL, GRF

Issued to
Emerson Automation Solutions Final Control (Sichuan) Co., Ltd.
Chengdu, Sichuan, China

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018
DNV GL class programme DNVGL-CP-0186 – Type approval – Valves

Application :

Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV GL.

Temperature range:	**-40°C to 160°C (see page 3 & 4)**
Max. working press.:	**See page 3**
Sizes:	**See page 2**

Issued at **Høvik** on **2019-07-03**

This Certificate is valid until **2024-07-02**.

for **DNV GL**

DNV GL local station: **Wuhan CMC**

Approval Engineer: **Maheshraja Venkatesan**

Zeinab Sharifi
Head of Section

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.

Job Id: **262.1-030902-1**
Certificate No: **TAP00001VS**

Product description

Wafer type (GRW), lug type (GRL) and double flange (GRF) butterfly valves.

Body thickness according to: EN 12516-4:2014.

Sizes included in this approval:

GRW & GRL types	NPS 2, 2½ , 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 24, 28, 30, 32, 36 (in) DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900 (mm)
GRF type	NPS 24, 28, 30, 32, 36, 40, 42, 44, 48, 54, 56, 60, 64, 66, 72 (in) DN 600, 700, 750, 800, 900, 1000, 1050, 1100, 1200, 1350, 1400, 1500, 1600, 1650, 1800 (mm)

Manufacturing location:
Emerson Automation Solutions Final Control (Sichuan) Co., Ltd.
1128 Kong Gang 4th Road, Southwest Airport Economic Development Zone
Chengdu City, Sichuan Province, P.R.China

Materials:

GRW and GRL, NPS 2 – 12 (DN 50 – DN 300)			
Part	*Material*	*ASTM Specification*	*EN Specification*
Body	Ductile Iron	-	EN 1563 EN-GJS-400-18-LT
		ASTM A395 Gr 60-40-18	EN 1563 EN-GJS-400-15
		ASTM A536 Gr 65-45-12	-
	Carbon Steel	ASTM A216 Gr WCB	EN 10213 GP240GH (1.0619)
	Stainless Steel	ASTM A351 Gr CF8M	EN 10213 1.4408
Disc	Super Duplex	ASTM A890 Gr 5A	EN 10283 GX2CrNiMoN26-7-4
	316 stainless steel	ASTM A351 Gr CF8M	EN 10213 GX5CrNiMo19-11-2
	304 stainless steel	ASTM A351 Gr CF8	EN 10213 GX5CrNi19-10
	Aluminium bronze	ASTM B148 UNS C95200	EN 1982 CuAl10Fe2-C
	Nickel aluminium bronze	ASTM B148 UNS C95800	EN 1982 CuAl10Fe5Ni5-C
	Ductile iron CTD (nickel	-	EN 1563 EN-GJS-400-15
	plated or nylon coated)	ASTM A536 Gr 65-45-12	-
Shaft	316 stainless steel	ASTM A276 Gr 316	EN 10088-3 X5CrNiMo17-12-2
	431 stainless steel	ASTM A276 Gr 431	EN 10088-3 X17CrNi16-2
	Super duplex	ASTM A276 UNS S32750	EN 10088-3 X2CrNiMoN25-7-4
	Monel K500	ASTM B865 UNS N05500	-

GRW and GRL, NPS 14 – 24 (DN 350 – DN 600)			
Part	*Material*	*ASTM Specification*	*EN Specification*
Body	Ductile Iron	-	EN 1563 EN-GJS-400-18-LT
		ASTM A395 Gr 60-40-18	EN 1563 EN-GJS-400-15
		ASTM A536 Gr 65-45-12	-
	Carbon Steel	ASTM A216 Gr WCB	EN 10213 GP240GH (1.0619)
	Stainless Steel	ASTM A351 Gr CF8M	EN 10213 1.4408
Disc	Super Duplex	ASTM A890 Gr 5A	EN 10283 GX2CrNiMoN26-7-4
	Duplex	ASTM A890 Gr 4A	EN 10283 GX2CrNiMoN22-5-3
	316 stainless steel	ASTM A351 Gr CF8M	EN 10213 GX5CrNiMo19-11-2
	304 stainless steel	ASTM A351 Gr CF8	EN 10213 GX5CrNi19-10
	Aluminium bronze	ASTM B148 UNS C95200	EN 1982 CuAl10Fe2-C

	Nickel aluminium bronze Ductile iron CTD (epoxy or nylon coated)	ASTM B148 UNS C95800 - ASTM A536 Gr 65-45-12	EN 1982 CuAl10Fe5Ni5-C EN 1563 EN-GJS-400-15 -
Shaft	431 stainless steel Duplex Super duplex Monel K500	ASTM A276 Gr 431 ASTM A276 UNS S31803 ASTM A276 UNS S32750 ASTM B865 UNS N05500	EN 10088-3 X17CrNi16-2 EN 10088-3 X2CrNiMoN22-5-3 EN 10088-3 X2CrNiMoN25-7-4 -

GRW and GRL, NPS 28 – 36 (DN 700 – DN 900)			
Part	*Material*	*ASTM Specification*	*EN Specification*
Body	Ductile Iron	- ASTM A395 Gr 60-40-18 ASTM A536 Gr 65-45-12	EN 1563 EN-GJS-400-18-LT EN 1563 EN-GJS-400-15 -
Disc	Super Duplex Duplex 316 stainless steel 304 stainless steel Aluminium bronze Nickel aluminium bronze Ductile iron CTD (epoxy or nylon coated)	ASTM A890 Gr 5A ASTM A890 Gr 4A ASTM A351 Gr CF8M ASTM A351 Gr CF8 ASTM B148 UNS C95200 ASTM B148 UNS C95800 - ASTM A536 Gr 65-45-12	EN 10283 GX2CrNiMoN26-7-4 EN 10283 GX2CrNiMoN22-5-3 EN 10213 GX5CrNiMo19-11-2 EN 10213 GX5CrNi19-10 EN 1982 CuAl10Fe2-C EN 1982 CuAl10Fe5Ni5-C EN 1563 EN-GJS-400-15 -
Shaft	431 stainless steel Duplex Super duplex Monel K500	ASTM A276 Gr 431 ASTM A276 UNS S31803 ASTM A276 UNS S32750 ASTM B865 UNS N05500	EN 10088-3 X17CrNi16-2 EN 10088-3 X2CrNiMoN22-5-3 EN 10088-3 X2CrNiMoN25-7-4 -

GRF NPS 24 – 72 (DN 600 – DN 1800)			
Part	*Material*	*ASTM Specification*	*EN Specification*
Body	Ductile Iron	- ASTM A395 Gr 60-40-18 ASTM A536 Gr 65-45-12	EN 1563 EN-GJS-400-18-LT EN 1563 EN-GJS-400-15 -
Disc	Duplex 316 stainless steel 304 stainless steel Super Duplex Aluminium bronze Nickel aluminium bronze Ductile iron CTD (epoxy or nylon coated)	ASTM A890 Gr 4A ASTM A351 Gr CF8M ASTM A351 Gr CF8 ASTM A890 GR 5A ASTM B148 UNS C95200 ASTM B148 UNS C95800 - ASTM A536 Gr 65-45-12	EN 10283 GX2CrNiMoN22-5-3 EN 10213 GX5CrNiMo19-11-2 EN 10213 GX5CrNi19-10 EN 10283 GX2CrNiMoN26-7-4 EN 1982 CuAl10Fe2-C EN 1982 CuAl10Fe5Ni5-C EN 1563 EN-GJS-400-15 -
Shaft	431 stainless steel Duplex Super duplex	ASTM A276 Gr 431 ASTM A276 UNS S31803 ASTM A276 UNS S32750	EN 10088-3 X17CrNi16-2 EN 10088-3 X2CrNiMoN22-5-3 EN 10088-3 X2CrNiMoN25-7-4

All models and sizes	
Part	*Material*
Seat	EPDM NBR White NBR Fluoroelastomer (FKM)

Bushing	Polyester
Packing	NBR
Bearing	PTFE/steel

Application/Limitation

Valves covered by this certificate may be used in General machinery service in the following piping systems - Fresh water, seawater, cargo oil, fuel oil, lubrication oil, hydraulic oil, thermal oil, sanitary, brine, bilge, low pressure steam, nitrogen, starting/control air.

GRF Valves (all sizes)
Maximum working pressure: 10 bar
Design temperature: -40°C*/160°C**

GRL & GRW Valves (DN50 – DN300)
Maximum working pressure: 16 bar
Design temperature: -40°C*/160°C**

GRL & GRW Valves (DN350 – DN900)
Maximum working pressure: 10 bar
Design temperature: -40°C*/160°C**
* Valves with body material EN 1563 EN-GJS-400-18-LT and ASTM A351 Gr CF8M are accepted for a design temperature of -40°C. For other body materials the minimum design temperature is limited to 0°C.
** Valves with body material of nodular cast iron of the ferritic/pearlitic type (ASTM A536 Gr 65-45-12) have an upper design temperature of 120°C.

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Valves of austenitic stainless steel shall not be used in direct contact with seawater.

The certificate holder does not have the authorization to make any changes to the design of the products. The design is controlled by Certificate No. TAP000016K.

EPDM may not be used for hydrocarbon services.

Ferritic steel castings - Charpy V-notch testing of the casting material is required at 5°C below the minimum design temperature. Energy values shall show at least 27 joules (DNV GL Ship Pt. 2 Ch. 2 Sec. 8 [6.4] Table 14.

Nodular cast iron of the ferritic/pearlitic type (ASTM A536 Gr 65-45-12):
- shall not to be used for piping subject to pressure shock, excessive strains and vibration
- shall not be used for class I and II piping with the following exceptions:
  - valves in hydraulic piping systems where failure would not render the system inoperative or introduce a fire risk
- may be used for class III piping, with the following exceptions:
  - valves fitted on ship sides and bottom and on sea chests
  - valves fitted on collision bulkhead
  - valves under static head fitted on the external wall of fuel tanks, lub. oil tanks and tanks for other flammable oils
  - valves for fluids with temperatures in excess of 120°C.

Nodular cast iron of the ferritic type (ASTM A395 Gr 60-40-18, EN-GJS-400-15, and EN-GJS-400-18-LT), with specified minimum elongation of 12%, may be used in class II and III piping and in pipes and valves located on the ship's side and bottom and valves on the collision bulkhead.

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

The valves covered by this certificate are not to be considered fire safe and therefore shall not be installed wherever fire safe application is required; e.g. as shut off or quick closing valves.

Type Approval documentation

Production Testing

Each valve body shall be subjected to:

- hydrostatic pressure test at 1.5 times the maximum working pressure at room temperature.
- seat leakage testing at 1.1 times the maximum working pressure in the valve flow direction.

Testing shall follow procedures and acceptance criteria in EN12266-1 (leakage rate A).

Certification

The Society's product certificates are required for ship side valves with *DN* > 100 mm regardless of pressure rating. For other valves, works certificate will be accepted.
Valve bodies shall be delivered with material certificates in accordance with DNVGL-RU-SHIP Pt.4 Ch.6 Sec.2 Table 3. Approval of manufactuer is required for VL and W material certificates.

Marking of product

For traceability to this type approval the valves are to be marked as a minimum with:

- manufacturer's name or trade mark
- valve type designation
- size
- maximum design pressure and temperature
- arrow to indicate direction of flow

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVGL-CP-0338.