

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Butterfly Valves**

with type designation(s)

**Concentric, Double Offset Eccentric**

Issued to

**DKC Co. Ltd.****Busan, Republic of Korea**

is found to comply with

**DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems****DNV GL class programme DNVGL-CP-0186 – Type approval – Valves****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

| Type:                   | Temperature range: | Max. working press.: | Sizes:         |
|-------------------------|--------------------|----------------------|----------------|
| Concentric              | See Certificate    | See Certificate      | DN50 to DN1000 |
| Double Offset Eccentric | See Certificate    | See Certificate      | DN50 to DN1000 |

Issued at **Høvik** on **2019-09-20**This Certificate is valid until **2024-09-19**.for **DNV GL**DNV GL local station: **Gimhae Station**Approval Engineer: **Mehdi Rowshan**

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**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.



## Product description

Butterfly valves, wafer, Semi-Lug, lug and flanged type with two disc design types of concentric and double offset Eccentric.

Design standards based on valve body material:

Steel: API 609 / ASME B16.34/ JIS B 2064  
Ductile iron: ASME B16.42/JIS B 2064

Face to face end connection design & standards:

- WAFER & LUG : API 609 Cat.A/B, JIS F7480
- FLANGE : API 609 Cat.A/B, JIS F7480

Sizes: DN50 to DN1000 (2", 2 1/2", 3", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 22", 24", 26", 28", 30", 32", 34", 36", 40")

## Valves Specifications:

| Type:            | Concentric                                | Double offset Eccentric                                 |
|------------------|-------------------------------------------|---------------------------------------------------------|
| End Connections: | Wafer, Semi-Lug, Lug and Flanged          | Wafer, Semi-Lug, Lug and Flanged                        |
| Size:            | DN50 to DN1000 (2" to 40")                | DN50 to DN1000 (2" to 40")                              |
| Flange ratings:  | [JIS 5K,10K], [ISO PN6,PN10], ASME 150 lb | [JIS 5K,10K,16K, 20K], [ISO PN6,PN10,PN16], ASME 150 lb |

## Material:

| Type |                                        | Concentric                                                                                                   | Double offset Eccentric                                                                                      |
|------|----------------------------------------|--------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Part | Material                               | Standard: ASTM/JIS                                                                                           | Standard: ASTM/JIS                                                                                           |
| Body | Nodular cast iron of the ferritic type | A395 Gr. 60-40-18<br>A395 Gr. 65-45-15<br>A536 Gr.60-40-18<br>A536 Gr.65-45-12<br>JISG 5502.FCD (FCD400/450) | A395 Gr. 60-40-18<br>A395 Gr. 65-45-15<br>A536 Gr.60-40-18<br>A536 Gr.65-45-12<br>JISG 5502.FCD (FCD400/450) |
|      | Carbon Steel                           | A216 Gr. WCB/ WCC<br>JISG 5101.SC (SC480/ SCPH2)                                                             | JISG 5101.SC (SC480/ SCPH2)<br>A216 Gr.WCB/WCC                                                               |
|      | Stainless Steel                        | N/A                                                                                                          | ASTM A351, JISG 5121.SCS                                                                                     |
| Disc | Stainless Steel                        | ASTM A351, A217, JISG 5121.SCS<br>Duplex_A890 4A /Super<br>Duplex_A890 5A                                    | ASTM A351, A217, JISG 5121.SCS<br>Duplex_A890 4A /Super<br>Duplex_A890 5A                                    |
|      | Aluminium Bronze                       | ASTM B148, JISH 5111, 5114<br>Al- Bronze                                                                     | ASTM B148, JISH 5111, 5114<br>AL-Bronze                                                                      |

## Application/Limitation

The valves are approved for use in ship piping, machinery piping and cargo piping systems.

Design temperatures dependant on lining/seat materials with the worst allowable temperature limit in the assembly:

| Type of Material   | Min. temperature | Max. temperature |
|--------------------|------------------|------------------|
| TEFLON (PTFE/RTFE) | -40°C            | 190°C            |
| EPDM               | -35°C            | 120°C            |
| NBR                | -18°C            | 100°C            |
| FKM                | -20°C            | 180°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.

Pressure parts shall fulfil the impact test requirements of DNVGL rules Part.2 chapter 2 at minimum design temperature.

Nodular cast iron of the ferritic type has the following limitations:

- 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 use of nodular cast iron in class I piping shall be subject to consideration for approval in each case.
- Nodular cast iron shall not be used for media having a temperature exceeding 350°C.
- The use of nodular cast iron for media having a temperature below 0°C shall be considered in each particular case.

Bilge valves and shipside valves shall be arranged for manual operation even if these valves are remote controlled. A portable hand pump is not accepted as equivalent to manual operation.

When used as shipside valves the disc must not extend outside the hull plating in open position.

The approval does not include any operating gear for remote control of the valves.

Valves having EPDM lining shall not be used in hydrocarbon service.

## Type Approval documentation

| Doc./drawing number | Doc./drawing title                                          | Date       | Status |
|---------------------|-------------------------------------------------------------|------------|--------|
|                     | Company catalogue and Product Introduction                  | 17.05.2018 | FI     |
| DKC-DS-C-01         | Concentric type Butterfly Valves Design Specification       | 17.05.2018 | FI     |
| DKC-DS-D-01         | Double eccentric type Butterfly Valves Design Specification | 17.05.2018 | FI     |
| DKC-COB-W-0208-RO   | Concentric BFV_ Wafer type 50A~200A                         | 17.05.2018 | FI     |
| DKC-COB-W-1014-RO   | Concentric BFV_ Wafer type 250A~350A                        | 17.05.2018 | FI     |
| DKC-COB-W-1622-RO   | Concentric BFV_ Wafer type 400A~550A                        | 17.05.2018 | FI     |
| DKC-COB-W-24-RO     | Concentric BFV_ Wafer type 600A                             | 17.05.2018 | FI     |
| DKC-COB-W-26-RO     | Concentric BFV_ Wafer type 650A                             | 17.05.2018 | FI     |
| DKC-COB-W-2832-RO   | Concentric BFV_ Wafer type 700A~800A                        | 17.05.2018 | FI     |
| DKC-COB-W-34-RO     | Concentric BFV_ Wafer type 850A                             | 17.05.2018 | FI     |
| DKC-COB-W-3640-RO   | Concentric BFV_ Wafer type 900A~1000A                       | 17.05.2018 | FI     |
| DKC-COB-S-022.5-RO  | Concentric BFV_ Semi Lug type 50A~65A                       | 17.05.2018 | FI     |
| DKC-COB-S-0308-RO   | Concentric BFV_ Semi Lug type 80A~200A                      | 17.05.2018 | FI     |
| DKC-COB-S-1014-RO   | Concentric BFV_ Semi Lug type 250A~350A                     | 17.05.2018 | FI     |
| DKC-COB-S-1622-RO   | Concentric BFV_ Semi Lug type 400A~550A                     | 17.05.2018 | FI     |
| DKC-COB-S-2426-RO   | Concentric BFV_ Semi Lug type 600A~650A                     | 17.05.2018 | FI     |
| DKC-COB-S-2832-RO   | Concentric BFV_ Semi Lug type 700A~800A                     | 17.05.2018 | FI     |
| DKC-COB-S-34-RO     | Concentric BFV_ Semi Lug type 850A                          | 17.05.2018 | FI     |
| DKC-COB-S-3640-RO   | Concentric BFV_ Semi Lug type 900A~1000A                    | 17.05.2018 | FI     |
| DKC-COB-L-0208-RO   | Concentric BFV_ Lug type 50A~200A                           | 17.05.2018 | FI     |
| DKC-COB-L-1014-RO   | Concentric BFV_ Lug type 250A~350A                          | 17.05.2018 | FI     |

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 Certificate No: **TAP00001UA**

|                    |                                                            |            |    |
|--------------------|------------------------------------------------------------|------------|----|
| DKC-COB-L-1622-RO  | Concentric BFV_ Lug type 400A~550A                         | 17.05.2018 | FI |
| DKC-COB-L-24-RO    | Concentric BFV_ Lug type 600A                              | 17.05.2018 | FI |
| DKC-COB-L-26-RO    | Concentric BFV_ Lug type 650A                              | 17.05.2018 | FI |
| DKC-COB-L-2830-RO  | Concentric BFV_ Lug type 700A~750A                         | 17.05.2018 | FI |
| DKC-COB-L-32-RO    | Concentric BFV_ Lug type 800A                              | 17.05.2018 | FI |
| DKC-COB-L-34-RO    | Concentric BFV_ Lug type 850A                              | 17.05.2018 | FI |
| DKC-COB-L-3640-RO  | Concentric BFV_ Lug type 900A~1000A                        | 17.05.2018 | FI |
| DKC-COB-F-0208-RO  | Concentric BFV_ Flange type 50A~200A                       | 17.05.2018 | FI |
| DKC-COB-F-1016-RO  | Concentric BFV_ Flange type 250A~400A                      | 17.05.2018 | FI |
| DKC-COB-F-1822-RO  | Concentric BFV_ Flange type 450A~550A                      | 17.05.2018 | FI |
| DKC-COB-F-2426-RO  | Concentric BFV_ Flange type 600A~650A                      | 17.05.2018 | FI |
| DKC-COB-F-2834-RO  | Concentric BFV_ Flange type 700A~850A                      | 17.05.2018 | FI |
| DKC-COB-F-3840-RO  | Concentric BFV_ Flange type 900A~1000A                     | 17.05.2018 | FI |
| DKC-HPB-W-0206-RO  | Double Eccentric BFV_ wafer type 50A~150A                  | 17.05.2018 | FI |
| DKC-HPB-W-0812-RO  | Double Eccentric BFV_ wafer type 200A~300A                 | 17.05.2018 | FI |
| DKC-HPB-W-1416-RO  | Double Eccentric BFV_ wafer type 350A~400A                 | 17.05.2018 | FI |
| DKC-HPB-W-1828-RO  | Double Eccentric BFV_ wafer type 450A~700A                 | 17.05.2018 | FI |
| DKC-HPB-W-3040-RO  | Double Eccentric BFV_ wafer type 750A~1000A                | 17.05.2018 | FI |
| DKC-HPB-L-0206-RO  | Double Eccentric BFV_ Lug type 50A~150A                    | 17.05.2018 | FI |
| DKC-HPB-L-0812-RO  | Double Eccentric BFV_ Lug type 200A~300A                   | 17.05.2018 | FI |
| DKC-HPB-L-1418-RO  | Double Eccentric BFV_ Lug type 350A~450A                   | 17.05.2018 | FI |
| DKC-HPB-L-2028-RO  | Double Eccentric BFV_ Lug type 500A~700A                   | 17.05.2018 | FI |
| DKC-HPB-L-3040-RO  | Double Eccentric BFV_ Lug type 750A~1000A                  | 17.05.2018 | FI |
| DKC-HPB-F-0206-RO  | Double Eccentric BFV_ Flange type 50A~150A                 | 17.05.2018 | FI |
| DKC-HPB-F-0812-RO  | Double Eccentric BFV_ Flange type 200A~300A                | 17.05.2018 | FI |
| DKC-HPB-F-1418-RO  | Double Eccentric BFV_ Flange type 350A~450A                | 17.05.2018 | FI |
| DKC-HPB-F-2028-RO  | Double Eccentric BFV_ Flange type 500A~700A                | 17.05.2018 | FI |
| DKC-HPB-F-3040-RO  | Double Eccentric BFV_ Flange type 750A~1000A               | 17.05.2018 | FI |
| DKC-DCB-SL-0204-RO | Double Eccentric Cargo BFV_ Wafer(semi-lug) type 50A~100A  | 05.01.2018 | FI |
| DKC-DCB-SL-0508-RO | Double Eccentric Cargo BFV_ Wafer(semi-lug) type 125A~200A | 05.01.2018 | FI |
| DKC-DCB-SL-1012-RO | Double Eccentric Cargo BFV_ Wafer(semi-lug) type 250A~300A | 05.01.2018 | FI |
| DKC-DCB-SL-1422-RO | Double Eccentric Cargo BFV_ Wafer(semi-lug) type 350A~550A | 05.01.2018 | FI |
| DKC-DCB-SL-2432-RO | Double Eccentric Cargo BFV_ Wafer(semi-lug) type 600A~800A | 05.01.2018 | FI |
| DKC-DCB-L-0204-RO  | Double Eccentric Cargo BFV_ Lug type 50A~100A              | 05.01.2018 | FI |
| DKC-DCB-L-0508-RO  | Double Eccentric Cargo BFV_ Lug type 125A~200A             | 05.01.2018 | FI |
| DKC-DCB-L-1012-RO  | Double Eccentric Cargo BFV_ Lug type 250A~300A             | 05.01.2018 | FI |
| DKC-DCB-L-1422-RO  | Double Eccentric Cargo BFV_ Lug type 350A~550A             | 05.01.2018 | FI |

|                   |                                                   |            |    |
|-------------------|---------------------------------------------------|------------|----|
| DKC-DCB-L-2432-RO | Double Eccentric Cargo BFV_ Lug type 600A~800A    | 05.01.2018 | FI |
| DKC-DCB-F-0204-RO | Double Eccentric Cargo BFV_ Flange type 50A~100A  | 17.05.2018 | FI |
| DKC-DCB-F-0508-RO | Double Eccentric Cargo BFV_ Flange type 125A~200A | 17.05.2018 | FI |
| DKC-DCB-F-1012-RO | Double Eccentric Cargo BFV_ Flange type 250A~300A | 17.05.2018 | FI |
| DKC-DCB-F-1422-RO | Double Eccentric Cargo BFV_ Flange type 350A~550A | 17.05.2018 | FI |
| DKC-DCB-F-2432-RO | Double Eccentric Cargo BFV_ Flange type 600A~800A | 17.05.2018 | FI |
| R-VM-18-BF-01     | Manual Installation & Maintenance                 | 05.01.2018 | FI |
| DKC-DNVGL-P-001   | Inspection & Test Procedure For type test         | 05.01.2018 | FI |

### 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 valves with  $DN > 100$  mm having a design pressure,  $p > 16$  bar and 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 manufacturer 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.