

# Compressor Seals Espey™ WKA250ND - 1100HP



## The Company



### Individual Sealing Systems

Espey Burgmann is one of the leading approved manufacturers of technically reliable and fully-developed carbon floating ring seals.

Espey Burgmann operates worldwide within the EagleBurgmann Group, a pioneering supplier for sealing systems.

The product portfolio of Espey Burgmann covers carbon floating ring seals for gases, dusts, vapours and water. The convincing attributes of Espey seals include economy and a high level of safety.

Besides sealing concepts Espey Burgmann offers full service from engineering through to after sales service with assembly, commissioning, on-site repairs, failure and damage analysis or maintenance, conversion and spare parts provision at the right time – all from a single source.

With qualified employees, a distinctive and established product program Espey Burgmann is your capable and reliable partner using state-of-the-art manufacturing technology.

### Espey Burgmann GmbH

The company was founded 1888 in Berlin as Gustav Espey GmbH (factory for stuffing boxes) and moved 1927 to Duisburg Ruhr.

Since 1998 Espey Burgmann belongs to the EagleBurgmann Group and moved in 2005 to its new site in Moers with its ideal regional infrastructure and closeness to customers and suppliers.

Together with the EagleBurgmann Group Espey Burgmann belongs to the Freudenberg Group, a worldwide operating family-run concern with location in Weinheim.

### Carbon floating ring seals of Espey Burgmann are used in following industries:

- Oil and gas industry
- Refining technology
- Chemical and petrochemical industry
- Power plant technology
- Mining industry
- Food processing industry
- Metal production and processing
- Machinery and plant building
- Water and waste water technology
- Waste incineration and removal industry
- Lime, cement and gypsum industry
- Shipbuilding

### Key applications are:

- Compressors
- Turbines
- Fans and blowers
- Centrifuges
- Mixers, agitators, dryers
- Mills
- Shut-off valves
- Gears
- Bulkheads

#### Important note

All the technical specifications are based on extensive tests and our many years of experience. However, the diversity of possible applications means that they can serve as guide values only.

It should be noted that the maximum values of each operating parameter cannot be applied at the same time because of their interaction. Furthermore, the operating range of each specific

product depends on the respective shaft diameter, materials used, mode of operation and on the medium to be sealed.

A guarantee can only be given in the individual case if the exact conditions of application are known and these are confirmed in a special agreement. When critical conditions of operation are involved, we recommend consulting with our specialist engineers.

Subject to change.

Espeys' strengths lie in technical competence, production flexibility and readiness to deliver high quality. Espey Burgmann is famous for its well-founded know-how in design and production, whether in the processing of carbon graphite, cast and special materials or the production of split housings.

## Compressor Seals Espey™ WKA250ND - 1100HP

Espey chamber seals are applied in several turbo machines: integral gear, screw and chiller compressors, steam turbines and shut-off valves for power plants. Main industries are oil and gas, refining, chemical and petrochemical industry, power plants and plants for iron and steel production. A further industry field with several references is carbon dioxide capture and storage (CCS).

Espey chamber seals have a modular design, means the seals can be composed using standard parts to meet individual application requirements. Espey chamber seals work with a very small operation gap between shaft and seal ring – leading to very low leakage – are designed for dry-running and compensate radial and axial shaft deflections. Another advantage is that no sealing components which could generate additional shaft vibrations are actually fitted on the shaft. The seal rings are axially spring-loaded to prevent swinging up at pressure-less machine operation. Espey delivers chamber seals since several decades to worldwide notable compressor manufacturers.



Photograph by courtesy of MAN Diesel & Turbo SE.



### Application story

Espey™ WKA 802 HD as sealing for a multi-stage integral-gear compressor in the fertiliser production.

### Issue

Urea is the worldwide leading nitrogen fertiliser. Urea is produced in high pressure synthesis from liquid ammonia and a gas-water mixture with 88,7 % carbon dioxide under high pressure and elevated temperatures in a synthesis tower. Thereby synthetic ammonia carbamate is produced which is finally obtained as white granules under supply of acid and heat. The high process pressures are generated by multi-stage radial integrally geared compressors. The seal has to work as leakage protection of the high-compressed CO<sub>2</sub>.

### Espey solution

Espey developed the compact chamber seal Espey™ WKA 802 HD with barrier gas and leakage port and up to 8 seal rings for this radial integrally geared compressor designed by MAN Diesel & Turbo SE. The operation pressure of 140 bar (2031 PSI), the temperature of 225 °C (437 °F) and revolutions up to 40,000 min<sup>-1</sup> were the main design parameters. Each of the 8 stages was equipped with an individual Espey™ WKA 802 HD with different installation lengths, seal and outer diameters. The one-piece seal rings with titanium bandage were designed axially spring-loaded to avoid vibrations during start and spin-out phase. The seal solution has a high reliability and operates maintenance-free.



Photograph by courtesy of MAN Diesel & Turbo SE.

# Shaft Seal Espey™ WKA250ND



## Features

- Chamber seal (modular design), optional with housing and lid
- Multi-part seal rings, radially cut
- Very small operation gap – low leakage
- Dry running
- Self-adjusting seal rings
- Compensation of radial and axial shaft deflections
- No sealing components mounted on the shaft and hence no additional shaft vibrations
- Seal rings running contact-free – sliding faces and machine consume no additional power
- Balanced seal ring inside chamber

## Advantages

- High reliability
- Maintainability
- Segmented seal rings for easy replacement
- Maintenance-free

## Operating range (see note on page: The Company)

Shaft diameter:  $d = 20 \dots 340 \text{ mm}$  (0.79" ... 13.39")  
 Operating pressure:  $p = \text{vacuum} \dots 15 \text{ bar}$  (217 PSI) abs.

Operating temperature:  $t = -120 \text{ °C} \dots +500 \text{ °C}$   
 (-184 °F ... +932 °F) for carbon,

max. 225 °C (437 °F) for PTFE compound

Sliding velocity:  $v_g = \text{max. } 240 \text{ m/s}$  (787 ft/s) for carbon, max. 40 m/s (131 ft/s) for PTFE compound

Radial play:  $\pm 2.0 \text{ mm}$  ( $\pm 0.08$ " )

Axial movement: theoretically unlimited

Recommended wear guard:  $> 58 \text{ HRC}$

## Materials

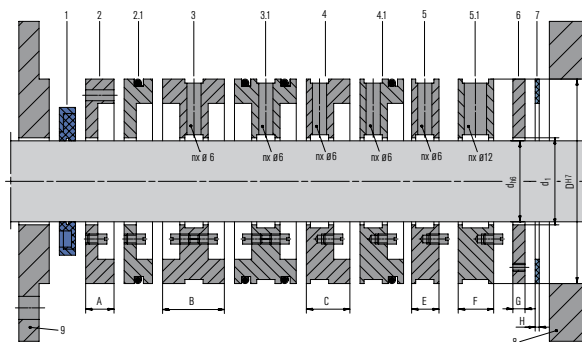
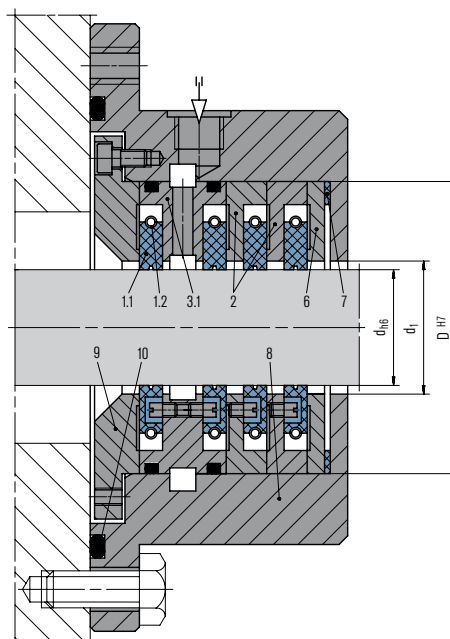
Seal ring: Carbon, PTFE compound

Chamber and housing parts: 1.4021, 1.4571, Hastelloy®, Titanium, Inconel®, others

Tension spring: 1.4571, Hastelloy®, Titanium, Inconel®

Secondary seal (elastomer): Fluorocarbon rubber (Viton®), Nitrile-butadiene-rubber (Perbunan®), Perfluorocarbon rubber (Kalrez®)

Secondary seal (gasket): Statotherm®-HT/HD, KSIL C 4400



## Standards and approvals

- Material approvals: FDA

## Item Description

Item	Description	Variable for width
1.1	Seal ring	
1.2	Tension spring	
1.3	Pressure spring	
2	Chamber	A
2.1	Chamber with O-Ring	A
3	Barrier gas chamber	B
3.1	Barrier gas chamber with O-Rings	B
4	Lantern chamber	C
4.1	Lantern chamber with O-Ring	C
5	Lantern thin	E
5.1	Lantern wide	F
6	End ring	G
7	Flat seal	H
8	Housing	
9	Lid	
10	O-Ring housing	
11	Flat seal housing	

## Recommended applications

- Gases
- Fumes and exhaust, solids containing, flammable (ATEX), acid containing and toxic gases
- (Solids containing) steams/liquid mist
- Oil mist/penetrating oil
- Water
- Oil and gas industry
- Refining technology
- Chemical and petrochemical industry
- Pulp and paper industry
- Metal production and processing
- Power plant technology
- Integral-gear compressors (one or multi-stage)
- Screw and chiller compressors
- Steam turbines
- Regulating devices

# Shaft Seal Espey™ WKA400HD



## Features

- Chamber seal (modular design), optional with housing and lid
- Multi-part seal rings, radially cut
- Very small operation gap – low leakage
- Dry running
- Self-adjusting seal rings
- Compensation of radial and axial shaft deflections
- No sealing components mounted on the shaft and hence no additional shaft vibrations
- Seal rings running contact-free – sliding faces and machine consume no additional power
- Balanced seal ring inside chamber

## Advantages

- High reliability
- Maintainability
- Segmented seal rings for easy replacement
- Maintenance-free

## Operating range (see note on page: The Company)

Shaft diameter:  $d = 20 \dots 340 \text{ mm}$  (0.79" ... 13.39")

Operating pressure:  $p = \text{vacuum} \dots 75 \text{ bar}$  (1,087 PSI) abs.

Operating temperature:  $t = -120 \text{ °C} \dots +500 \text{ °C}$   
(-184 °F ... +932 °F)

Sliding velocity:  $v_g = \text{max. } 240 \text{ m/s}$  (787 ft/s)

Radial play:  $\pm 1.0 \dots 2.0 \text{ mm}$  ( $\pm 0.04" \dots 0.08"$ )

Axial movement: theoretically unlimited

Recommended wear guard:  $> 58 \text{ HRC}$

## Materials

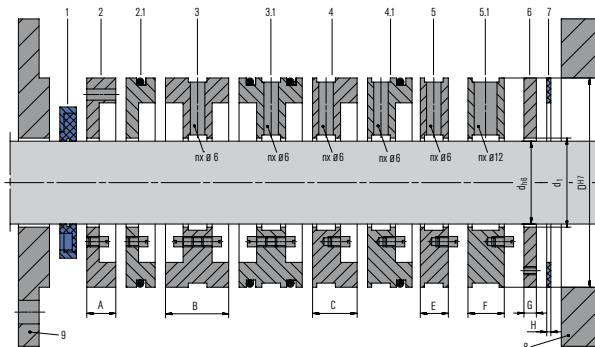
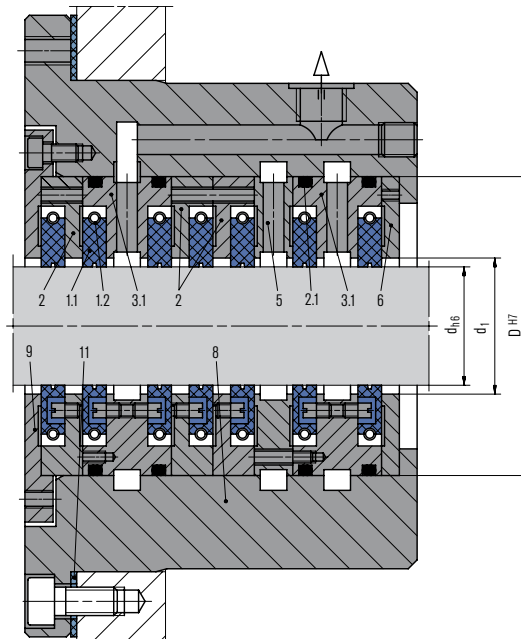
Seal ring: Carbon

Chamber and housing parts: 1.4021, 1.4571, Hastelloy®, Titanium, Inconel®, others

Tension spring: 1.4571, Hastelloy®, Titanium, Inconel®

Secondary seal (elastomer): Fluorocarbon rubber (Viton®), Nitrile-butadiene-rubber (Perbunan®), Perfluorocarbon rubber (Kalrez®)

Secondary seal (gasket): Statotherm®-HT/HD, KSIL C 4400



## Standards and approvals

- Material approvals: FDA

## Item Description

Item	Description	Variable for width
1.1	Seal ring	
1.2	Tension spring	
1.3	Pressure spring	
2	Chamber	A
2.1	Chamber with O-Ring	A
3	Barrier gas chamber	B
3.1	Barrier gas chamber with O-Rings	B
4	Lantern chamber	C
4.1	Lantern chamber with O-Ring	C
5	Lantern thin	E
5.1	Lantern wide	F
6	End ring	G
8	Housing	
9	Lid	
10	O-Ring housing	
11	Flat seal housing	

## Variable for width

## Recommended applications

- Gases
- Fumes and exhaust, solids containing, flammable (ATEX), acid containing and toxic gases
- (Solids containing) steams/liquid mist
- Oil mist/penetrating oil
- Water
- Oil and gas industry
- Refining technology
- Chemical industry
- Petrochemical industry
- Pulp and paper industry
- Metal production and processing
- Power plant technology
- Integral-gear compressors (one or multi-stage)
- Screw and chiller compressors
- Steam turbines
- Regulating devices

# Shaft Seal Espey™ WKA802HD



## Features

- Chamber seal (modular design), optional with housing and lid
- Very small operation gap – low leakage
- Dry running
- Compensation of radial and axial shaft deflections
- No sealing components mounted on the shaft and hence no additional shaft vibrations
- Seal rings running contact-free – sliding faces and machine consume no additional power
- One-piece seal ring with titanium bandage
- Balanced seal ring inside chamber
- Seal ring axially spring-loaded – no swinging up at pressure-less machine operation

## Advantages

- High reliability
- Maintainability
- Maintenance-free

## Operating range (see note on page: The Company)

Shaft diameter:  $d = 20 \dots 200 \text{ mm}$  (0.79" ... 7.87")

Operating pressure:  $p = \text{vacuum} \dots 140 \text{ bar}$  (2,030 PSI) abs.

Operating temperature:  $t = -120 \text{ °C} \dots +225 \text{ °C}$  (-184 °F ... +437 °F)

Sliding velocity:  $v_g = \text{max. } 240 \text{ m/s}$  (787 ft/s)

Radial play:  $\pm 1.0 \text{ mm}$  ( $\pm 0.04$ " )

Axial movement: theoretically unlimited

Recommended wear guard:  $> 58 \text{ HRC}$

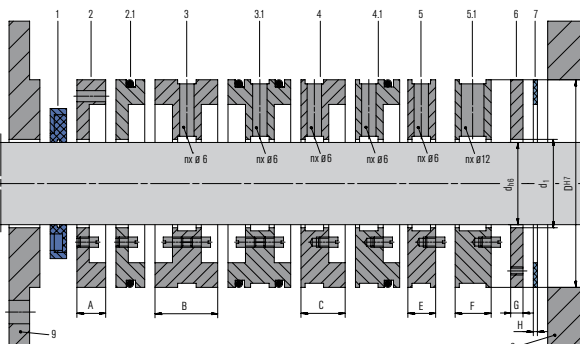
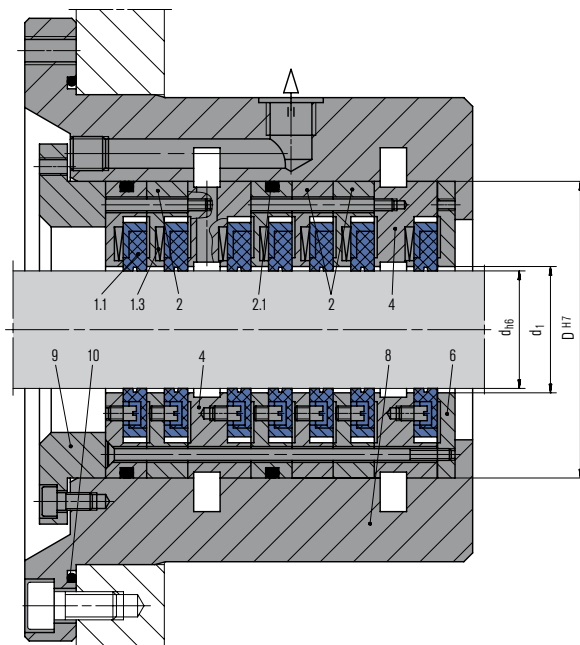
## Materials

Seal ring: Carbon with titanium bandage

Chamber and housing parts: 1.4021, 1.4571, Hastelloy®, Titanium, Inconel®, others

Secondary seal (elastomer): Fluorocarbon rubber (Viton®), Nitrile-butadiene-rubber (Perbunan®), Perfluorocarbon rubber (Kalrez®)

Secondary seal (gasket): Statotherm®-HT/HD, KSIL C 4400



## Standards and approvals

- Material approvals: FDA

## Item Description

Item	Description	Variable for width
1.1	Seal ring	
1.2	Tension spring	
1.3	Pressure spring	
2	Chamber	A
2.1	Chamber with O-Ring	A
3	Barrier gas chamber	B
3.1	Barrier gas chamber with O-Rings	B
4	Lantern chamber	C
4.1	Lantern chamber with O-Ring	C
5	Lantern thin	E
5.1	Lantern wide	F
6	End ring	G
7	Flat seal	H
8	Housing	
9	Lid	
10	O-Ring housing	
11	Flat seal housing	

## Recommended applications

- Gases
- Fumes and exhaust, solids containing, flammable (ATEX), acid containing and toxic gases
- (Solids containing) steams/liquid mist
- Oil mist/penetrating oil
- Water
- Oil and gas industry
- Refining technology
- Chemical and petrochemical industry
- Pulp and paper industry
- Metal production and processing
- Power plant technology
- Integral-gear compressors (one or multi-stage)
- Screw and chiller compressors
- Steam turbines
- Regulating devices

# Shaft Seal Espey™ WKA1100HP



## Features

- Chamber seal (modular design), optional with housing and lid
- Very small operation gap – low leakage
- Dry running
- Compensation of radial and axial shaft deflections
- No sealing components mounted on the shaft and hence no additional shaft vibrations
- Seal rings running contact-free – sliding faces and machine consume no additional power
- One-piece seal ring with titanium bandage
- Both side balanced seal ring inside chamber for short-term backpressure operation
- Seal ring axially spring-loaded – no swinging up at pressure-less machine operation

## Advantages

- High reliability
- Maintainability
- Maintenance-free

## Operating range (see note on page: The Company)

Shaft diameter:  $d = 20 \dots 200 \text{ mm}$  (0.79" ... 7.87")

Operating pressure:  $p = \text{vacuum} \dots 250 \text{ bar}$  (3,625 PSI) abs.

Operating temperature:  $t = -120 \text{ °C} \dots +225 \text{ °C}$  (-184 °F ... +437 °F)

Sliding velocity:  $v_g = \text{max. } 240 \text{ m/s}$  (787 ft/s)

Radial play:  $\pm 1.0 \text{ mm}$  ( $\pm 0.04$ " )

Axial movement: theoretically unlimited

Recommended wear guard:  $> 58 \text{ HRC}$

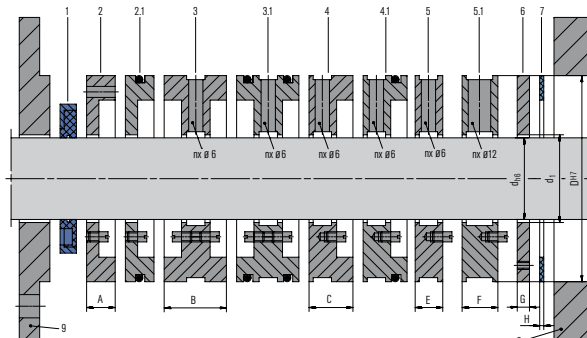
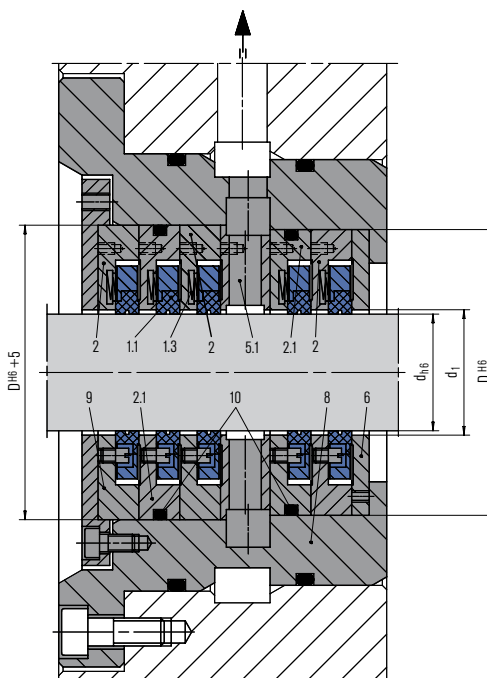
## Materials

Seal ring: Carbon with titanium bandage

Chamber and housing parts: 1.4021, 1.4571, Hastelloy®, Titanium, Inconel®, others

Secondary seal (elastomer): Fluorocarbon rubber (Viton®), Nitrile-butadiene-rubber (Perbunan®), Perfluorocarbon rubber (Kalrez®)

Secondary seal (gasket): Statotherm®-HT/HD, KSIL C 4400



## Standards and approvals

- Material approvals: FDA

## Item Description

1.1	Seal ring	
1.2	Tension spring	
1.3	Pressure spring	
2	Chamber	A
2.1	Chamber with O-Ring	A
3	Barrier gas chamber	B
3.1	Barrier gas chamber with O-Rings	B
4	Lantern chamber	C
4.1	Lantern chamber with O-Ring	C
5	Lantern thin	E
5.1	Lantern wide	F
6	End ring	G
7	Flat seal	H
8	Housing	
9	Lid	
10	O-Ring housing	

## Variable for width

## Recommended applications

- Gases
- Fumes and exhaust, solids containing, flammable (ATEX), acid containing and toxic gases
- (Solids containing) steams/liquid mist
- Oil mist/penetrating oil
- Water
- Oil and gas industry
- Refining technology
- Chemical and petrochemical industry
- Pulp and paper industry
- Metal production and processing
- Power plant technology
- Integral-gear compressors (one or multi-stage)
- Screw and chiller compressors

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EagleBurgmann is one of the leading international companies for industrial sealing technology. Our products are used everywhere when safety and reliability are important: In the oil and gas industries, petroleum refining, chemicals, pharmaceutical, energy, food, paper, water, marine applications, aerospace and mining. Every day, more than 5200 employees contribute their ideas, solutions and commitment to ensuring that customers all over the world can rely on our seals. Our modular seal service, TotalSealCare™, underlines our commitment to customer orientation and our provision of tailor-made services for every application.

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