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## Wafer Type Check Valves

Instruction Manual

SR / HSR

ZRK / ZRL

ZRD



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## Wafer Type Check Valves

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### 1. General Notes

This instruction manual applies to the above mentioned valves which are subject to the Quality Management System Standard acc. to DIN/ISO9001 in both the manner of manufacturing as well as testing and which do meet the basic safety requirements of Annex I of the Pressure Equipment Directive 2014/68/EU. This instruction manual is intended to support the user of above mentioned valves in installation, operation and maintenance.



**Disregarding the following caution advices could evoke dangerous situations which entail an inefficacy of the manufacturers' warranty.**  
For any questions, please contact the manufacturer and also see chapter 10.

### 2. Intended Use

Wafer type check valves are solely destined for installation within a pipeline system in consideration of the admitted pressure and temperature limits to avoid a backflow of the media.

It is the operators' responsibility to examine the chemical resistance in relation to the specified operation data.

All valid operation data are indicated in appendix II respectively in the technical data sheets of the relevant types.

### 3. Safety Instructions

#### 3.1 Generally Safety Instructions

Those safety regulations applying to the pipeline system apply to the valves itself accordingly, i. e. any national or international rules for accident prevention as well as possibly existing operators' working-, production- and safety regulations have to be considered. This instruction manual only points to those safety instructions which have to be considered additionally.

#### 3.2 Qualification of Personnel

Only qualified staff is permitted to install and maintain the valves. The operator is obliged to coordinate the competencies, the responsibilities and the surveillance of his staff. Should the staff not have the necessary knowledge, the operator must provide adequate additional training. The operator has to ensure that the content of this instruction manual is comprehended in all its particulars.

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### 3.3 Safety Instructions for the Operator

Due to the fact that the following points are not in the responsibility of the valve manufacturer the operator has to ensure when using the valves that

- the valves are solely used in the way described in chapter 2
- the pipeline system is installed in a professional manner. The wall thickness of the valve body is designed in a way that tensions which do exist within the pipeline system are considered in a usual order of magnitude.
- the valves are properly installed between the flanges.
- an usual flow rate within the pipeline system is not exceeded during a continuous operation. For abnormal service conditions, e. g. oscillation, water shock, cavitation or a medium that contains larger solid particles, please contact RITAG for clarification.
- the valves are protected against touch when working at a temperature  $<0^{\circ}\text{C}$  respectively  $>40^{\circ}\text{C}$ .



#### **Prevention from misusing the valves:**

**It has to be particularly ensured that the selected body materials and inner parts of the valve are suited for the medium that is used. The manufacturer assumes no liability for any damages caused by aggressive media.**

### 3.4 Special Dangers



**Before disassembling the valve the pipeline has to be depressurized, the pipe has to be totally drained and released. Afterwards the flange screw connections can be unscrewed and the valve can be dismantled. Misusing this precaution means danger to the life of the operating personnel.**

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#### 4. Transport and Storage

The valves are provided ready for installation. They need to be treated, conveyed and stored carefully. Those valves that are delivered with a protecting packing need to be stored within this packing up to the moment of installation.

- In case of a direct storage at the installation location the valve has to be stored in a closed room and has to be protected against any damaging impacts.
- It is recommended to use up any stock items first in order to achieve short storage periods.
- Those valves that are equipped with a soft sealing need to be protected against sunlight that might hit this soft sealing or any other UV-radiation in order to avoid ageing.
- Lifting tools for transport are only to be fastened on the valve body. Inner parts may not be misused as „carrying devices“.

#### 5. Conformity in acc. to PED 2014/68/EU article 13

The Certificate of Conformity is available for download on our website [www.ritag.com](http://www.ritag.com). If you would like us to submit the Certificate of Conformity by e-mail, please contact us.

For information on fluid groups and the corresponding RITAG valves, please refer to our product data sheets.

#### 6. Specification

The sectional drawings shown in this chapter do exemplary illustrate the basic design of the valves. Detailed information can be found in the technical data sheet of the specific valve type.

##### 6.1 Marking

All valves are marked in acc. to PED 2014/68/EU, TRB 801 No. 45 or EN19.

##### General Marking

Manufacturer	RITAG
Valve type	...
Nominal diameter	DN...
Nominal pressure	PN..
Material	...
Batch no. (retraceability of the material)	...
Year of manufacture (month, year, e.g. 5.02)	...
CE-marking (starting from category I, see chapter 1 u. 6)	CE
Code of the Notified Body (Module A1 und H)	<b>0525</b>
Stamp of inspector	...

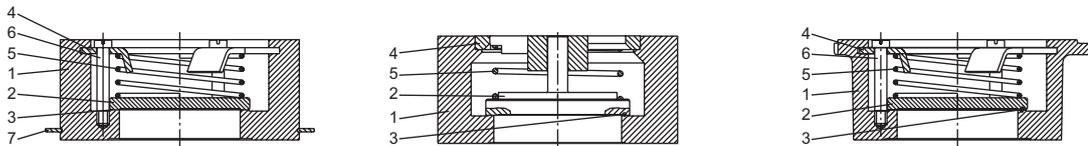
Further special markings, e. g. plant identification code or project name could be additionally affixed on request.

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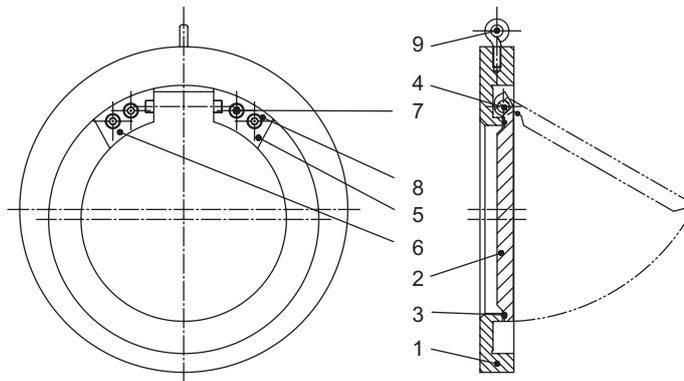
### 6.2 Drawings and Parts Lists

#### Lift Check Valves



Item	Denomination	Item	Denomination
1	Body	2	Plate/disc
3	Sealing (spare part)	4	Guiding plate
5	Spring	6	Guiding screw
7	Centering ring		

#### Swing Check Valves

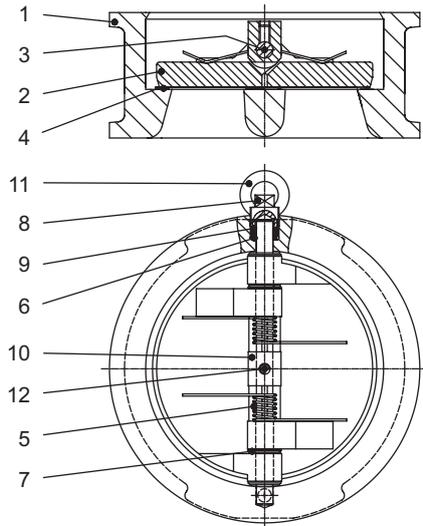


Item	Denomination	Item	Denomination
1	Body	2	Plate
3	Sealing (spare part)	4	Hinge pin
5	Hinge, right	6	Hinge, left
7	Screw	8	Ring
9	Eye screw		

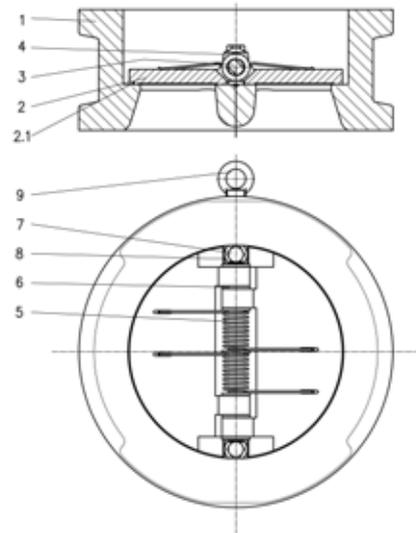
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### Dual Plate Wafer Type Check Valves



with retainer



retainerless

Item	Denomination	Item	Denomination
1	Body	2	Plate
3	Shaft	4	Sealing (spare part)
5	Spring (spare part)	6	Packing (spare part)
7	Ring	8	Pin retainer
9	Ring	10	Stop pin
11	Eye screw	12	Set screw

Item	Denomination	Item	Denomination
1	Body	2	Plate
3	Shaft	4	Stop pin
5	Spring (spare part)	6	Ring
7	Screw	8	Safety Plate
9	Eye screw		

### 6.3 Functionality

Wafer type non-return valves are valves which are controlled by the backflow of the medium. The obturator (disc, cone, plate) is first lifted and then opened by the flow. In the event of an incipient backflow (e. g. failure of a pump) the obturator closes self-controlled by its dead weight. This closing process can optionally be supported by using a spring.

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### 7. Installation

#### 7.1 General Information

Positioning within the isometry of the pipeline as well as a proper installation of the valves is basically the responsibility of the engineer or the operator. Any faults in engineering or installation could cause malfunction of the valves and constitute a significant danger.

For the installation of the valves the same safety regulations are to be considered as for connecting pipelines and its components.



Pipelines have to be laid in such a manner that shearing strain and bending stress are not able to affect the valve body. The flange facings have to be in a parallel position to each other. The facings need to be clean and undamaged.



Valve bodies in material cast iron EN-JL1040, EN-JS1030 must not be treated by sudden pressure (e. g. hammer blow) because components may be destroyed.  
Valves working at temperatures  $<0^{\circ}\text{C}$  respectively  $>40^{\circ}\text{C}$  need to be protected against touch.

#### 7.2 Operation Characteristics (Pressure/Temperature-Rating)

For maximum permissible operating data in relation to pressure/temperature rating, please refer to Annex I.

#### 7.3 Range of Applications

Industrial plants, heating systems, fluids, gases and vapour (see also fluid groups in table of article 6), hot water heating systems DIN4751 / DIN4752, heat transmission plants DIN4754, steam boiler plants TRD110, pressure vessel plants TRB801 No. 45. Fluid groups I+II acc. to PED 2014/68/EU.

Potential restrictions by any technical body of legislation are to be considered.

The materials of the valves have to be applicative for the medium.

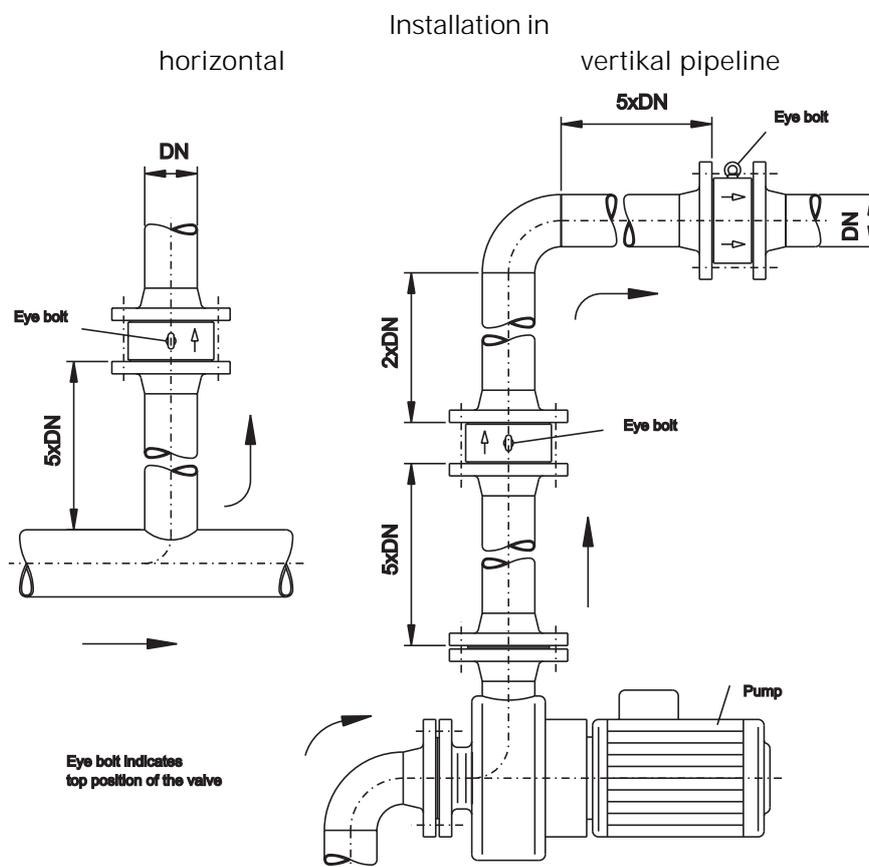
In case of pulsating flow (e.g. caused by piston compressors) the suitability of the selected valve type has to be clarified with RITAG.

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#### 7.4 Installation Instructions

The arrow indicating the flow direction and the flow direction itself need to run in the same direction. For the valve to open a minimum dynamic pressure is required. Valves without spring can only be installed in vertical lines with upward flow.



Wafer type non-return valves are designed for installation between two pipeline flanges including appropriate flange sealings. The outer diameter of the valve centres itself by the flange bolts. The fasteners require a technical applicability in accordance to the service conditions. They have to comply with the regulations and have to be tightened with the permissible torque. Screws, nuts or flange sealings are not covered by the valve manufacturers' scope of supply.



Exception: Swing type check valves model ZRK have to be manually center-lined.

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#### 7.5 Additional instructions for oxygen valves

- All RITAG valves intended for oxygen service are sealed or wrapped in PE foil to ensure that they are safely protected against internal contamination.
- Such valves are identifiable by a label marked „Öl- und fettfrei für Sauerstoffanwendung / Free of oil and grease for oxygen service“ which is affixed outside on the packaging. In addition there can be a customized marking such as DN, PN and Tag number.
- For heavy valves it is ensured that the lifting lug will be accessible for handling with a crane.
- For further details on cleaning and packaging, please ask us for the RITAG Standard RS0515.
- The valves should be handled with care to avoid any damage of the protective foil.
- When storing the valves in the warehouse do not pull them over rough surfaces which could damage the protective foil.
- The protective foil is only to be removed right before installation.
- During assembly, take care that only tools are used which are clean and free of oil and grease.
- During assembly a clean and free of oil and grease environment has to be ensured
- The valves should only be touched with clean and free of oil and grease gloves

#### 7.6 Directive 2014/34/EU (ATEX)

The check valves do not have an own potential source of ignition and therefore the Directive 2014/34/EU is not applicable to these valves. A manufacture declaration can be downloaded at our website [www.ritag.com](http://www.ritag.com) or send by e-mail on request.

The valves may be used in the EX range.

In case of the possibility for electrostatic charges, the valves can be optionally equipped with an earth connection (e.g. stud bolt and nut M6).

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### 8. Initial Operation, Shut-down, Maintenance

#### 8.1 Initial Operation

Materials and service conditions have to be compared with the pipeline system data before pressure test and initial operation in order to check resistance and load.

For new plants or repairs the pipeline system has to be thoroughly rinsed in order to clean it from potential welding residues or any other damaging solid particles.

#### 8.2 Pressure tests of pipeline sections

Since non-return valves are always in a closed position within a filled pipeline section a testing overpressure value of 1,1 x PS must not be exceeded (PS = NP = max. permissible working pressure).

Throughout the pressure test process the valve and the flange connections have to be examined regarding any leaks. Leakages have to be immediately sealed by retightening all fasteners.

#### 8.3 Shutt-down

If the system is out of operation for a lasting period all media which might change its condition (i. e. polymerisation, crystallisation, solidification) have to be drained off the piping system. Rinse the system if necessary.

#### 8.4 Maintenance

The valves are maintenance-free. For safety reasons and in order to avoid unnecessary periods of interruption the operator is advised to examine functionality and reliability of the valves within reasonable and regular intervals (periods to be defined by the operator).

Safety instructions in chapter 4 are to be considered.

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### 8.5 Elimination of Failures

Failure definition	Potential reasons	Remedy
High leakage rate	Contaminated seat facings Deformation of disc/cone/ plate by hammer blow Damaged seat ring Disc/cone/plate does not close, cone is hanging, high activity rate causes a seizing due to friction	Clean the seat facings, regrind if necessary Replace disc/cone/plate Replace seat ring Recheck operating data, reengineer all parts
Inappropriate noises	Insufficient flow rate, turbulent flow, decelerated starting of the pump	Select reduced sizes Recheck the distance between pipe bend and pump (5-7xDN) Use lighter plates or springs with reduced opening pressure Extend the period of running up the pump
Leaks of stuffing box (ZRL-HG, ZRD)	Stuffing box is inadequately preloaded	Retighten stuffing box Replace stuffing box packings if necessary
No flow	Valve is installed in the wrong way	Arrow of flow direction has to run in the same direction as the flow itself.
Leaks of flange sealings	Connection flanges are not wired	Retighten fasteners

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#### 9. Spare Parts



For repair work any valve parts must only be replaced by spare parts from the original supplier. Unauthorised conversion as well as spare parts production cause an expiry of the declaration of conformity and may also invalidate any warranty claims.

Any springs or o-rings (relevant for valves equipped with a soft sealing) can be ordered as spare parts. The full marking of the valve body has to be specified in the purchase order.

#### 10. Further information

For further information such as RITAG technical data sheets, repair instructions, certificates etc. please contact us at [www.ritag.com](http://www.ritag.com) or send your mail to:

RITAG Armaturenwerk  
Postfach 1332  
D 27703 Osterholz-Scharmbeck  
Sachsenring 30  
D 27711 Osterholz-Scharmbeck  
Tel. +49 (0) 4795 55042-0  
Fax +49 (0) 4795 55042-850  
E-Mail: [contact@ritag.com](mailto:contact@ritag.com)

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for cast iron

Material	Temp. ( °C )	max. working pressure (bar)	
		PN10	PN16
EN-JL 1040	RT	10	16
	100	10	16
	200	8	14,4
	300	6	9,6

#### Working data for bronze

Material	Temp. ( °C )	max. working pressure (bar)	
		PN10	PN16
CC483K	RT	10	16
	100	10	16
	200	8	14

#### Working data for material group 3E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	8,5	13,7	21,4	34,2	54	85,7	137,1	214,2
	150	8,3	13,3	20,8	33,3	52,5	83,3	133,3	208,3
<b>1.0460</b>	<b>200</b>	7,7	12,4	19,4	31	48,9	77,6	124,1	194
<b>1.0619</b>	<b>250</b>	7	11,3	17,7	28,3	44,7	70,9	113,5	177,3
<b>1.0425</b>	<b>300</b>	6,4	10,2	16	25,7	40,5	64,2	102,8	160,7
<b>1.0577 *</b>	<b>350</b>	6	9,6	15,1	24,1	38,1	60,4	96,7	151,1
	<b>400</b>	5,7	9,1	14,2	22,8	36	57,1	91,4	142,8
	<b>450</b>	3,2	5,2	8,2	13,1	20,7	32,8	52,5	82,1

\* only up to 300°C

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 3E1

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
1.0426 1.0481	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	10	15,2	23,8	38	60	95,2	152,3	238
	200	10	14,5	22,7	36,3	57,3	90,9	145,5	227,3
	250	9,7	13,3	20,8	33,3	52,5	83,3	133,3	208,3
	300	8,8	12,2	19,1	30,6	48,3	76,6	122,6	191,6
	350	8	11,3	17,7	28,3	44,7	70,9	113,5	177,3
	400	7,3	10,2	16	25,7	40,5	64,2	102,8	160,7
450	4	6,4	10,1	16,1	25,5	40,4	64,7	101,1	

#### Working data for material group 4E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
1.5415 1.5419	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	10	16	25	40	63	100	160	250
	200	9,2	14,8	23,2	37,1	58,5	92,8	148,5	232,1
	250	8,5	13,7	21,4	34,2	54	85,7	137,1	214,2
	300	7,6	12,1	19	30,4	48	76,1	121,9	190,4
	350	7	11,2	17,5	28	44,1	70	112	175
	400	6,3	10,1	15,8	25,3	39,9	63,3	101,3	158,3
	450	5,9	9,4	14,7	23,6	37,2	59	94,4	147,6
	500	4,4	7	11	17,7	27,9	44,2	70,8	110,7
	510	3,5	5,6	8,8	14	22,2	35,2	56,3	88
	520	2,8	4,4	7	11,2	17,7	28	44,9	70,2
	530	2,2	3,5	5,5	8,9	14,1	22,3	35,8	55,9

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 5E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	10	16	25	40	63	100	160	250
	200	10	16	25	40	63	100	160	250
	250	10	16	25	40	63	100	160	250
1.7335	300	9,1	14,7	22,9	36,7	57,9	91,9	147	229,7
1.7357	350	8,4	13,5	21,1	33,9	53,4	84,7	135,6	211,9
	400	7,9	12,7	19,8	31,8	50,1	79,5	127,2	198,9
	450	7,3	11,8	18,4	29,5	46,5	73,8	118	184,5
	500	6,5	10,4	16,3	26	41,1	65,2	104,3	163
	550	2,3	3,7	5,8	9,3	14,7	23,3	37,3	58,3
	560	1,9	3	4,7	7,6	12	19	30,4	47,6
	570	1,5	2,5	3,9	6,2	9,9	15,7	25,1	39,2

#### Working data for material group 6E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	10	16	25	40	63	100	160	250
	200	10	16	25	40	63	100	160	250
	250	10	16	25	40	63	100	160	250
	300	10	16	25	40	63	100	160	250
	350	9,7	15,6	24,4	39	61,5	97,6	156,1	244
1.7380	400	9,2	14,8	23,2	37,1	58,5	92,8	148,5	232,1
1.7383	450	8,8	14	22	35,2	55,5	88	140,9	220,2
1.7375	500	6,4	10,2	16	25,7	40,5	64,2	102,8	160,7
	550	3,2	5,1	8	12,9	20,4	32,3	51,8	80,9
	560	2,7	1,4	6,9	11	17,4	27,6	44,1	69
	570	2,4	3,8	6	9,7	15,3	24,2	38,8	90,7
	580	2	3,3	5,2	8,3	13,2	20,9	33,5	52,3
	590	1,8	2,8	4,5	7,2	11,4	18	28,9	45,3
	600	1,6	2,5	4	6,4	10,2	16,1	25,9	40,4

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 10E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	8,6	13,7	21,5	34,4	54,3	86,1	137,9	215,4
	150	7,7	12,3	19,2	30,8	48,6	77,1	123,4	192,8
	200	7	11,2	17,5	28	44,1	70	112	175
	250	6,5	10,4	16,3	26	41,1	65,2	104,3	163
	300	6	9,6	15,1	24,1	38,1	60,4	96,7	151,1
	350	5,7	9,2	14,4	23	36,3	57,6	92,1	144
1.4306	400	5,5	8,8	13,8	22	34,8	55,2	88,3	138
1.4307	450	5,3	8,5	13,3	21,4	33,7	53,5	85,7	133,9
	500	5,1	8,3	12,9	20,7	32,7	51,9	83	129,7
	550	4,3	7	10,9	17,5	27,6	43,8	70	109,5
	560	4	6,4	10,1	16,1	25,6	40,4	64,7	101,1
	570	3,7	5,9	9,2	14,8	23,4	37,1	59,4	92,8
	580	3,4	5,4	8,5	13,7	21,6	34,2	54,8	85,7
	590	3	4,9	7,7	12,3	19,5	30,9	49,5	77,3
	600	2,8	4,4	7	11,2	17,7	28	44,9	70,2

#### Working data for material group 11E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	9	14,5	22,7	36,3	57,3	90,9	145,5	227,3
	150	8,1	13,1	20,4	32,7	51,6	81,9	131	204,7
	200	7,4	11,9	18,6	29,9	47,1	74,7	119,6	186,9
	250	6,9	11	17,2	27,6	43,5	69	110,4	172,6
	300	6,4	10,2	16	25,7	40,5	64,2	102,8	160,7
	350	6,1	9,8	15,3	24,5	38,7	61,4	98,2	153,5
1.4301	400	5,9	9,5	14,8	23,8	37,5	59,5	95,2	148,8
1.4308	450	5,8	9,3	14,5	23,3	36,7	58,3	93,3	145,8
	500	5,7	9,1	14,2	22,8	36	57,1	91,4	142,8
	550	4,3	7	10,9	17,5	27,6	43,8	70	109,5
	560	4	6,4	10,1	16,1	25,5	40,4	64,7	101,1
	570	3,7	5,9	9,2	14,8	23,4	37,1	59,4	92,8
	580	3,4	5,4	8,5	13,7	21,6	34,2	54,8	85,7
	590	3	4,9	7,7	12,3	19,5	30,9	49,5	77,3
	600	2,8	4,4	7	11,2	17,7	28	44,9	70,2

## Wafer Type Check Valves

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 12E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	9,9	15,8	24,7	39,6	62,4	99	158,4	250
	150	9,3	14,9	23,3	37,3	58,8	93,3	149,3	233,3
	200	8,8	14,1	22,1	35,4	55,8	88,5	141,7	221,4
	250	8,4	13,4	21	33,7	53,1	84,2	134,8	210,7
	300	7,9	12,7	19,8	31,8	50,1	79,5	127,2	198,8
<b>1.4541</b>	350	7,6	12,2	19,1	30,6	48,3	76,6	122,6	191,6
<b>1.4550 *</b>	400	7,4	11,8	18,5	29,7	46,8	74,2	118,8	185,7
<b>1.4552 *</b>	450	7,2	11,6	18,1	29	45,7	72,6	116,1	181,5
	500	7	11,3	17,7	28,3	44,7	70,9	116,5	177,3
	550	6,7	10,8	16,9	27	42,6	67,6	108,1	169
	560	6,1	9,8	15,3	24,5	38,7	61,4	98,2	153,5
	570	5,6	8,9	14	22,4	35,4	56,1	89,9	140,4
	580	5	8,1	12,7	20,3	32,1	50,9	81,5	127,3
	590	4,5	7,3	11,4	18,2	28,8	45,7	73,1	114,2
	600	4	6,5	10,2	16,3	25,8	40,9	65,5	102,3

\* max 500°C

#### Working data for material group 13E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
	RT	10	16	25	40	63	100	160	250
	100	9,4	15,1	23,6	37,9	59,7	94,7	151,6	236,9
	150	8,6	13,7	21,5	34,4	54,3	86,1	137,9	215,4
	200	7,9	12,7	19,8	31,8	50,1	79,5	127,2	198,8
<b>1.4404</b>	250	7,4	11,9	18,6	29,9	47,1	74,7	119,6	186,9
<b>1.4435</b>	300	6,9	11	17,2	27,6	43,5	69	110,4	172,6
<b>1.4458</b>	350	6,6	10,5	16,5	26,4	41,7	66,1	105,9	165,4
	400	6,4	10,2	16	25,7	40,5	64,2	102,8	160,7
	450	6,2	10	15,6	25	39,4	62,6	100,1	156,5
	500	6	9,7	15,2	24,3	38,4	60,9	97,5	152,3

## Wafer Type Check Valves

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### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 14E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
1.4401 1.4408 1.4436	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	9	14,5	22,7	36,3	57,3	90,9	145,5	227,3
	200	8,4	13,4	21	33,7	53,1	84,2	134,8	210,7
	250	7,9	12,7	19,8	31,8	50,1	79,5	127,2	198,8
	300	7,4	11,8	18,5	29,7	46,8	74,2	118,8	185,7
	350	7,1	11,4	17,8	28,5	45	71,4	114,2	178,5
	400	6,8	10,9	17,1	27,4	43,2	68,5	109,7	171,4
	450	6,7	10,7	16,8	26,9	42,4	67,3	107,8	168,4
	500	6,6	10,5	16,5	26,4	41,7	66,1	105,9	165,4
	550	6,5	10,4	16,3	26	41,1	65,2	104,3	163
	560	6,4	10,3	16	25,7	40,5	64,3	103	160,9
	570	6,3	10,1	15,8	25,4	40	63,5	101,6	158,8
	580	6,2	10	15,6	25	39,5	62,7	100,3	156,7
	590	6,1	9,9	15,4	24,7	39	61,9	99	154,7
	600	5,6	8,9	14	22,4	35,4	56,1	89,9	140,4

#### Working data for material group 15E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
1.4571 1.4581	RT	10	16	25	40	63	100	160	250
	100	10	16	25	40	63	100	160	250
	150	9,8	15,6	24,5	39,2	61,8	98	156,9	245,2
	200	9,3	14,9	23,3	37,3	58,8	93,3	149,3	233,3
	250	8,8	14,1	22,1	35,4	55,8	88,5	141,7	221,4
	300	8,3	13,3	20,8	33,3	52,5	83,3	133,3	208,3
	350	8	12,8	20,1	32,1	50,7	80,4	128,7	201,1
	400	7,8	12,4	19,5	31,2	49,2	78	124,9	195,2
	450	7,6	12,2	19,1	30,6	48,3	76,6	122,6	191,6
	500	7,5	12	18,8	30	47,4	75,2	120,3	188
	550	7,4	11,9	18,6	29,9	47,1	74,7	119,6	186,9
	560	7,4	11,8	18,5	29,6	46,6	74	118,5	185,1
	570	7,3	11,7	18,3	29,3	46,2	73,3	117,3	183,3
	580	6,7	10,7	16,7	26,8	42,3	67,1	107,4	167,8
	590	6	9,7	15,2	24,3	38,4	60,9	97,5	152,3
	600	5,5	8,8	13,8	22	34,8	55,2	88,3	138

## Wafer Type Check Valves

*Instruction manual*

### Annex I - Pressure/Temperature Classification acc. to DIN EN 12516

#### Working data for material group 16E0

Material	Temp. ( °C )	max. working pressure (bar)							
		PN10	PN16	PN25	PN40	PN63	PN100	PN160	PN250
<b>1.4462</b>	<b>RT</b>	10	16	25	40	63	100	160	250
<b>1.4362</b>	<b>100</b>	10	16	25	40	63	100	160	250
<b>1.4410</b>	<b>150</b>	10	16	25	40	63	100	160	250
<b>1.4517</b>	<b>200</b>	10	16	25	40	63	100	160	250
<b>1.4469</b>	<b>250</b>	10	16	25	40	63	100	160	250

Working temperatures below 0° C can be found in AD 2000-W10

## Wafer Type Check Valves

Instruction manual

### Annex II - Pressure/Temperature Classification acc. to ASME B16.34

#### Working data for material group 1.1

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
A216 WCB A515 Grade70 A105 A350 LF2	-29 to 38	19,6	51,1	102,1	153,2	255,3	425,5
	50	19,2	50,1	100,2	150,4	250,6	417,7
	100	17,7	46,6	93,2	139,8	233	388,3
	150	15,8	45,1	90,2	135,2	225,4	375,6
	200	13,8	43,8	87,6	131,4	219	365
	250	12,1	41,9	83,9	125,8	209,7	349,5
	300	10,2	39,8	79,6	119,5	199,1	331,8
	325	9,3	38,7	77,4	116,1	193,6	322,6
	350	8,4	37,6	75,1	112,7	187,8	313
	375	7,4	36,4	72,7	109,1	181,8	303,1
	400	6,5	34,7	69,4	104,2	173,6	289,3
	425	5,5	28,8	57,5	86,3	143,8	239,7

#### Working data for material group 1.2

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
A106 GradeC A216 WCC A352 LC2 * A352 LC3 * A352 LCC *	-29 to 38	19,8	51,7	103,4	155,1	258,6	430,9
	50	19,5	51,7	103,4	155,1	258,6	430,9
	100	17,7	51,5	103	154,6	257,6	429,4
	150	15,8	50,2	100,3	150,5	250,8	418,1
	200	13,8	48,6	97,2	145,8	243,2	405,4
	250	12,1	46,3	92,7	139	231,8	386,2
	300	10,2	42,9	85,7	128,6	214,4	357,1
	325	9,3	41,4	82,6	124	206,6	344,3
	350	8,4	40	80	120,1	200,1	333,5
	375	7,4	37,8	75,7	113,5	189,2	315,3
	400	6,5	34,7	69,4	104,2	173,8	289,3
	425	5,5	28,8	57,5	86,3	143,8	239,7

\* not to be used above 345°C

## Wafer Type Check Valves

Instruction manual

### Annex II - Pressure/Temperature Classification acc. to ASME B16.34

#### Working data for material group 1.3

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
A352 LCB * A515 Grade70 A516 Grade65**	-29 to 38	18,4	48	96	144,1	240,1	400,1
	50	18,2	47,5	94,9	142,4	237,3	395,6
	100	17,4	45,3	90,7	136	226,7	377,8
	150	15,8	43,9	87,9	131,8	219,7	366,1
	200	13,8	42,5	85,1	127,6	212,7	354,4
	250	12,1	40,8	81,6	122,3	203,9	339,8
	300	10,2	38,7	77,4	116,1	193,4	322,4
	325	9,3	37,6	75,2	112,7	187,9	313,1
	350	8,4	36,4	72,8	109,2	182	303,3
	375	7,4	35	69,9	104,9	174,9	291,4
	400	6,5	32,6	65,2	97,9	163,1	271,9
	425	5,5	27,3	54,6	81,9	136,5	227,5

\* \* not to be used above 345°C    \*\* not to be used above 425°C

#### Working data for material group 1.9

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
A182 Grade F11 Cl.2 * A217 WC6 *	-29 to 38	19,8	51,7	103,4	155,1	258,6	430,9
	50	19,5	51,7	103,4	155,1	258,6	430,9
	100	17,7	51,5	103	154,4	257,4	429
	150	15,8	49,7	99,5	149,2	248,7	414,5
	200	13,8	48	95,9	143,9	239,8	399,5
	250	12,1	46,3	92,7	139	231,8	386,2
	300	10,2	42,9	85,7	128,6	214,4	357,1
	325	9,3	41,4	82,6	124	206,6	344,3
	350	8,4	40,3	80,4	120,7	201,1	335,3
	375	7,4	38,9	77,6	116,5	194,1	323,2
	400	6,5	36,8	73,3	109,8	183,1	304,9
	425	5,5	35,2	70	105,1	175,1	291,6
	450	4,6	33,7	67,7	101,4	169	281,8
	475	3,7	31,7	63,4	95,1	158,2	263,9
	500	2,8	25,7	51,5	77,2	128,6	214,4
	538	1,4	14,9	29,8	44,7	74,5	124,1
	550	1,4	12,7	25,4	38,1	63,5	105,9
	575	1,4	8,8	17,6	26,4	44	73,4
600	1,4	6,1	12,2	18,3	30,5	50,9	

\* not to be use above 595°C

## Wafer Type Check Valves

Instruction manual

### Annex II - Pressure/Temperature Classification acc. to ASME B16.34

#### Working data for material group 2.1

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
	-29 to 38	19	49,6	99,3	148,9	248,2	413,7
	50	18,3	47,8	95,6	143,5	239,1	398,5
	100	15,7	40,9	81,7	122,6	204,3	340,4
	150	14,2	37	74	111	185	308,4
	200	13,2	34,5	69	103,4	172,4	287,3
A182 F304 *	250	12,1	32,5	65	97,5	162,4	270,7
A182 F304H	300	10,2	30,9	61,8	92,7	154,6	257,6
A240 F304 *	325	9,3	30,2	60,4	90,7	151,1	251,9
A240 F304H	350	8,4	29,6	59,3	88,9	148,1	246,9
A351 CF3 **	375	7,4	29	58,1	87,1	145,2	241,9
A351 CF8 *	400	6,5	28,4	56,9	85,3	142,2	237
A479 F304 *	425	5,5	28	56	84	140	233,3
A479 F304H	450	4,6	27,4	54,8	82,2	137	228,4
	475	3,7	26,9	53,9	80,8	134,7	224,5
	500	2,8	26,5	53	79,5	132,4	220,7
	538	1,4	24,4	48,9	73,3	122,1	203,6
	550	1,4	23,6	47,1	70,7	117,8	196,3
	575	1,4	20,8	41,7	62,5	104,2	173,7
	600	1,4	16,9	33,8	50,6	84,4	140,7

\* above 538°C only when carbon content is 0,04% or higher \*\* not to be used above 425°C

## Wafer Type Check Valves

Instruction manual

### Annex II - Pressure/Temperature Classification acc. to ASME B16.34

#### Working data for material group 2.2

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
	-29 to 38	19	49,6	99,3	148,9	248,2	413,7
	50	18,4	48,1	96,2	144,3	240,6	400,9
	100	16,2	42,2	84,4	126,6	211	351,6
	150	14,8	38,5	77	115,5	192,5	320,8
A182 F316 *	200	13,7	35,7	71,3	107	178,3	297,2
A182 F316 H	250	12,1	33,4	66,8	100,1	166,9	278,1
A240 Grade316 *	300	10,2	31,6	63,2	94,9	158,1	263,5
A240 Grade 316H	325	9,3	30,9	61,8	92,7	154,4	257,4
A351 CF3A **	350	8,4	30,3	60,7	91	151,6	252,7
A351 CF3M ***	375	7,4	29,9	59,8	89,6	149,4	249
A351 CF8A **	400	6,5	29,4	58,9	88,3	147,2	245,3
A351 CF8M *	425	5,5	29,1	58,3	87,4	145,7	242,9
A479 F316 *	450	4,6	28,8	57,7	86,5	144,2	240,4
A479 F316H	475	3,7	28,7	57,3	86	143,4	238,9
	500	2,8	28,2	56,5	84,7	140,9	235
	538	1,4	25,2	50	75,2	125,5	208,9
	550	1,4	25	49,8	74,8	124,9	208
	575	1,4	24	47,9	71,8	119,7	199,5
	600	1,4	19,9	39,8	59,7	99,5	165,9

\* above 538°C only when carbon content is 0,04% or higher    \*\* not to be used over 345°C

\*\*\* not to be used over 425°C

#### Working data for material group 2.3

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
	-29 to 38	15,9	41,4	82,7	124,1	206,8	344,7
	50	15,3	40	80	120,1	200,1	333,5
	100	13,3	34,8	69,6	104,4	173,9	289,9
A182 F304L *	150	12	31,4	62,8	94,2	157	261,6
A182 F316L	200	11,2	29,2	58,3	87,5	145,8	243
A240 Grade 304L *	250	10,5	27,5	54,9	82,4	137,3	228,9
A240 Grade316L	300	10	26,1	52,1	78,2	130,3	217,2
A479 Grade304L *	325	9,3	25,5	51	76,4	127,4	212,3
A479 Grade316L	350	8,4	25,1	50,1	75,2	125,3	208,9
	375	7,4	24,8	49,5	74,3	123,8	206,3
	400	6,5	24,3	48,6	72,9	121,5	202,5
	425	5,5	23,9	47,7	71,6	119,3	198,8
	450	4,6	23,4	46,8	70,2	117,1	195,1

\* not to be used over 425°C

## Wafer Type Check Valves

Instruction manual

### Annex II - Pressure/Temperature Classification acc. to ASME B16.34

#### Working data for material group 2.4

Material	Temp. ( °C )	max. working pressure (bar)					
		150	300	600	900	1500	2500
	-29 to 38	19	49,6	99,3	148,9	248,2	413,7
	50	18,6	48,6	97,1	145,7	242,8	404,6
	100	17	44,2	88,5	132,7	221,2	368,7
	150	15,7	41	82	122,9	204,9	341,5
	200	13,8	38,2	76,6	114,9	191,5	319,1
	250	12,1	36	72	108,1	180,1	300,2
A182 F321 *	300	10,2	34,1	68,3	102,4	170,7	284,6
A240 F321 *	325	9,3	33,3	66,6	99,9	166,5	277,6
A479 Grade 321 *	350	8,4	32,6	65,2	97,8	163	271,7
A182 F321H **	375	7,4	32	64,1	96,1	160,2	266,9
A240 F321H **	400	6,5	31,6	63,2	94,8	157,9	263,2
A479 Grade 321H **	425	5,5	31,1	62,3	93,4	155,7	259,5
	450	4,6	30,8	61,7	92,5	154,2	256,9
	475	3,7	30,5	61,1	91,6	152,7	254,4
	500	2,8	28,2	56,5	84,7	140,9	235
	538	1,4	25,2	50	75,2	125,5	208,9
	550	1,4	25	49,8	74,8	124,9	208
	575	1,4	24	47,9	71,8	119,7	199,5
	600	1,4	20,3	40,5	60,8	101,3	168,9

\* not to be used above 538°C

\*\* above 538°C only when material is heat treated (über 1095°C)