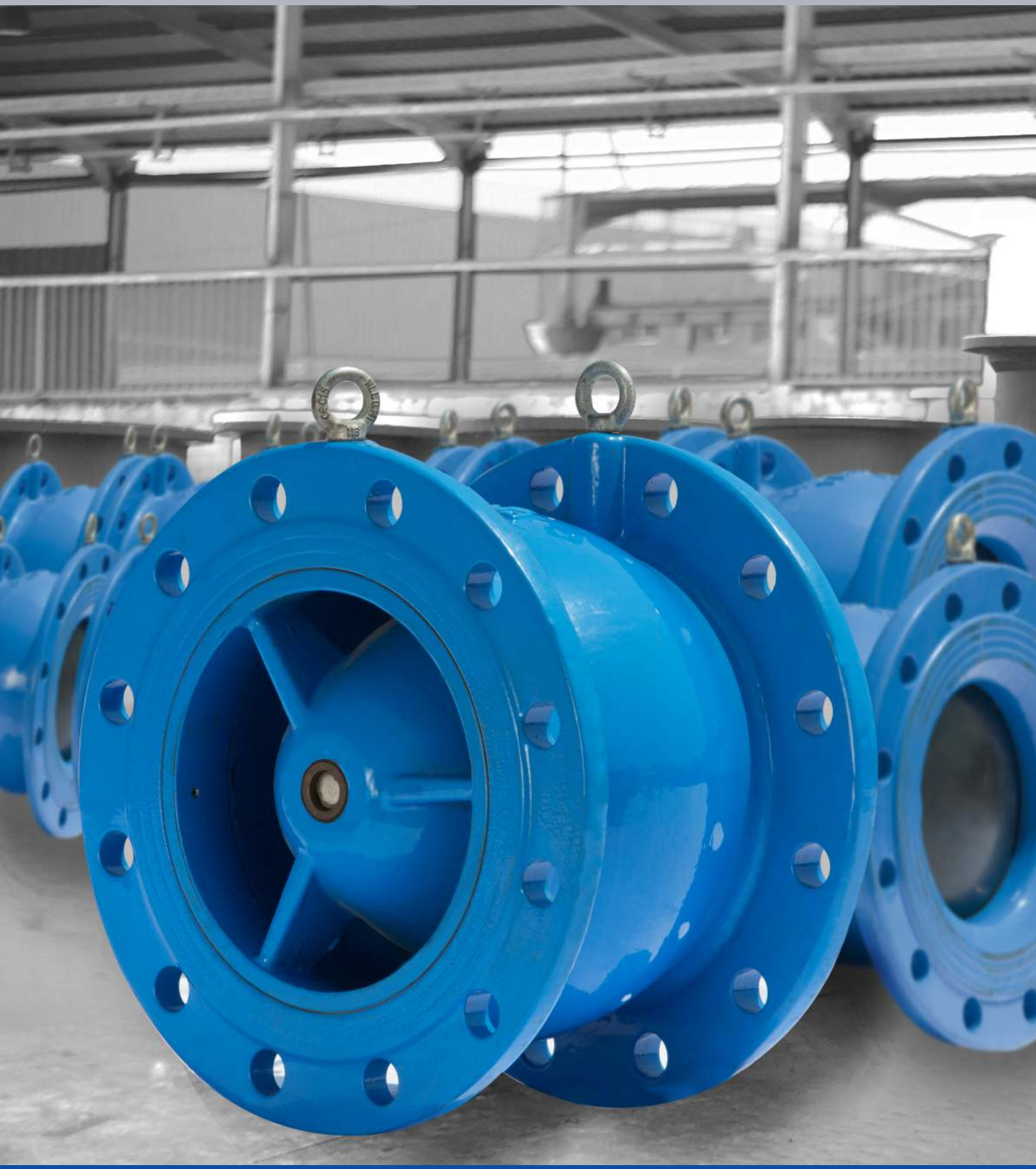
SIERRA
Engineering & Manufacturing



5500| NON-SLAM NOZZLE CHECK VALVE

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NON-SLAM NOZZLE CHECK VALVE

SIERRA Model 5500 non-slam nozzle check valve is one of the faste closing check valves that reduce slam and water hammer due to its short linear stroke, low moving masses supported by helical springs that ensure valves closing slam-free within fractions of seconds. The nozzle check valve design also reduces head loss during operation. Hence is one of the most economical valves.

5500 SCOPE OF SUPPLY & DESIGN STANDARDS

RANGE OF SIZES:	DN65 - DN1200
PRESSURE RATINGS:	PN10, PN16, PN25
TEMPERATURE RANGE:	-10°C TO +80°C
DESIGN AND TYPE TO:	BS5153
FACE-TO-FACE DIMENSIONS:	ISO5752, EN558-1, Series 14
FLANGE DIMENSIONS:	EN1092-2 (DIN2501)
HYDROSTATIC TESTING:	BS EN 122266-2 , ISO5208
TYPE TESTING TO:	EN1074 - 3

5500 MODEL FIELDS OF APPLICATIONS

- Potable and raw water
- Firefighting systems
- Irrigation systems

5500 MODEL ADVANTAGES

- Closing time (dynamic response) is a fraction of a second
- In case of sudden pump stops, nozzle check valve reduces pressure surges in the pipeline
- Avoids pressure surges in the pipeline or minimizes them
- Suitable for high pressure applications
- Non-slam (Silent) check valve
- Face to face, according to ISO5752 series 14 enabling easy installation
- No maintenance required
- Suitable for vertical, horizontal and diagonal mounting
- Low pressure drop
- Perfect disc sealing which provide tight shutoff
- Low maintenance cost

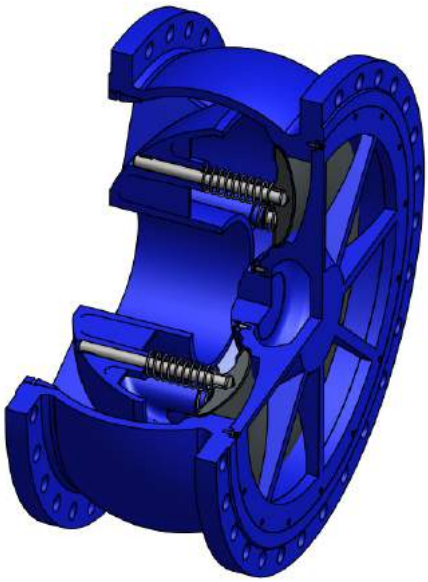
DESIGN FEATUREES AND BENEFITS

1 -NON-SLAM: QUICK RESPONSE

Low weight discs, short stroke lengths and spring assistance combine to ensure that the Axial type check valve responds quickest to change in flow direction. This fast response ensures reverse velocity cannot build up to a level that can damage pumps, pipes or related equipment. As pressure surges can occur when a valve is closed against a moving body of fluid, the quick closure results in a considerably lower pressure peak than with other types of check valve.

2 - MINIMAL HEADLOSS

The valve design and nozzle shape maintain streamlined flow passage, optimum flow, optimised zeta values, and extremely low head-loss coefficient in open position.



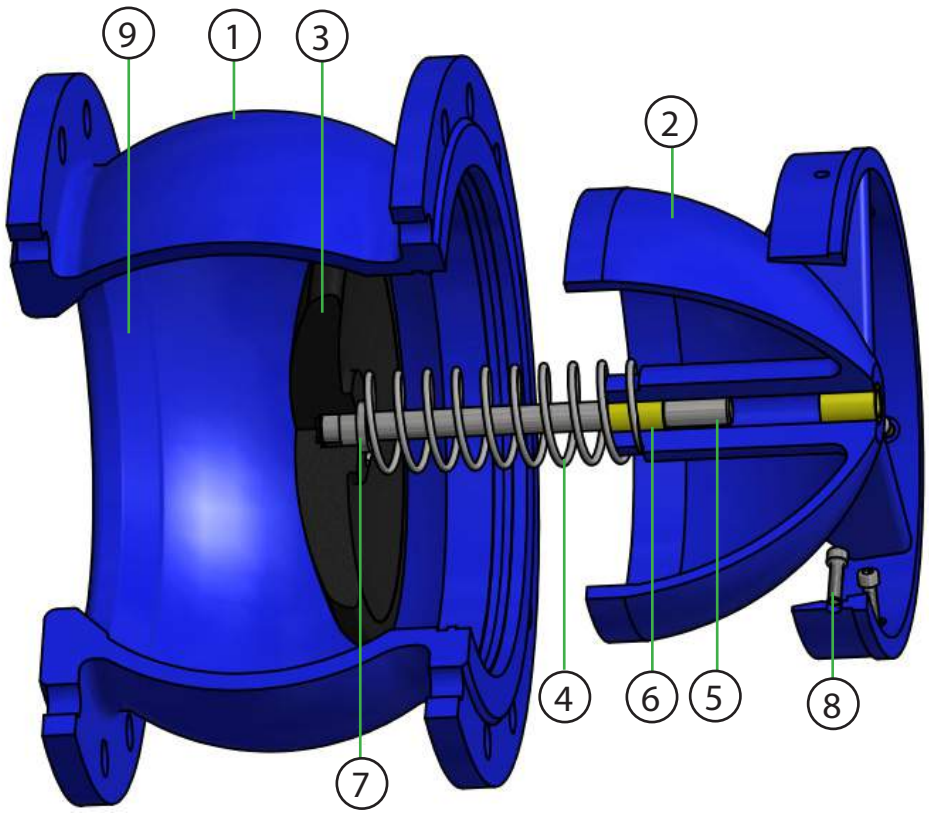
3 - DROP TIGHT SEATING

Resilient-seated disc assure positive seating at high and low pressure ratings

4 -MAINTENANCE FREE

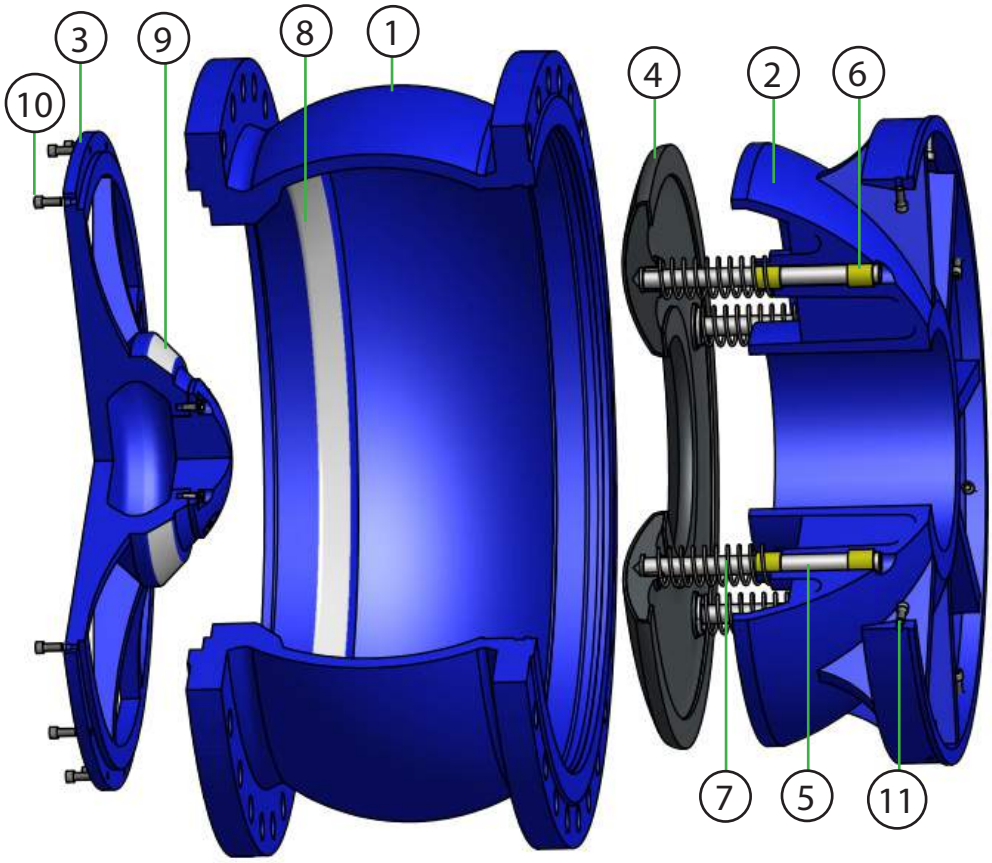
Sierra non-slam nozzle check valve design and material selection of inner parts, minmizses wearing of parts, it is considered maintenance free valve. The springs are sized according to the flow rates to ensure that the valves are in the fully open position during normal use. This minimises cycling of the spring, giving the valves a long

MATERIAL STANDARDS (DN65 : DN300)



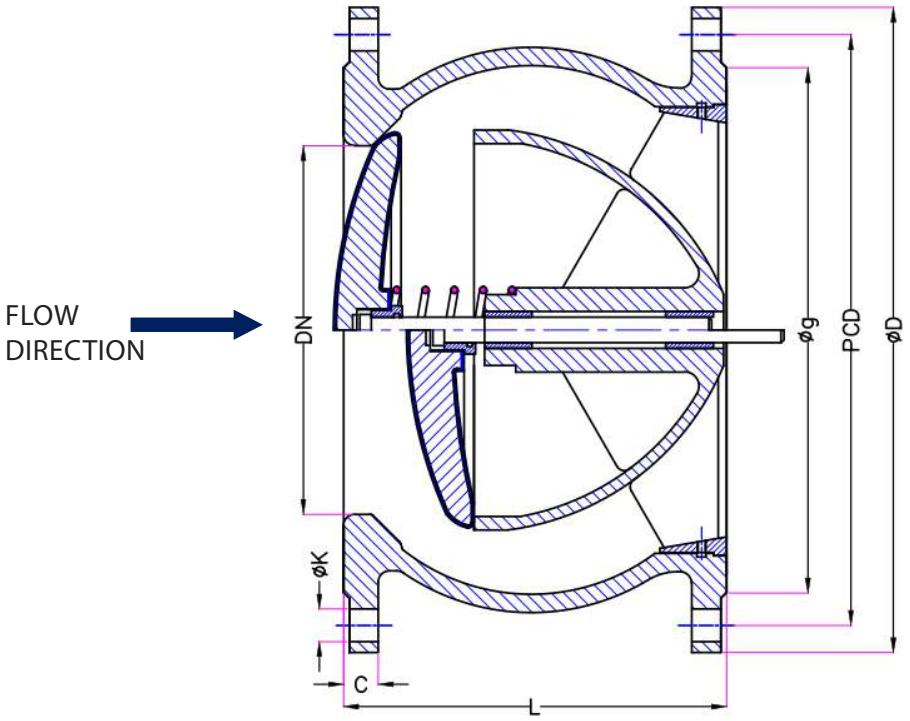
ITEM	DESCRIPTION	MATERIAL		STANDARDS
		STANDARD	OPTIONAL	
1	Valve Body	Ductile Iron EN GJS-500/7	Ductile Iron EN GJS- 400/12	EN1565
2	Diffuser	Ductile Iron EN GJS-500/7	Ductile Iron EN GJS- 400/12	EN1565
3	Disc	Ductile Iron EN GJS-500/7 rubber vulcanized disc		EN1565
4	Spring	SS316		EN10088
5	Stem	SS304	SS316	EN10088
6	Sleeve(s)	Bronze		EN1982
7	Nut	SS304	SS316	EN10088
8	Diffuser Bolts	SS304	SS316	EN10088
9	Body Seat	Inegral seat	SS316	

MATERIAL STANDARDS (DN350 : DN1200)



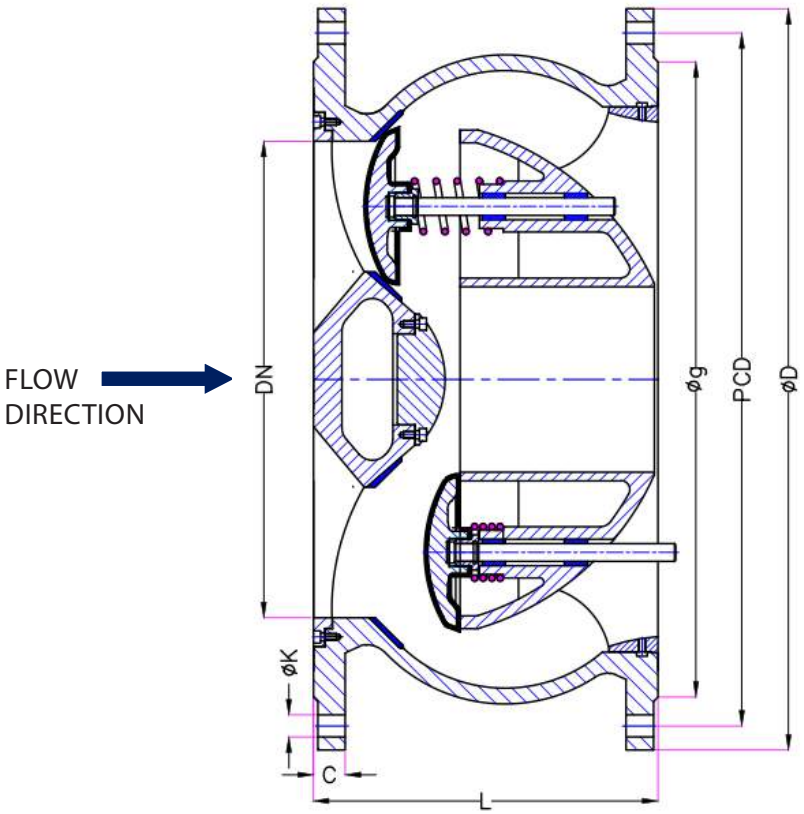
ITEM	DESCRIPTION	MATERIAL		STANDARDS
		STANDARD	OPTIONAL	
1	Valve Body	Ductile Iron EN GJS-500/7	Ductile Iron EN GJS-400/12	EN1565
2	Diffuser	Ductile Iron EN GJS-500/7	Ductile Iron EN GJS-400/12	EN1565
3	Disc Seat	Ductile Iron EN GJS-500/7	Ductile Iron EN GJS-400/12	EN1565
4	Disc	Ductile Iron EN GJS-500/7 rubber vulcanized disc		EN1565
5	Stems	SS304	SS316	EN10088
6	Sleeves	Bronze		EN1982
7	Springs	SS316		EN10088
8	Body Seat	Inetgral Seat	SS316	
9	Inner Disc Seat	Inetgral Seat	SS316	
10	Disc Seat Bolts	SS304	SS316	EN10088
11	Diffuser Bolts	SS304	SS316	EN10088

DIMENSION TABLE FOR PN10-16 NON-SLAM NOZZLE CHECK VALVE (DN65-300)



MAIN VALVE DIMENSIONS		PN10 BAR FLANGES							PN16 BAR FLANGES						
DN	L	ØD	Øg	PCD	C	Øk	N	BOLTS	ØD	Øg	PCD	C	Øk	N	BOLTS
65	170	185	118	145	19	19	8	M16	185	118	145	19	19	8	M16
80	180	200	132	160	19	19	8	M16	200	132	160	19	19	8	M16
100	190	220	156	180	19	19	8	M16	220	156	180	19	19	8	M16
150	210	285	211	240	19	23	8	M20	285	211	240	19	23	8	M20
200	230	340	266	295	20	23	8	M20	340	266	295	20	23	12	M20
250	250	400	319	350	22	23	12	M20	400	319	355	22	28	12	M24
300	270	455	370	400	24.5	23	12	M20	455	370	410	24.5	28	12	M24

DIMENSION TABLE FOR PN10-16 NON-SLAM NOZZLE CHECK VALVE (DN350-1200)



MAIN VALVE DIMENSIONS		PN10 BAR FLANGES							PN16 BAR FLANGES						
DN	L	ØD	Øg	PCD	C	Øk	N	BOLTS	ØD	Øg	PCD	C	Øk	N	BOLTS
350	290	505	429	460	24.5	23	16	M20	520	429	470	26.5	28	16	M24
400	310	565	480	515	24.5	28	16	M24	580	480	525	28	31	16	M27
450	330	615	527	565	25.5	28	20	M24	640	544	585	30	31	20	M27
500	350	670	582	620	26.5	28	20	M24	715	609	650	31.5	34	20	M30
600	390	780	682	725	30	31	20	M27	840	720	770	36	37	20	M33
700	430	895	794	840	32.5	31	24	M27	910	794	875	39.5	37	24	M33
800	470	1015	901	950	35	34	24	M30	1025	901	990	43	40	24	M36
900	510	1115	1001	1050	37.5	34	28	M30	1125	1001	1090	46.5	40	28	M36
1000	550	1230	1112	1160	40	37	28	M33	1255	1112	1210	50	43	28	M39
1200	630	1455	1328	1380	45	40	32	M33	1485	1328	1420	57	49	32	M39

ENGINEERING DATA

OPERATING PRINCIPLES

Non return valves mounted on large supply networks and in pumping station delivery lines are required to operate frequently. Statistics show that when serious pressure surge occurs, is often due to the fact that an incorrect type of valve has been installed. For example, when a pump isswitched off in a pumping station, the flow reduces the speed, stops and is subsequently reversed. The valve then closes under the effect of the disc's weight or a return spring, or by the reversal of the flow. Experience and calculations show that this reversal can occur within an extremely short time (from 1/100 to 1/10 of a second).

If the valve does not respond quickly, closure will occur sharply, with the result that:

- The disc is slammed against the seating with a creation of a loud shock wave
- Water hammer is created causing pressure surge
- Shock waves and pressure surge stress installation which may result in mechanical failure of the valve components and pipeline.

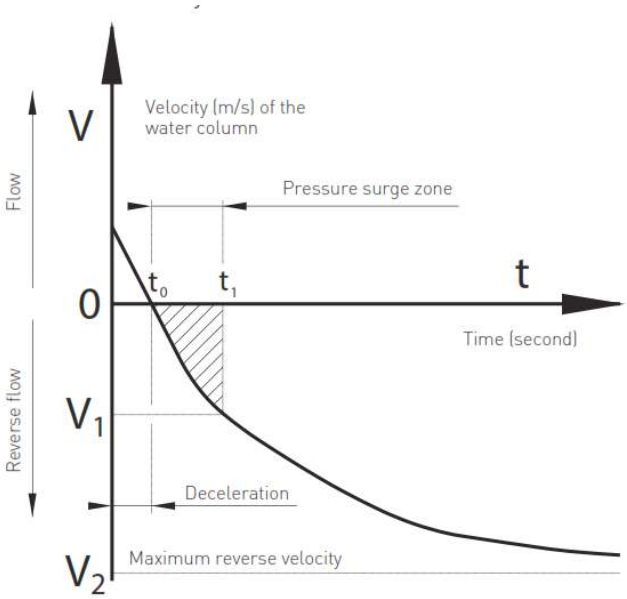
Non-Slam Nozzle Axial Check Valves operating principle

SIERRA Model 5500 Non-Slam Axial check valve designed to stop reverse flow using a non-slam, fast closing spring assisted disc. This unique design results in improved reliability and performance compared to conventional check valves. A fundamental feature of the NozzleCheck valve design is its ability to close at the moment flow stops, thereby avoiding the pressure surge and impact of reverse flow.

The features of ideal check valve can be summarized in the opposite graph:

- $t = 0$: The pump stops
- $t = t_0$: The velocity of the water is $V = 0$, it is the beginning of the reverse flow. Usual values: $1/100\ s < t_0 < 1/10\ s$
- $t = t_1$: The disc of the check valve is positioned on the seat:
  - The reverse velocity of the water is V1
  - The reverse flow is stopped immediately
  - The overpressure is proportional to the reverse velocity (V1)

The ideal check valve should close at : $t = t_0$



ENGINEERING DATA

DYNAMIC CHARACTERISTICS

The valve disc, the spring and the closing stroke have been designed in such a way that acts so quickly, which minimizes reverse velocities, even in case of extremely high flow deceleration (e.g. vertical pipeline). This will lead to a decrease of water hammer phenomena.

CRACKING PRESSURE AND CRITICAL VELOCITY

Cracking pressure is the minimum required pressure to open the valve (move the disc), once the valve is open a minimum velocity is required to keep the valve in a fully open position and prevent disc fluttering. This velocity is referred to as critical velocity

HEAD LOSS CHARACTERISTICS

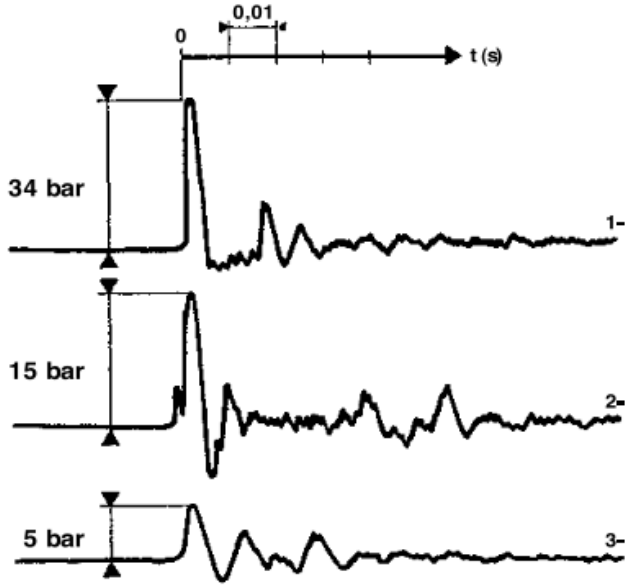
$\Delta P = SG.(Q/KV)^2$

Where,
ΔP = Head loss in bar
Sg = Specific gravity (equals 1 in case of water)
Q = Flow rate in m3/hr.
Kv = Flow coefficient of valve

PRESSURE SURGE COMPARISON WITH DIFFERENT CHECK VALVES

The opposite figure shows the water hammer resulting from closure of various type of valves under identicaloperating conditions:

A. Single flap valve
B. Dual plate check valve
C. Non-Slam nozzle check valve



The 5500 nozzle check valve is one of the faster closing check valves that reduce slam and water hammer due to its short linear stroke. The nozzle check valve design also reduces head loss during operation. Hence is one of the most economical valves.

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