

## GATE VALVE GENERAL INFORMATION

It is a type of valve to be used for general purpose which consists of a long, flat or oval body, a disc inside it, a spindle and a spindle nut to operate the disc.

Gate valves are not used only for clean water but also can be used for sewage as long as materials of components are selected correctly.

Disc is drawn into the bonnet. It is an advantage that when valve is open, pipe line is fully clear without any obstacle; flow path is not interrupted. This advantage gives the possibility of "pigging" for cleaning of pipe line.

When valve is fully closed, disc sits on the seat surface completely. Bottom side of disc is narrower than top side. As a result of this feature, the contact between seat surfaces is interrupted and disc travels by sliding on body and bonnet guides while valve is opening. Seat surfaces are never in contact while valve is opening or closing. So, they are not worn or scratched due to friction; they are long lasting.

Gate valves, that have an operation system consists of spindle and nut, shall not be used for throttling purpose but can be used as isolation valve for on-off duty.

Gate valves are manufactured as rising spindle type or non-rising spindle type depending on usage area and selecting correct shaft material accordingly.

Installation Position, Valve should be installed as spindle in vertical position. For horizontal installation, valve should be equipped with guides and slippers.

### Common Accessories for All Type of Gate Valves,

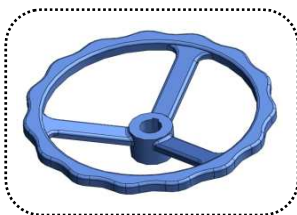
#### By-pass,

It is a "U" shaped equipment fixed on body, which connects outlet of valve to inlet from outside of main pipe line. There is a gate valve between two elbows.

In closed position of disc, by-pass valve is used to transfer the fluid from outlet side to inlet side. If chamber of pump is emptied, fluid can be transferred into the pump by opening by-pass valve.

It is difficult to open big diameter gate valves and valves under high differential pressure. Before opening main valve, by-pass valve opens; pressure difference on different faces of disc is balanced or decreased. It helps to open main valve with less torque requirement; valve opens easily without any damage on seats.

By-pass is applied for valves comply with EN558-1 S19 and S15 face-to-face standard.

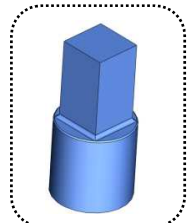


Hand wheel,

It is a wheel to open and close the valve manually.

Cap-Top,

It is an accessory allows using T-key to open and close valve.

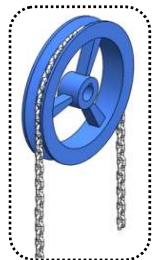


Headstock, Product Code, HS

If valve is installed at first floor but operational equipments are at second floor, headstock and operational equipments are placed at second floor. Extension shafts and guide brackets are between valve and headstock. So, it is not needed to be next to valve to operate it.

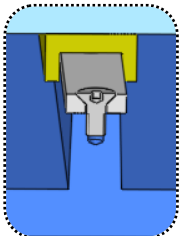


Chain wheel, If valve is installed at a high point, chain wheel is more practical to use than hand wheel. Chain is used to operate the valve.



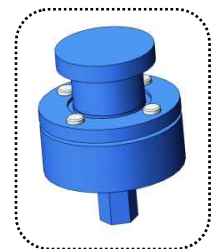
Guides and Slippers,

They are used to achieve a smoother disc travel and longer valve life. Guides on body are made of stainless steel and slippers on disc are made of bronze. Disc travels on that guide-slipper system. For horizontally installed valves, that accessory is strongly recommended.



Jacking Screw,

It is located inside the valve, at the bottom of body. It is a mechanism used to move the disc upwards if there is a sticking problem. It is applied upon request.



Bevel Gearbox (1:1 Rated), Product Code, B

This is a bevel type gearbox with 1:1 ratio and 90 degrees angle between axes of input and output gears. It can be fitted on top of gearbox of any type of valve in place of hand-wheel. While fitting, four holes on connection flange are used. So, four different positions for operation are available.



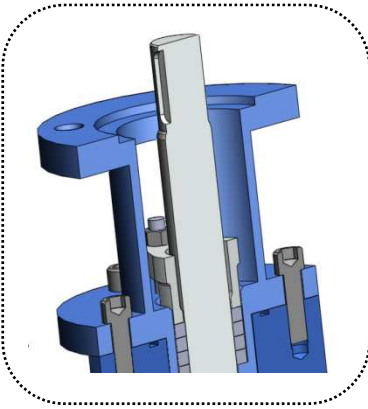
## NON RISING SPINDLE GATE VALVE with PACKING DESIGN

Threaded section of valve spindle is inside valve chamber.

When spindle is operated, spindle nut, which is located in the groove of disc, also travels on spindle. Disc is drawn into the bonnet and valve opens. To close the valve, direction of operation is changed.

Gate valve should not be used for sea water and sewage media that includes very aggressive chemicals.

Installation Position, Valve should be installed as spindle in vertical position. For horizontal installation, valve should be equipped with guides and slippers.

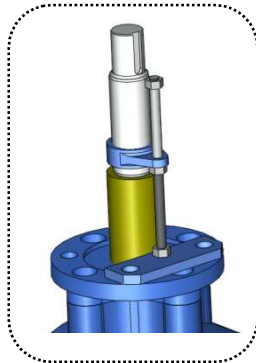


Non-asbestos packing or other special items are used for shaft sealing.

That design is applicable for all diameters and pressure ratings of gate valves.

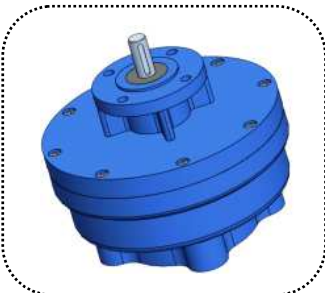


### Accessories of Non-Rising Spindle Gate Valve,



#### Mechanical Indicator,

It is mechanical equipment that shows position of disc of gate valve installed in pipe-line. It slides on a pin according to operation of spindle.

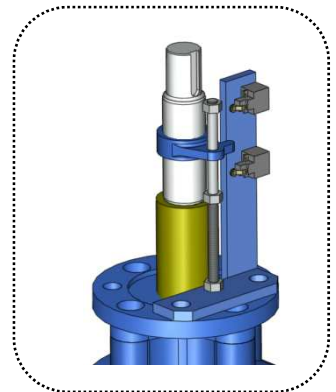


#### Planet Gearbox, Product Code, GGB-P,

It is used for operation of non-rising spindle gate valve.

#### Indicator with Switch,

It is the same mechanical indicator which additionally has limit switches fixed on. Signals, indicating fully open and fully closed positions of valve, are sent to panel at operation room.

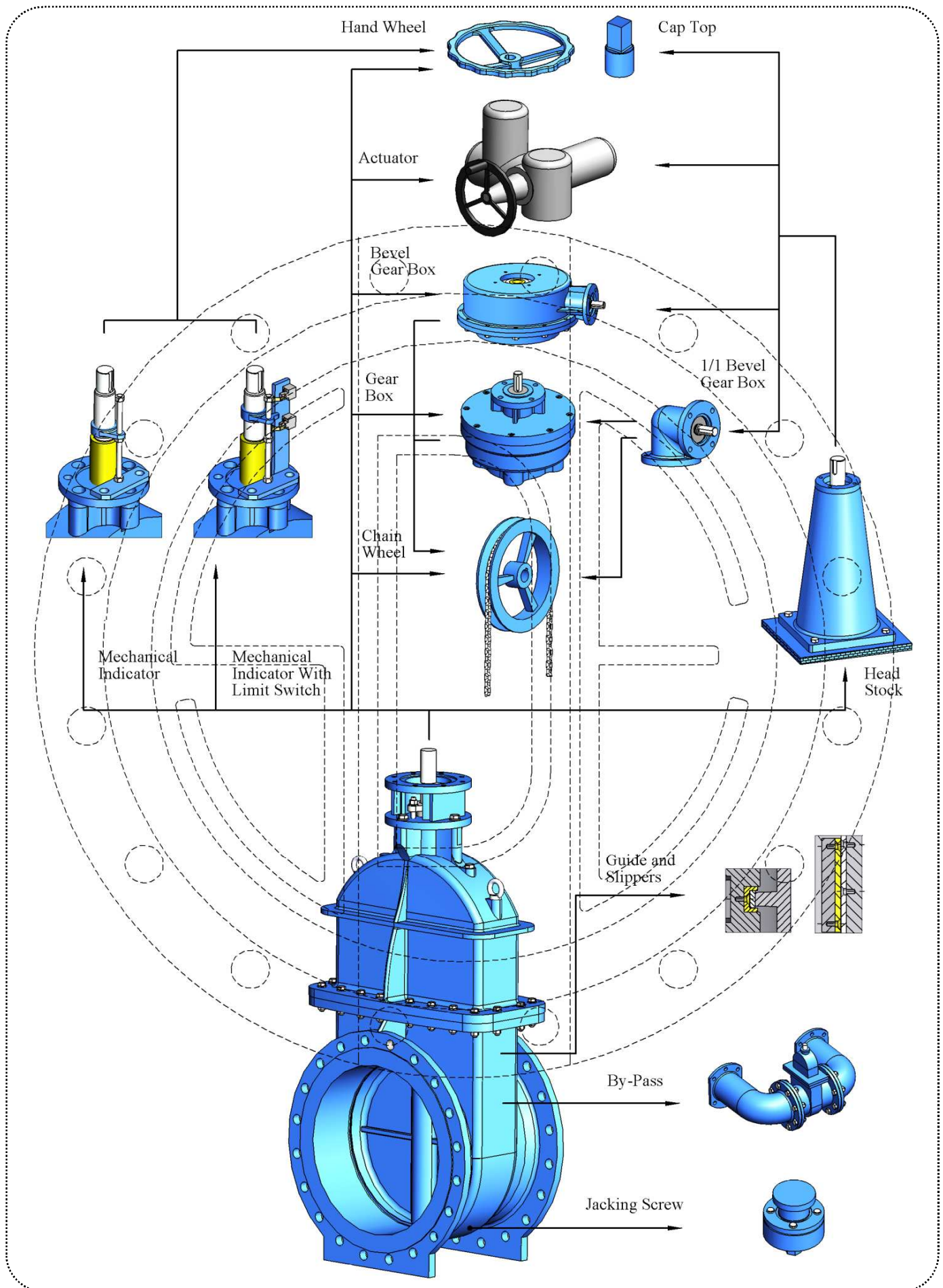


### Maintenance,

In case of a problem at top group sealing, more packing can be added or replaced totally even valve is installed in the pipe-line. To do this, disc is opened fully to prevent water pass through shaft hole.

If there is a gearbox mounted on valve, gears are lubricated. If valve is uninstalled, cleaning of valve is advised, only.

**S.D.E.**  
**ACCESSORIES OF**  
**NON RISING SPINDLE GATE VALVE with PACKING DESIGN**



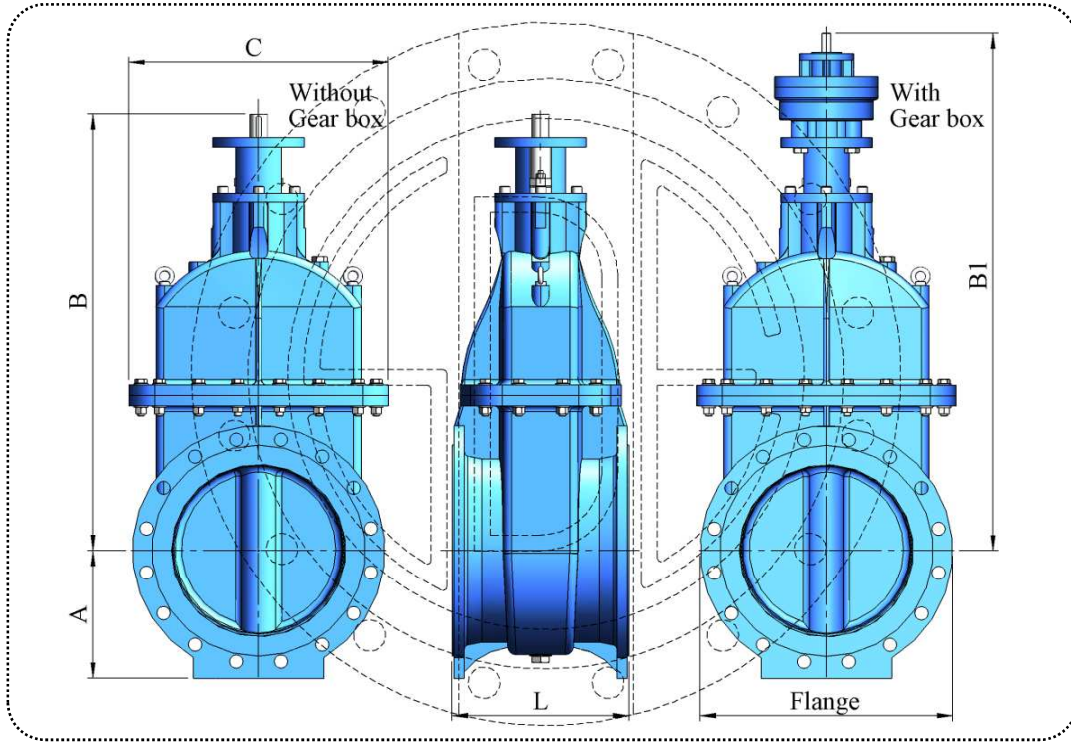


## GATE VALVE NON RISING SPINDLE with PACKING DESIGN PN 10

Body Length Standard : EN 558-1, S 14, By-Pass not applicable.

Valve Standard : EN 1171

Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.



### DIMENSIONS

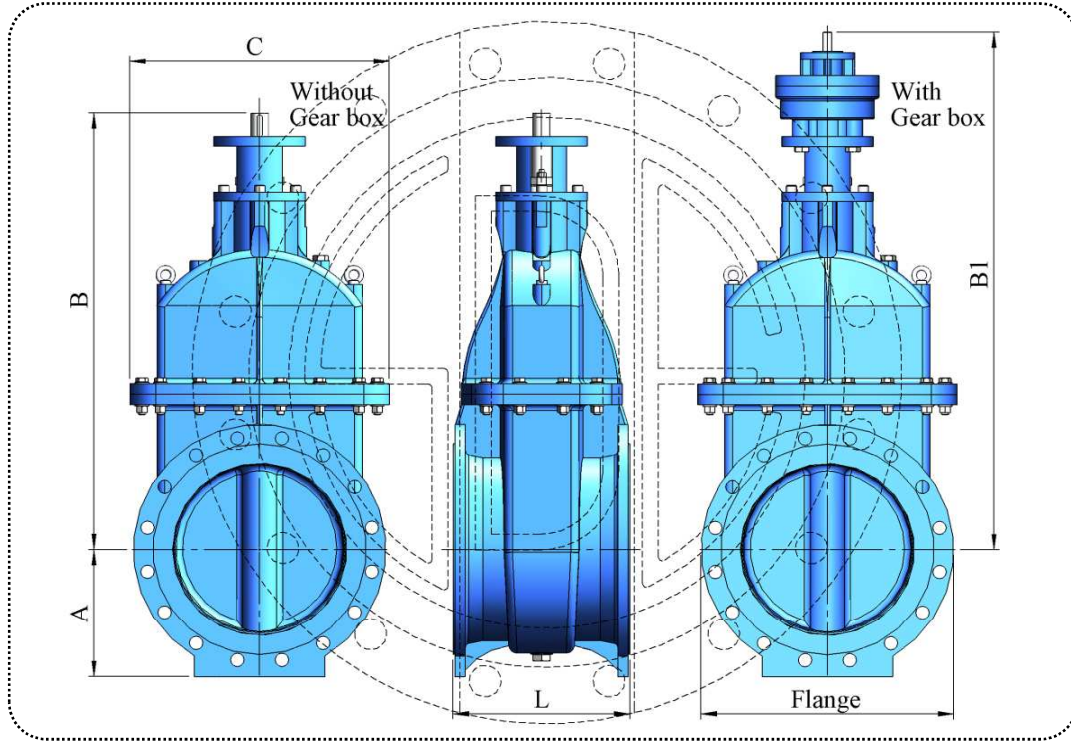
DN	A	B	B1	C	L	Kg		
						Bare Shaft	With Gear box	
							Ratio 1/4	Ratio 1/8
300	228	773	923	455	270	237	273	273
350	258	913	1.113	519	290	300	353	353
400	288	1.003	1.203	583	310	371	425	425
450	313	1.108	1.328	637	330	446	527	527
500	340	1.195	1.415	696	350	544	624	624
550	368	1.313	1.563	754	370	702	782	782
600	395	1.400	1.650	813	390	835	956	956
650	424	1.489	1.739	875	410	997	1.119	1.119
700	453	1.578	1.828	936	430	1.117	1.238	1.238
750	488	1.693	1.963	1.011	450	1.328	1.449	1.449
800	513	1.778	2.048	1.065	470	1.555	1.741	1.741
900	563	1.948	2.218	1.172	510	1.930	2.115	2.115
1.000	620	2.125	2.395	1.295	550	2.389	2.574	2.574
1.050	648	2.243	2.543	1.355	570	2.930	3.115	3.115
1.100	676	2.331	2.631	1.415	590	3.328	3.514	3.514
1.200	733	2.508	2.808	1.535	630	3.813	3.998	3.998

## GATE VALVE NON RISING SPINDLE with PACKING DESIGN PN 10

Body Length Standard : EN 558-1, S 3, By-Pass applicable.

Valve Standard : EN 1171

Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.



### DIMENSIONS

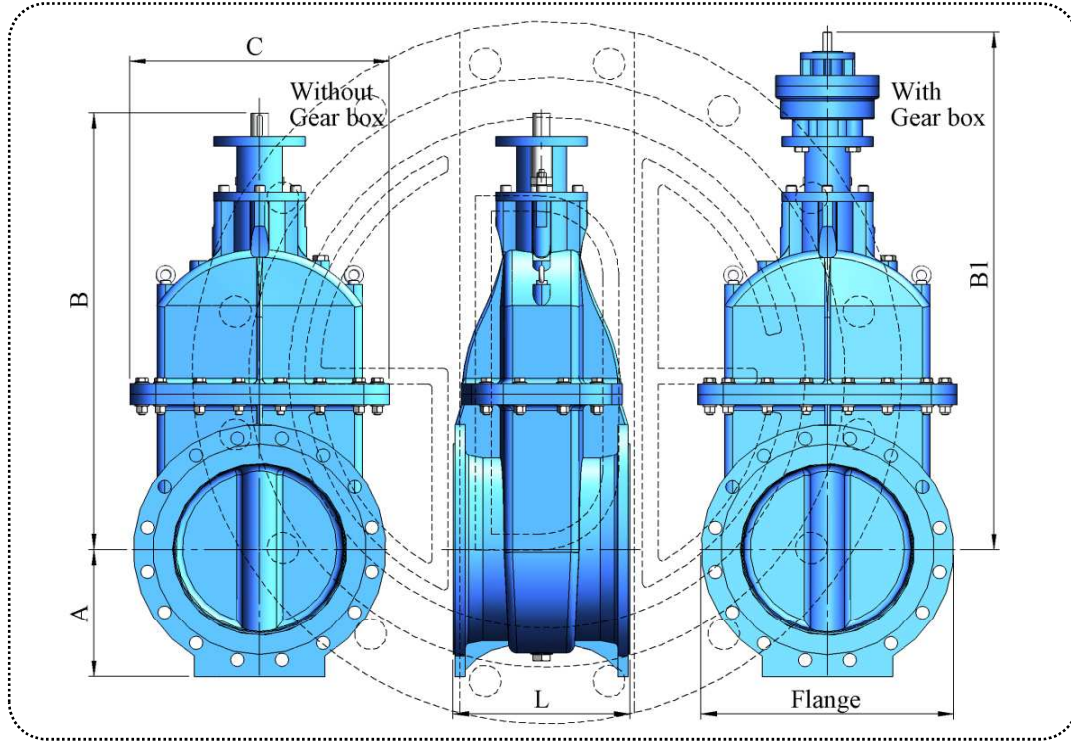
DN	A	B	B1	C	L	Kg			
						Bare Shaft	With Gear box		
							Ratio 1/4	Ratio 1/8	Ratio 1/16
300	228	773	923	455	356	255	290	290	299
350	258	913	1.113	519	381	320	373	373	387
400	288	1.003	1.203	583	406	396	450	450	463
450	313	1.108	1.328	637	432	476	556	556	576
500	340	1.195	1.415	696	457	578	658	658	678
550	368	1.313	1.563	754	483	746	826	826	846
600	395	1.400	1.650	813	508	886	1.007	1.007	1.038
650	424	1.489	1.739	875	560	1.068	1.189	1.189	1.220
700	453	1.578	1.828	936	610	1.205	1.326	1.326	1.357
750	488	1.693	1.963	1.011	635	1.427	1.549	1.549	1.579
800	513	1.778	2.048	1.065	660	1.669	1.854	1.854	1.901
900	563	1.948	2.218	1.172	711	2.064	2.249	2.249	2.295
1.000	620	2.125	2.395	1.295	811	2.594	2.779	2.779	2.826
1.050	648	2.243	2.543	1.355	811	3.141	3.326	3.326	3.373
1.100	676	2.331	2.631	1.415	811	3.536	3.722	3.722	3.768
1.200	733	2.508	2.808	1.535	838	4.041	4.227	4.227	4.273
1.300	793	2.688	2.988	1.664	1.120	5.918	6.202	6.202	6.274
1.400	843	2.888	3.218	1.771	1.120	7.438	7.722	7.722	7.793
1.500	898	3.063	3.393	1.889	1.200	9.202	9.486	9.486	9.557
1.600	963	3.248	3.578	2.028	1.200	10.840	11.279	11.279	11.389
1.700	1.013	3.458	3.828	2.135	1.350	12.305	12.744	12.744	12.853
1.800	1.063	3.628	3.998	2.242	1.500	13.590	14.029	14.029	14.139
1.900	1.115	3.800	4.170	2.354	1.500	15.567	16.006	16.006	16.116
2.000	1.168	3.973	4.343	2.466	1.500	17.008	17.447	17.447	17.556

## GATE VALVE NON RISING SPINDLE with PACKING DESIGN PN 10

Body Length Standard : EN 558-1, S 19, By-Pass applicable.

Valve Standard : EN 1171

Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.



### DIMENSIONS

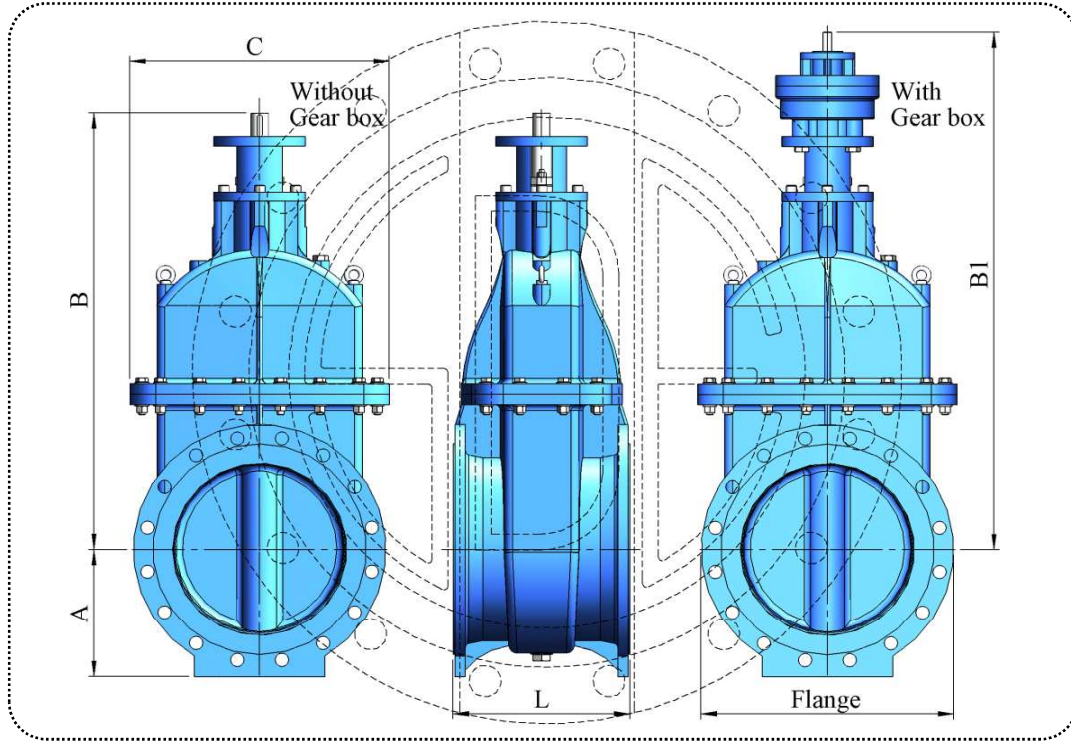
DN	A	B	B1	C	L	Kg			
						Bare Shaft	With Gear box		
							Ratio 1/4	Ratio 1/8	Ratio 1/16
300	228	773	923	455	502	298	334	334	343
350	258	913	1.113	519	572	375	428	428	442
400	288	1.003	1.203	583	610	474	527	527	540
450	313	1.108	1.328	637	660	574	654	654	674
500	340	1.195	1.415	696	711	698	778	778	798
550	368	1.313	1.563	754	750	899	979	979	999
600	395	1.400	1.650	813	787	1.063	1.185	1.185	1.215
650	424	1.489	1.739	875	800	1.233	1.354	1.354	1.385
700	453	1.578	1.828	936	810	1.347	1.469	1.469	1.499
750	488	1.693	1.963	1.011	810	1.565	1.687	1.687	1.717
800	513	1.778	2.048	1.065	810	1.800	1.986	1.986	2.032
900	563	1.948	2.218	1.172	838	2.187	2.373	2.373	2.419
1.000	620	2.125	2.395	1.295	1.000	2.811	2.996	2.996	3.043
1.050	648	2.243	2.543	1.355	1.050	3.447	3.632	3.632	3.679
1.100	676	2.331	2.631	1.415	1.100	3.934	4.119	4.119	4.166
1.200	733	2.508	2.808	1.535	1.200	4.623	4.808	4.808	4.855
1.300	793	2.688	2.988	1.664	1.300	6.227	6.511	6.511	6.583
1.400	843	2.888	3.218	1.771	1.400	8.092	8.376	8.376	8.447
1.500	898	3.063	3.393	1.889	1.500	9.971	10.255	10.255	10.327
1.600	963	3.248	3.578	2.028	1.600	12.020	12.458	12.458	12.568
1.700	1.013	3.458	3.828	2.135	1.700	13.342	13.781	13.781	13.890
1.800	1.063	3.628	3.998	2.242	1.800	14.475	14.913	14.913	15.023
1.900	1.115	3.800	4.170	2.354	1.900	16.942	17.381	17.381	17.490
2.000	1.168	3.973	4.343	2.466	2.000	18.931	19.370	19.370	19.480

## GATE VALVE NON RISING SPINDLE with PACKING DESIGN PN 10

Body Length Standard : EN 558-1, S 15, By-Pass applicable.

Valve Standard : EN 1171

Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.

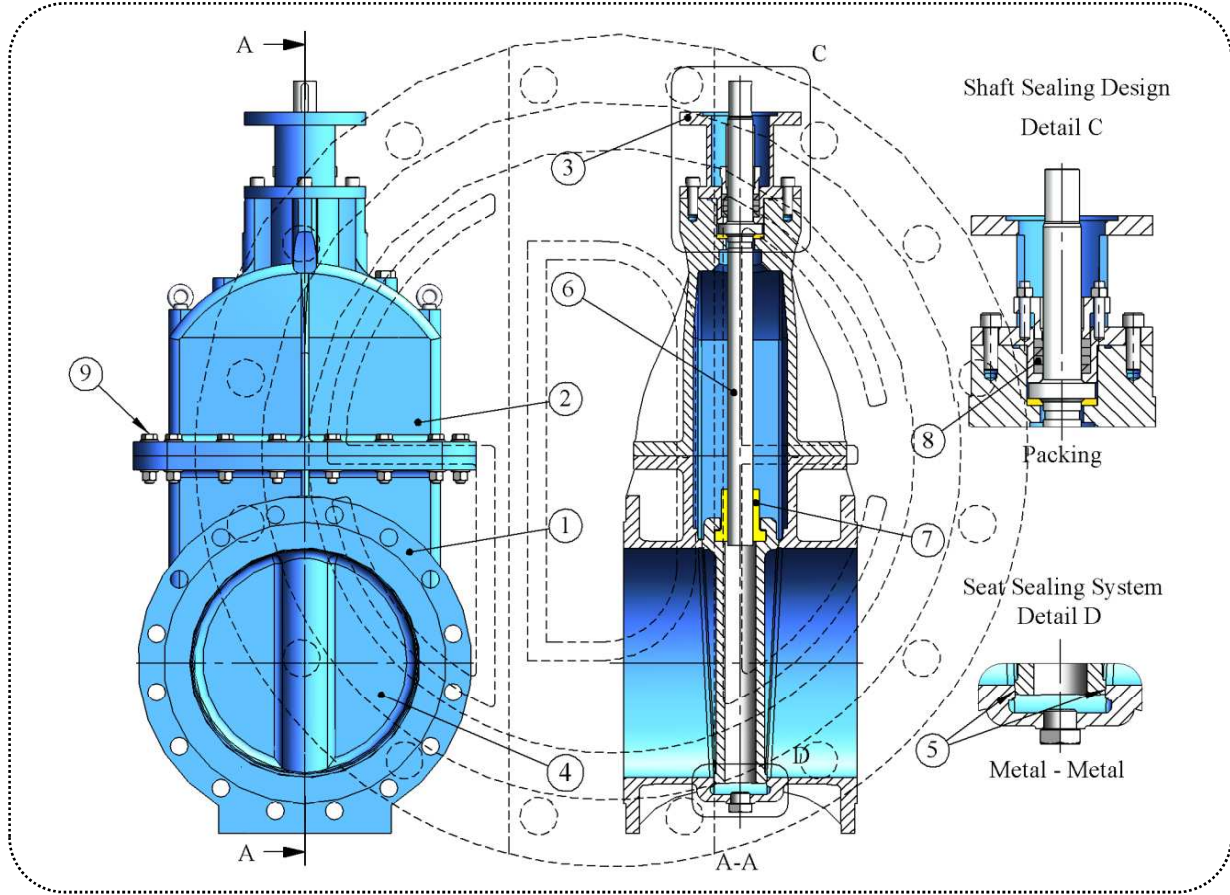


### DIMENSIONS

DN	A	B	B1	C	L	Kg			
						Bare Shaft	With Gear box		
							Ratio 1/4	Ratio 1/8	Ratio 1/16
300	228	773	923	455	500	298	333	333	342
350	258	913	1.113	519	550	375	428	428	441
400	288	1.003	1.203	583	600	470	523	523	536
450	313	1.108	1.328	637	650	569	650	650	670
500	340	1.195	1.415	696	700	693	773	773	793
550	368	1.313	1.563	754	750	899	979	979	999
600	395	1.400	1.650	813	800	1.072	1.193	1.193	1.223
650	424	1.489	1.739	875	850	1.267	1.389	1.389	1.419
700	453	1.578	1.828	936	900	1.411	1.533	1.533	1.563
750	488	1.693	1.963	1.011	950	1.675	1.797	1.797	1.827
800	513	1.778	2.048	1.065	1.000	1.966	2.152	2.152	2.198
900	563	1.948	2.218	1.172	1.100	2.442	2.628	2.628	2.674
1.000	620	2.125	2.395	1.295	1.200	3.040	3.226	3.226	3.272
1.050	648	2.243	2.543	1.355	1.250	3.703	3.888	3.888	3.935
1.100	676	2.331	2.631	1.415	1.300	4.209	4.394	4.394	4.441
1.200	733	2.508	2.808	1.535	1.400	4.944	5.129	5.129	5.176
1.300	793	2.688	2.988	1.664	1.500	6.570	6.855	6.855	6.926
1.400	843	2.888	3.218	1.771	1.600	8.559	8.843	8.843	8.914
1.500	898	3.063	3.393	1.889	1.700	10.484	10.768	10.768	10.839
1.600	963	3.248	3.578	2.028	1.800	12.609	13.048	13.048	13.158
1.700	1.013	3.458	3.828	2.135	1.900	13.934	14.373	14.373	14.483
1.800	1.063	3.628	3.998	2.242	2.000	15.064	15.503	15.503	15.613
1.900	1.115	3.800	4.170	2.354	2.100	17.629	18.068	18.068	18.178
2.000	1.168	3.973	4.343	2.466	2.200	19.700	20.139	20.139	20.249



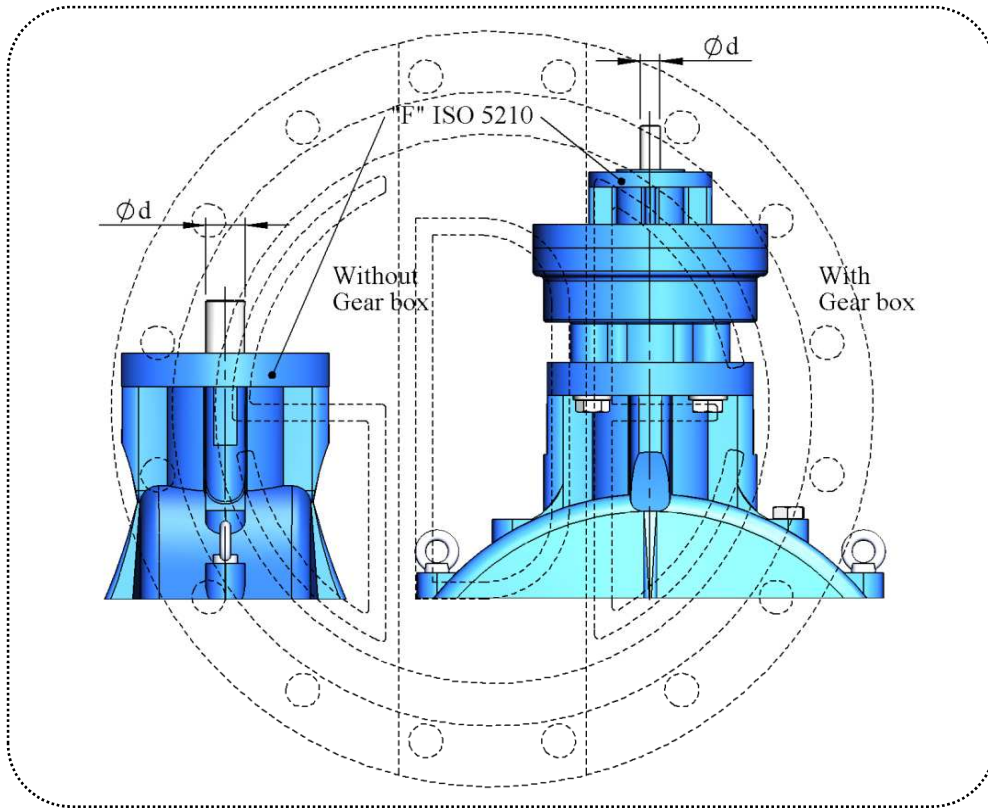
## GATE VALVE NON RISING SPINDLE with PACKING DESIGN



No	Item Name	Material	Description	EN Standard	Material No
1-2	Body - Bonnet	GGG 40	Ductile Iron	EN-GJS-450-15	0.7040
		GGG 50		EN-GJS-500-7	0.7050
		ST 37-2	Steel Construction	EN 10025	1.0037
3	Top Thrust Cover	GGG 50	Ductile Iron	EN-GJS-500-7	0.7050
4	Disc	GGG 40	Ductile Iron	EN-GJS-450-15	0.7040
		GGG 50		EN-GJS-500-7	0.7050
		304	Stainless Steel Casting	G - X6CrNi 18-9	1.4308
		316		G - X6CrNiMo 18-10	1.4408
		CC 331G-GS	Aluminium Bronze	CuAl10Fe2-C	2.0940.01
5	Seats	CuAl8	Aluminium Bronze Welding	14640 S Cu 6100	2.0921
6	Spindle	420	Stainless Steel	X20Cr13	1.4021
		304		X5CrNi 18-10	1.4301
		316		X5CrNiMo17-12-2	1.4401
		431		X17CrNi16-2	1.4057
7	Travelling Nut	Rg 10	Bronze	-	2.1086.01
8	Shaft Sealing	Packing	Non Asbestos	-	-
9	Bolts Nuts	Galvanized	Steel	-	-
		A 2 - A 4	Stainless Steel	-	-
Coating		WRAS approved fusion bonded epoxy, 300 microns dft as standard.			
Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.					



OPERATION  
GATE VALVE NON RISING TYPE  
PN 10



DN	Bare Shaft, Ratio 1/1				Gear Box, Ratio 1/4				Gear Box, Ratio 1/8				Gear Box, Ratio 1/16			
	F	d	Torque Nm	Number of turn	F	d	Torque Nm	Number of turn	F	d	Torque Nm	Number of turn	F	d	Torque Nm	Number of turn
300	14	30	148	27	10	20	40	106	10	20	20	213	10	20	10	426
350	16	40	226	31	10	20	61	124	10	20	31	247	10	20	15	494
400	16	40	294	35	10	20	80	141	10	20	40	282	10	20	20	563
450	16	40	372	39	14	30	101	158	14	30	51	316	10	20	25	632
500	16	40	510	44	14	30	139	175	14	30	69	350	10	20	35	700
550	16	40	676	48	14	30	184	192	14	30	92	385	10	20	46	769
600	25	50	803	52	14	30	218	209	14	30	109	419	10	20	55	838
650	25	50	1.026	57	14	30	279	227	14	30	139	453	10	20	70	906
700	25	50	1.191	61	14	30	324	244	14	30	162	488	10	20	81	975
750	25	50	1.480	65	14	30	402	261	14	30	201	522	10	20	101	1.044
800	30	60	1.687	70	16	40	458	278	14	30	229	556	14	30	115	1.112
900	30	60	2.303	78	16	40	626	312	14	30	313	625	14	30	156	1.250
1.000	30	60	2.870	87	16	40	780	347	14	30	390	694	14	30	195	1.387
1.050	30	60	3.600	91	16	40	978	364	14	30	489	728	14	30	245	1.456
1.100	30	60	3.982	95	16	40	1.082	381	14	30	541	762	14	30	271	1.524
1.200	30	60	4.770	104	16	40	1.296	415	14	30	648	831	14	30	324	1.662
1.300	35	70	6.280	112	25	50	1.707	450	16	40	853	900	14	30	427	1.799
1.400	35	70	7.302	121	25	50	1.984	484	16	40	992	968	14	30	496	1.936
1.500	35	70	9.302	130	25	50	2.528	518	16	40	1.264	1.037	14	30	632	2.074
1.600	40	80	10.664	138	30	60	2.898	553	25	50	1.449	1.106	16	40	724	2.211
1.700	40	80	12.052	147	30	60	3.275	587	25	50	1.638	1.174	16	40	819	2.348
1.800	40	80	13.489	155	30	60	3.666	621	25	50	1.833	1.243	16	40	916	2.486
1.900	40	80	18.000	164	30	60	4.891	656	25	50	2.446	1.312	16	40	1.223	2.623
2.000	40	80	19.852	173	30	60	5.395	690	25	50	2.697	1.380	16	40	1.349	2.760

**PLANET TYPE GEARBOX  
TO BE USED FOR NON-RISING SPINDLE GATE VALVES**



It is a type of gearbox which consists of a body, a cover and gears.

Valves can be operated by means of a hand-wheel which is mounted at the top of spindle.

But, direct operation is not possible for valves that require high torque values. In that case, a suitable size gearbox is mounted at the top of valve and hand-wheel is mounted on gearbox pinion.

Number of turns is increased but smaller forces are capable to operate the valve.

Other advantage of gearbox is that if actuator operation is required for a valve, smaller size and cheaper actuator can be used.

Properties of Gearbox input force required to operate the valve can easily be applied by one person.

To achieve output force, suitable gear ratio is selected.

Input and output flanges and shafts are manufactured in accordance with ISO 5210 F standards.

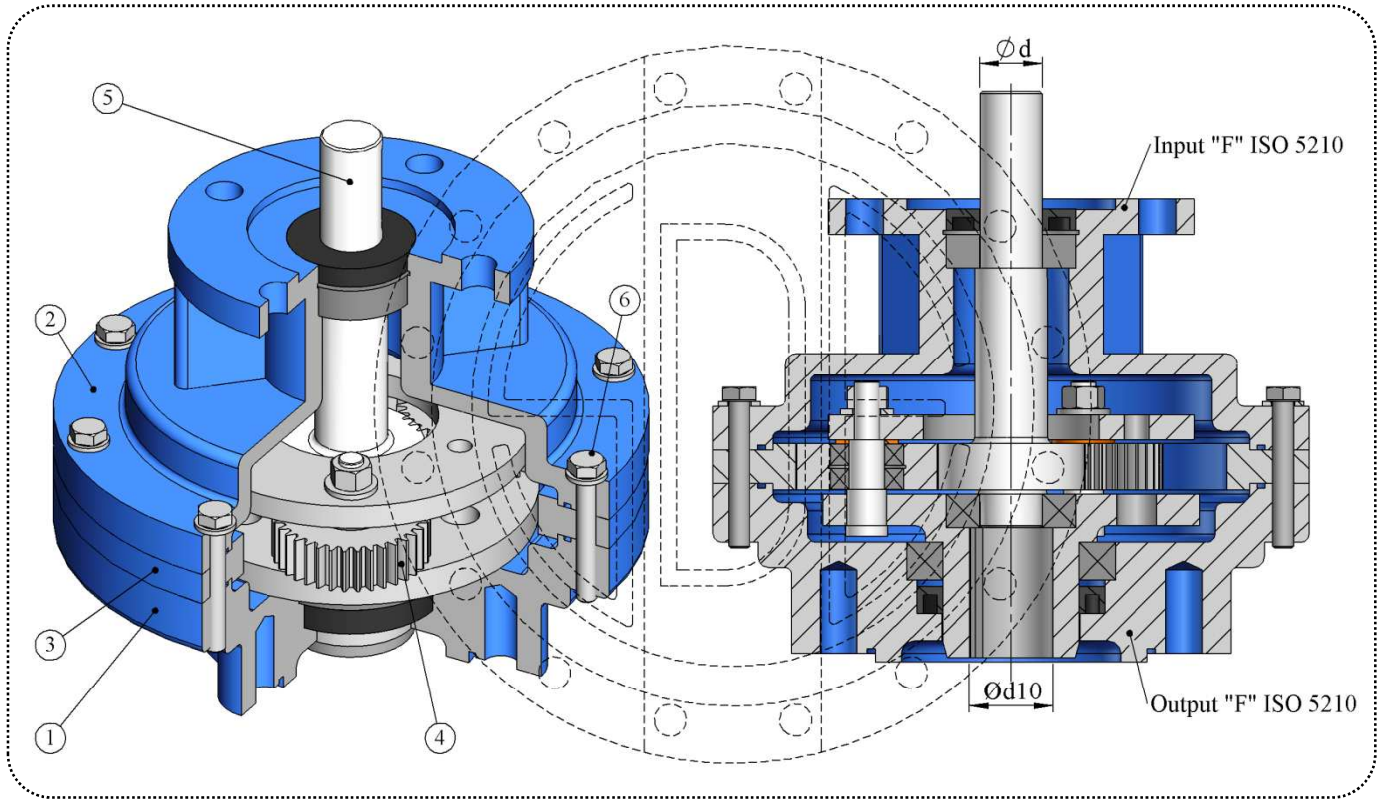
Thus, gearbox can be mounted to another valve with same size. Or gearbox can be removed and another brand can be mounted instead.

If required, a suitable size actuator can be fitted or existing one can be changed with another brand.

Maintenance,

No maintenance is needed except lubricating gears.

## GEARBOX, PLANET TYPE FOR NON RISING type GATE VALE



### PARTS

No	Item Name	Material	Description	EN Standard	Material No
1-2	Body - Cover	GGG 50	Ductlie Iron	EN-GJS-500-7	0.7050
3	Gear	1050	Steel	100083-3	1.1191
4	Gears	1050	Steel	100083-3	1.1191
5	Pinion Gear	420	Stainless Steel	X20Cr13	1.4021
		304		X5CrNi 18-10	1.4301
6	Bolts	Galvanized	Steel	-	-
		A 2, A 4	Stainless Steel	-	-
Coating		WRAS approved fusion bonded epoxy, 300 microns dft as standard.			
Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.					

### TECHNICAL INFORMATION

No	Input Ratio 1/4				Input Ratio 1/8				Input Ratio 1/16				Output		
	F	d	Torque Nm	Kg	F	d	Torque Nm	Kg	F	d	Torque Nm	Kg	F	d	Torque Nm
1	10	20	68	24	10	20	34	24	10	20	17	30	10	25	250
2	10	20	136	36	10	20	68	36	10	20	34	45	12	30	500
3	10	20	272	53	10	20	136	53	10	20	68	67	14	40	1.000
4	14	30	543	80	14	30	272	80	10	20	136	100	16	40	2.000
5	14	30	1.359	121	14	30	679	121	10	20	340	152	25	50	5.000
6	16	40	2.717	185	14	30	1.359	185	14	30	679	232	30	60	10.000
7	25	50	5.435	285	16	40	2.717	285	14	30	1.359	356	35	70	20.000
8	30	60	10.870	439	25	50	5.435	439	16	40	2.717	549	40	80	40.000



**BEVEL GEARBOX  
TO BE USED FOR RISING SPINDLE GATE VALVES**



It is a type of gearbox which consists of a body, a cover and gears.

Valves can be operated by means of a hand-wheel which is mounted at the top of spindle.

But, direct operation is not possible for valves that require high torque values. In that case, a suitable size gearbox is mounted at the top of valve and hand-wheel is mounted on gearbox pinion.

Number of turns is increased but smaller forces are capable to operate the valve.

This is a bevel type gearbox where conical gears are used. The angle between these gears is 90 degrees. While fitting, according to size of gearbox, four or eight holes on connection flange are used. So, four or eight different positions for operation are available.

Other advantage of gearbox is that if actuator operation is required for a valve, smaller size and cheaper actuator can be used.

Properties of Gearbox, Input force required to operate the valve can easily be applied by one person.

To achieve output force, suitable gear ratio is selected.

Input and output flanges and shafts are manufactured in accordance with ISO 5210 F standards.

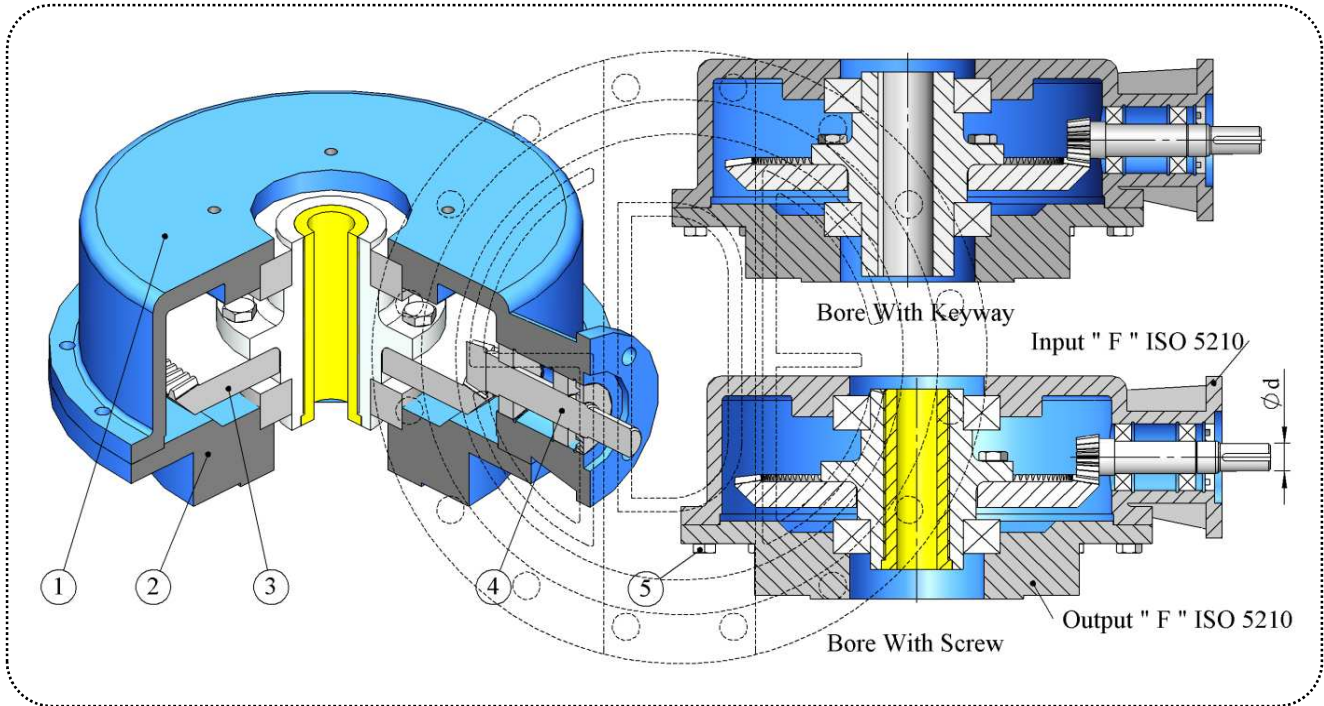
Thus, gearbox can be mounted to another valve with same size or gearbox can be removed and another brand can be mounted instead.

If required, a suitable size actuator can be fitted or existing one can be changed with another brand.

Maintenance,

No maintenance is needed except lubricating gears.

## BEVEL GEARBOX FOR RISING TYPE GATE VALVE



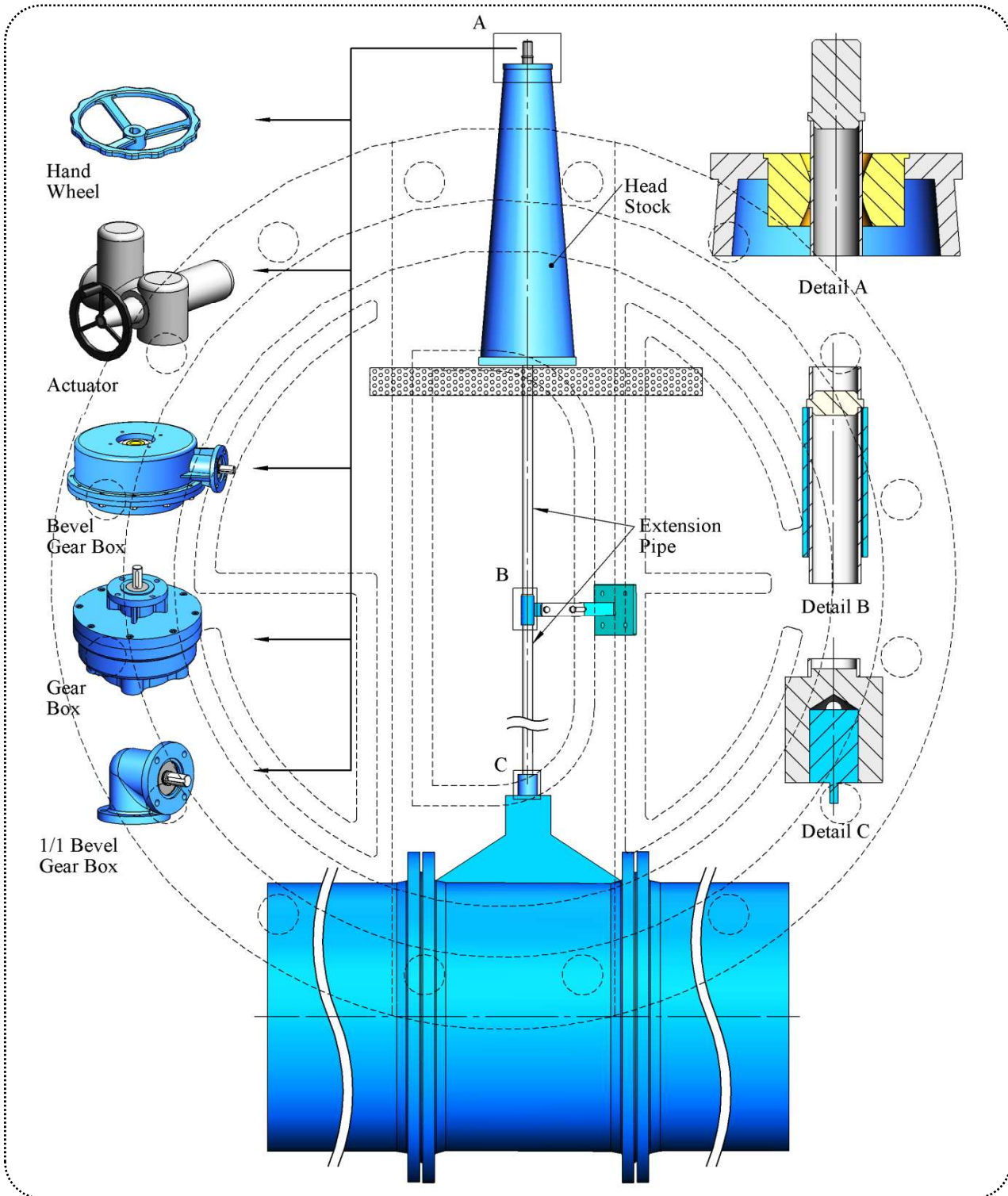
### PARTS

No	Item Name	Material	Description	EN Standard	Material No
1-2	Body - Cover	GGG 50	Ductile Iron	EN-GJS-500-7	0.7050
3	Gear	1050	Steel	100083-3	1.1191
4	Pinion Gear	420	Stainless Steel	X20Cr13	1.4021
		304		X5CrNi 18-10	1.4301
5	Bolts	Galvanized	Steel	-	-
		A 2, A 4	Stainless Steel	-	-
Coating		WRAS approved fusion bonded epoxy. 300 microns dft as standard.			
Maximum allowable working temperature for all types of our valves is 80 degrees Celcius.					

### TECHNICAL INFORMATION

GGB-B No	Input 1/4				Input 1/8				Input 1/16				Output		
	F	d	Torque	Kg	F	d	Torque	Kg	F	d	Torque	Kg	F	d	Torque
			Nm				Nm				Nm				Nm
1	10	20	68	34	10	20	34	34	10	20	17	43	10	25	250
2	10	20	136	59	10	20	68	59	10	20	34	73	12	30	500
3	10	20	272	102	10	20	136	102	10	20	68	128	14	40	1.000
4	14	30	543	181	14	30	272	181	10	20	136	226	16	40	2.000
5	14	30	1.359	324	14	30	679	324	10	20	340	405	25	50	5.000
6	16	40	2.717	588	14	30	1.359	588	14	30	679	735	30	60	10.000
7	25	50	5.435	1.079	16	40	2.717	1.079	14	30	1.359	1.349	35	70	20.000
8	30	60	10.870	2.003	25	50	5.435	2.003	16	40	2.717	2.504	40	80	40.000

## HEADSTOCK



Headstock consists of a cast body, extension spindles and guide brackets holding the spindles.

According to usage area of valve, it can be installed at first floor but operational equipments can be at second floor.

Valve can be in a dirty or humid environment and operational equipments may not be requested to be at the same place.

For such conditions, headstock accessory can be used for any kind of valve.

Valve is located where it has to be, but operational equipments are located at a clean area.

Headstock is fixed on floor by screws. Extension spindles are between valve and headstock.

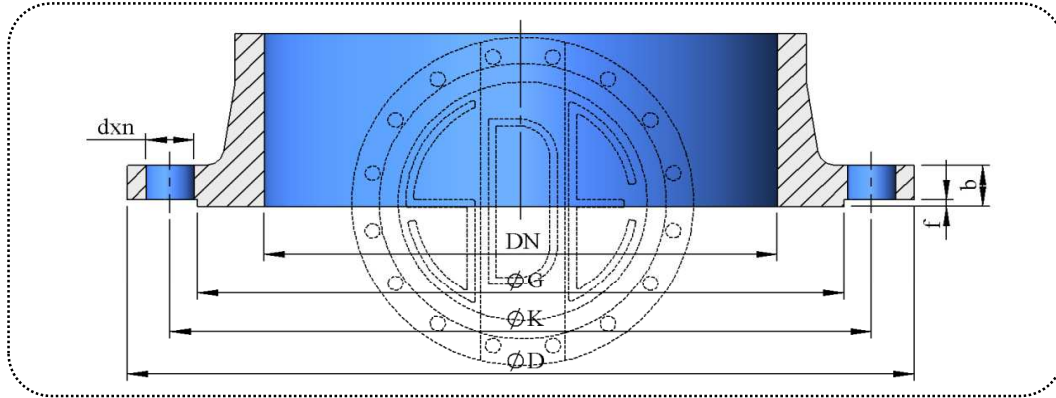
If space between valve and headstock is more than 3 meters, guide brackets are used to hold spindle and eliminate oscillation.

It is advised to use one guide bracket for each 3 meters.

Upon request, extension spindles can be made of plain carbon steel or stainless steel.



## FLANGE DIMENSIONS



Nominal Dia	Outside Dia	Raised Face		Flange Holes			Flange Thickness	Outside Dia	Raised Face		Flange Holes			Flange Thickness
DN	D	G	f	K	d	n	b	D	G	f	K	d	n	b
PN 10								PN 16						
100	220	158	3	180	19	8	19	220	158	3	180	19	8	19
125	250	188	3	210	19	8	19	250	188	3	210	19	8	19
150	285	212	3	240	23	8	19	285	212	3	240	23	8	19
200	340	268	3	295	23	8	20	340	268	3	295	23	12	20
250	395	320	3	350	23	12	22	405	320	3	355	28	12	22
300	445	370	4	400	23	12	25	460	378	4	410	28	12	25
350	505	430	4	460	23	16	25	520	438	4	470	28	16	27
400	565	482	4	515	28	16	25	580	490	4	525	31	16	28
450	615	532	4	565	28	20	26	640	550	4	585	31	20	30
500	670	585	4	620	28	20	27	715	610	4	650	34	20	32
600	780	685	5	725	31	20	30	840	725	5	770	37	20	36
700	895	800	5	840	31	24	33	910	795	5	840	37	24	40
800	1.015	905	5	950	34	24	35	1.025	900	5	950	41	24	43
900	1.115	1.005	5	1.050	34	28	38	1.125	1.000	5	1.050	41	28	47
1.000	1.230	1.110	5	1.160	37	28	40	1.255	1.115	5	1.170	44	28	50
1.200	1.455	1.330	5	1.380	41	32	45	1.485	1.330	5	1.390	50	32	57
1.400	1.675	1.535	5	1.590	44	36	46	1.685	1.530	5	1.590	50	36	59
1.500	1.785	1.640	5	1.700	44	36	48	1.820	1.640	5	1.710	57	36	63
1.600	1.915	1.760	5	1.820	50	40	49	1.930	1.750	5	1.820	57	40	65
1.800	2.115	1.950	5	2.020	50	44	52	2.130	1.950	5	2.020	57	44	69
2.000	2.325	2.150	5	2.230	50	48	55	2.345	2.150	5	2.230	62	48	73
2.200	2.550	2.370	5	2.440	57	52	59	2.555	2.360	5	2.440	62	52	80
PN 25								PN 40						
100	235	162	3	190	23	8	19	235	162	3	190	23	8	19
125	270	188	3	220	28	8	19	270	188	3	220	28	8	24
150	300	218	3	250	28	8	20	300	218	3	250	28	8	26
200	360	278	3	310	28	12	22	375	285	3	320	31	12	30
250	425	335	3	370	31	12	25	450	345	3	385	34	12	35
300	485	395	4	430	31	16	28	515	410	4	450	34	16	40
350	555	450	4	490	34	16	30	580	465	4	510	37	16	44
400	620	505	4	550	37	16	32	660	535	4	585	41	16	48
450	670	548	4	600	37	20	34	685	560	4	610	41	20	50
500	730	615	4	660	37	20	37	755	615	4	670	44	20	52
600	845	720	5	770	41	20	42	890	735	5	795	50	20	58
700	960	820	5	875	44	24	47	995	840	5	900	50	24	63
800	1.085	930	5	990	50	24	51	1.140	960	5	1.030	57	24	68
900	1.185	1.030	5	1.090	50	28	56	1.250	1.070	5	1.140	57	28	73
1.000	1.320	1.140	5	1.210	57	28	60	1.360	1.180	5	1.250	57	28	80
1.200	1.530	1.360	5	1.420	57	32	69	1.575	1.385	5	1.460	62	32	88
1.400	1.755	1.570	5	1.640	62	36	74	1.795	1.600	5	1.680	62	36	98
1.500	1.865	1.680	5	1.750	62	40	75	1.910	1.700	5	1.790	70	40	102
1.600	1.975	1.790	5	1.860	62	40	81	2.025	1.815	5	1.900	70	40	108
1.800	2.195	2.000	5	2.070	70	44	88							
2.000	2.425	2.230	5	2.300	70	48	95							