GATE VALVES

CONTENT

1 Selection guide

EXaL Technology can supply a variety of gate valves for different applications.

Type	Diameters	Pressure classes	Max. temperature	Wedge	Stem design
On-Off valves					
ET-000S33.1EX	DN 50 / DN 600	PN 16 / PN 100	450°C	Flexible	Rising
	NPS 2” / 24”	ANSI 150# / 600#			
ET-000S33.2EX	DN 50 / DN 600	PN 6 / PN 16	450°C	Solid	Rising
ET-000S33.3EX	DN 50 / DN 600	PN 16	250°C	Solid	Non rising
ET-000S33.4EX	DN 500 / DN 2000	PN 2,5 / PN 25	400°C	Solid	Rising
	NPS 20” / 48”	ANSI 150#			
ET-000S43.1EX	DN 50 / DN 350	PN 63 / PN 100	600°C	Flexible	Rising
	NPS ½” / 2”	ANSI 150# / 1500#			
ET-000S43.3EX	DN 50 / DN 400	PN 16 / PN 100	100°C	Flexible	Non rising
ET-000S43.5EX	DN 65 / DN 400	PN 160 / PN 420	650°C	Flexible	Rising
	NPS 2” / 16”	ANSI 900# / 2500#			
Control valves					
ET-000S33CEX	DN 50 / DN 600	PN 16	450°C	Solid	
ET-000S43CEX	DN 150 / DN 600	PN 63 / PN 420	600°C	Flexible	

Other types like underground, through conduit, knife, bonnet, and soft wedge gate valves are available upon request

2. Gate Valves type ET-000S33EX

2.1 General

2.1.1 Applications

Gate valves are isolating valves designed for full closing or opening of working media flow. Gate valves find their main applications in the power engineering, nuclear power, chemical and petrochemical, gas supply, crude oil, water supply, non-aggressive liquids, etc. For fluids with large mechanical impurities or solids in suspension, please contact us.

If the gate valves are used for regulating or throttling purposes, the tightness cannot be guaranteed. For regulation we recommend to use special control gate valve type ET-000S33.C

2.1.2 Fluids

Gate valves Type ET-000S33 are used for many fluids, like:

- water
- non-corrosive liquids
- steam
- air
- gases

- petroleum and petroleum products

The service fluids shall not contain rough impurities.
For other fluids, please contact us.

2.1.3 Technical description

The gate valve is an outside-screw-and-yoke, full bore with flexible wedge and rising stem. The body and the bonnet are made of castings and are connected by a flanged joint. The sealing surfaces of the seats and the wedge are made in compliance with API 600. The seat rings are welded into the body. They are equipped with a back seat and have a bi-directional sealing. The body-bonnet joint and the packing chamber are sealed with asbestos-free gasket and packing which guarantee a long-life service. The requirement for an automatic body cavity pressure relief shall be specified in the purchase order. Pressure relief can be achieved by:

- drilling a hole through one disc of the wedge,
- special valve incorporated into the wedge,
- external bypass,
- use of solid wedge.

Designs according to environmental protection regulations like TA-Luft or iSO 15848 are available on request.

2.1.4 Connection to the pipe

- Flanged ends according to EN 1092-1 or ASME B16.5 and B16.47
  Face-to-face dimensions according to EN 558 Series 14, 15 and 26, ASME B16.10
- Welded ends - acc. to EN 12627 or ASME B16.25
  Face to face dimensions according to ASME B16.10

On request other type of process connections or face to face dimensions can be supplied.

2.1.5 Operation

The valves are supplied with a handwheel, a manual bevel gear, an electric actuator or bare stem ready for connection to an actuator. The standard connecting dimensions for connection to a manual gear or an electric actuator meet the requirements of ISO 5210.

2.1.6 Accessories

The valves can be equipped with the following accessories:

- Drain valve,
- Air-vent valve,
- By-pass valves,
- Support for remote control, including chains and chain wheels,
- Vent plugs,
- Gland packing „live loaded “

2.1.7 Test

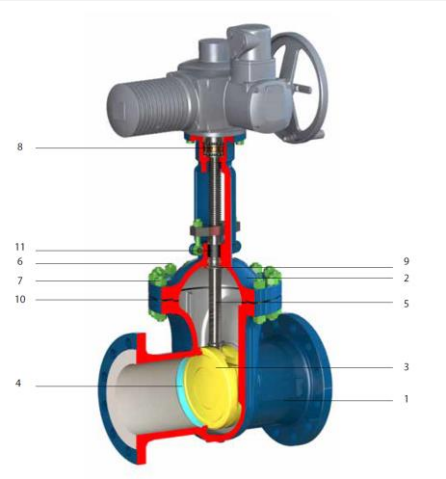
The gate valves are subjected to the following tests performed with water:

- Shell strength test according to EN 12266 or API 598
- Shell tightness test according to EN 12266 or API 598
- Seat tightness test according to EN 12266; ANSI/FCI or API 598. Leak rate according to specification.
- Functionality test
- Other tests by agreement.

2.1.8 Installation

Gate valves can be installed into the piping in vertical or horizontal position. In case they are equipped with an electric or pneumatic actuator, the instructions of the actuators must be followed.
The valve type ET-000S33.4 can be installed only in horizontal pipes with the shaft and actuator above the valve in vertical position

2.2 Type ET-000S33.1EX



2.2.1 Characteristics

Diameters:	according to European norms: DN 50 up to DN 600 according to ASME: NPS 2” up to 24”
Pressure classes:	according to European norms: PN 16 up to PN 100 according to ASME: Class 150# up to Class 600#
Temperature range:	450°C (till 595°C upon request)
Body design:	yoke gate valve
Rising stem	
Rising wheel	
Flexible wedge	

2.2.2 Materials according to EN (Europe)

Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
1	Body	1.0619	1.7357	1.6220	1.4408
2	Bonnet	1.0619	1.7357	1.6220	1.4408
3	Wedge + overlay	1.0619 + 13Cr	1.7357 + stellite 6	1.6220 + F304	1.4408
4	Seat + overlay	1.0460 + 13Cr	1.7335 + stellite 6	1.0566 + stellite 6	1.4401
5	Stem	1.4021	1.4923	1.4301	1.4401
6	Bonnet bolts*	1.7218*	1.7709*	1.7225*	1.4401*
7	Bonnet nuts*	1.1191*	1.7709*	1.7225*	1.4401*
8	Stem nut	Ni alloy, Al bronze			
9	Back seat	1.4006 + hard coating		1.4301 + hard coating	1.4401 + hard coating
10	Gasket	Graphite with stainless steel inserts			
11	Packing	Pressed graphite			

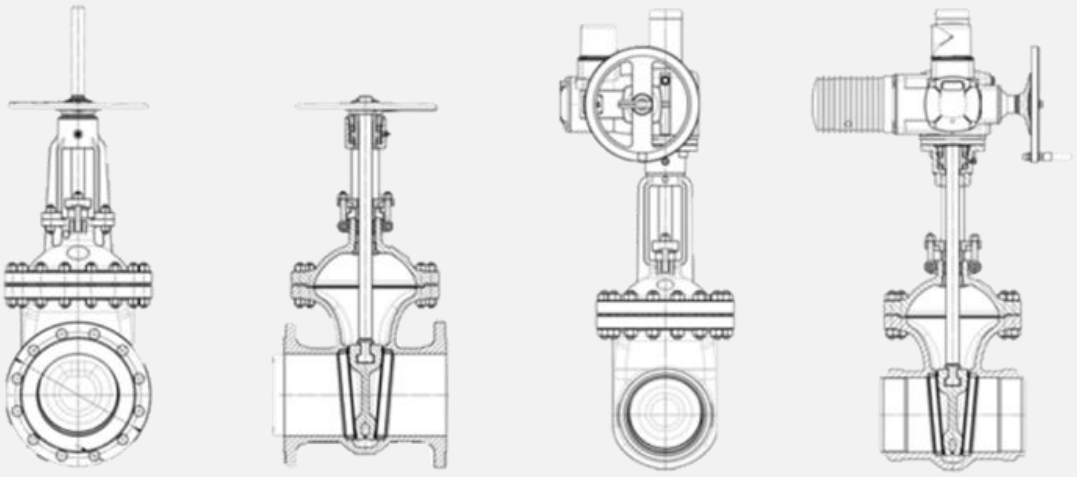
*or according to customers request

2.2.3 Materials according to ASME (USA)

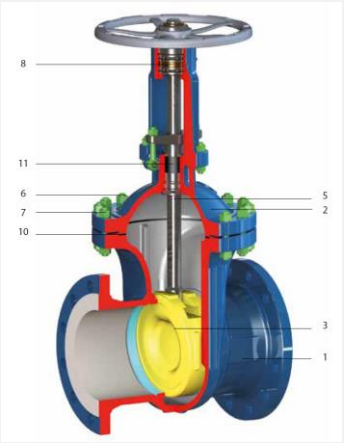
Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
1	Body	A261 WCB	A217 WC6	A352 LCC	A351 CF8M
2	Bonnet	A216 WCB	A217 WC6	A351 LCC	A351 CF8M
3	Wedge+overlay**	A216 WCB + 13Cr	A217 WC6 + 13Cr	A352 LCC + F304	A351 CF8M
4	Seat + overlay**	A105 + 13Cr	A182 F11 + stellite 6	A350 LF2 + stellite 6	A182 F316
5	Stem	A182 F6A	A182 F6A	A182 F304	A182 F316
6	Bonnet bolts*	A193 F7*	A193 B16*	A320 L7*	A193 B8*
7	Bonnet nuts*	A194 2H*	A194 4*	A194 7*	A194 8*
8	Stem nut	A439 D2, Al Bronze			
9	Back seat	A182 F6A		A182 F304	A182 F316
10	Gasket	Graphite with stainless steel inserts			
11	Packing	Pressed graphite			

* or according to customers request

** other trims according to API 600



2.3 Type ET-000S33.2EX



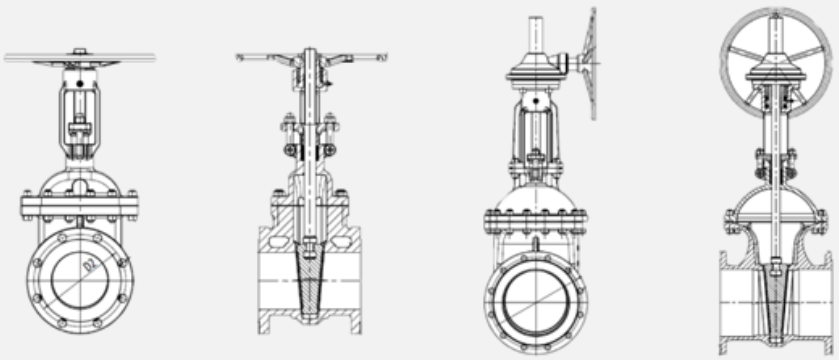
2.3.1 Characteristics

Diameters: according to European norms: DN 50 up to DN 600
Pressure classes: according to European norms: PN 6 up to PN 16
Temperature range: 450°C
Body design: yoke gate valve
Rising stem
Non rising wheel
Solid wedge

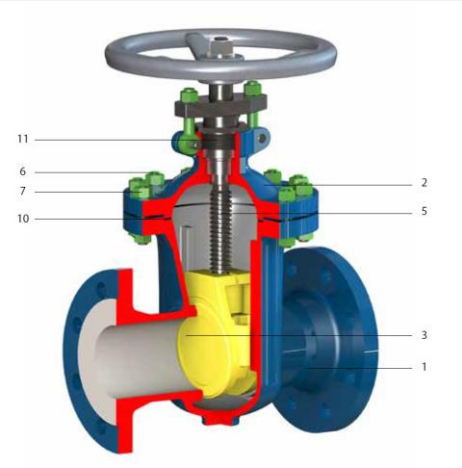
2.3.2 Materials (EN and ASTM)

Pos	Component	Carbon steel		Stainless steel	
		EN	ASTM	EN	ASTM
1	Body + overlay	1.0619 + 13Cr	A216 WCB + 13Cr	1.4408	A351 CF8M
2	Bonnet	1.0619	A216 WCB	1.4408	A351 CF8M
3	Wedge + overlay	1.0619 + 13Cr	A216 WCB + 13Cr	1.4408	A351 CF8M
5	Stem	1.4021	A182 F6A	1.4401	A182 F316
6	Bonnet bolts*	1.7218*	A193 B7*	1.4301*	A192 B8*
7	Bonnet nuts*	1.1191*	A194 2H*	1.4301*	A194 8*
8	Stem nut	A439 D2, Al – Broze			
10	Gasket	Graphite			
11	Packing	Graphite			

*or according to customers request



2.4 Type ET-000S33.3EX



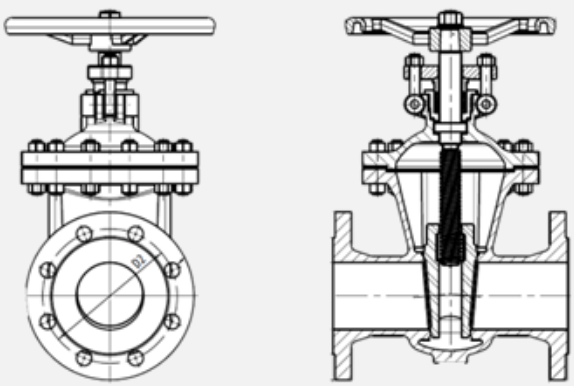
2.4.1 Characteristics

Diameters:	according to European norms: DN 50 up to DN 600
Pressure classes:	according to European norms: PN 16
Temperature range:	450°C
Body design:	yoke gate valve
Non rising stem	
Non rising wheel	

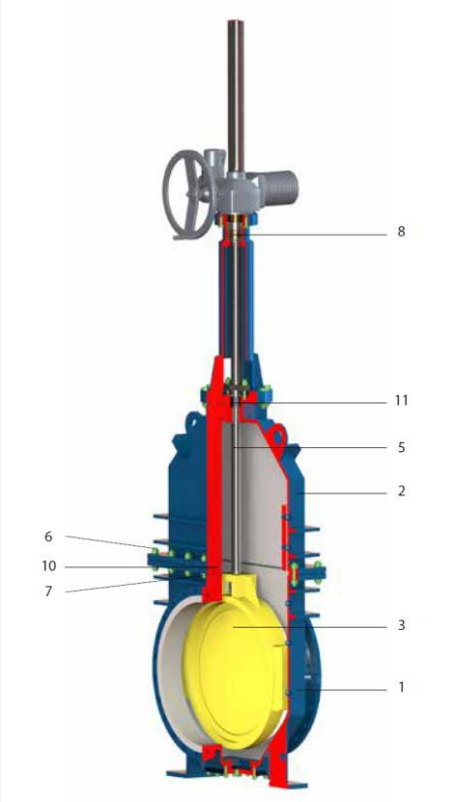
2.4.2 Materials according to EN (Europe)

Pos	Component	Material
1	Body + overlay	1.0619 + 13Cr
2	Bonnet	1.0619
3	Wedge + overlay	1.0619 + 13Cr
5	Stem	1.4021
6	Bonnet bolts*	1.7218*
7	Bonnet nuts*	1.1191*
10	Gasket	Graphite
11	Packing	Graphite

*or according to customers request



2.5 Type ET-000S33.4EX



2.5.1 Characteristics

Diameters:	according to European norms: DN 500 up to DN 2000
	according to ASTM/ASME: NPS 20” up to 48”
Pressure classes:	according to European norms: PN 2,5 up to PN 25
	according to American norms: ANSI 150#
Temperature range:	400°C
Body design:	yoke gate valve

Rising stem
Non rising wheel
Solid wedge

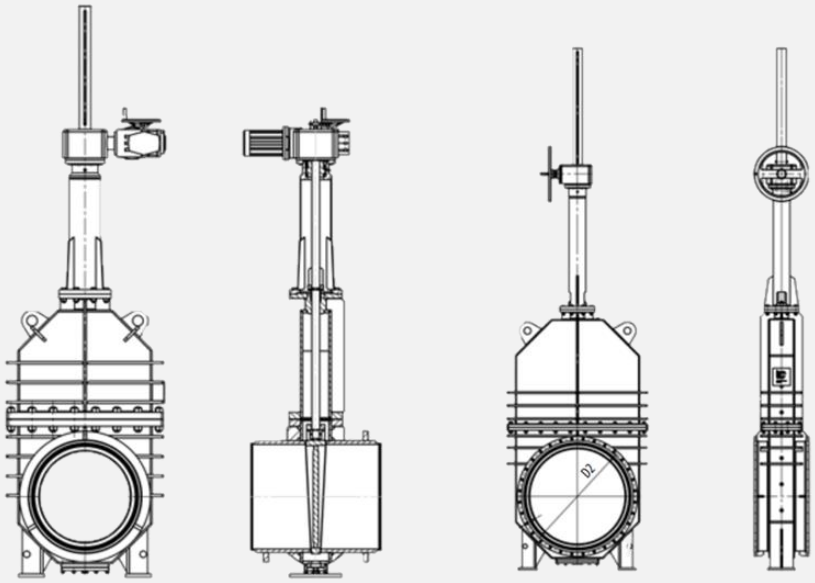
2.5.2 Materials according to EN (Europe)

Pos	Component	Carbon steel	Carbon steel for low temperatures
1	Body + overlay	1.0424 + 13Cr	1.0566 + 13Cr
2	Bonnet	1.0424	1.0566
3	Wedge + overlay	1.0425 + 13Cr	1.0566 + 13Cr
5	Stem	1.4021	1.4021
6	Bonnet bolts*	1.7218*	1.7225*
7	Bonnet nuts*	1.1191*	1.7225*
8	Stem nut	A439 D2, Al Bronze	
10	Gasket	Graphite with stainless steel inserts	
11	Packing	Graphite	

*or according to customers request

2.5.3 Materials according to ASTM (USA)

Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
1	Body + overlay	A516 60 + 13Cr	A387 11 + 13Cr	A350 Lf2 + 13Cr	A240 F316
2	Bonnet	A516 60	A387 11	A350 LF2	A240 F316
3	Wedge + overlay	A516 60 + 13Cr	A387 11 + 13Cr	A350 Lf2 + 13Cr	A240 F316 + 17Cr
5	Stem	A182 F6A			A182 F431
6	Bonnet bolts*	A193 B7	A193 B16	A320 L7	A193 B8
7	Bonnet nuts*	A194 2H	A194 4	A194 7	A194 8
8	Stem nut	A439 D2, Al Bronze			
10	Gasket	Graphite with stainless steel inserts			
11	Packing	Graphite cord + formed graphite rings			



3 Gate Valves type ET-000S43EX – High pressure

3.1 General

3.1.1 Applications

Gate valves type ET-000S43 are shut-off valves used especially in power engineering, chemical industry as well as other industries depending on material selection.

3.1.2 Fluids

Gate valves type ET-000S43 are used mainly for

- Water
- Steam
- Gases
- Other fluids

3.1.3 Technical description

The body is a forged piece into which a flexible wedge is inserted through the yoke-type bonnet or through the pressure seal bonnet. The seating surfaces of the wedge are hard faced and proper seating of the wedge is provided for by precision-machined guides in the body. The seat rings are welded in the body and hard faced as well. The bonnet and the stuffing box are sealed with special graphite gaskets and packing rings. The gate valves can be, on request, designed with pressure released system against over pressure in the body cavity. Overpressure release system can be done optionally by drilling a hole at the input side of the disc, using a safety valve or with a by-pass. Also, upon request, the gate valve can be equipped with one and up to three bypass valves.

3.1.4 Connection to the pipe

- Flanged ends according to EN 1092-1, ISO 7005-1 or ASME B16.5
  Face-to-face dimensions according to EN 558 Series 14, 15 and 26, ASME B16.10
- Welded ends - acc. to EN 12627 or ASME B16.25
  Face to face dimensions according to ASME B16.10
- Socket weld ends according to ASME B16.11
- Threaded ends according to ASME B1.20

On request other type of process connections or face to face dimensions can be supplied.

3.1.5 Operation

The valves can be supplied with following actuators

- Manual with hand wheel
- Electric actuator
- Pneumatic actuator
- External actuation with chain

A locking device can be supplied on request

3.1.6 Test

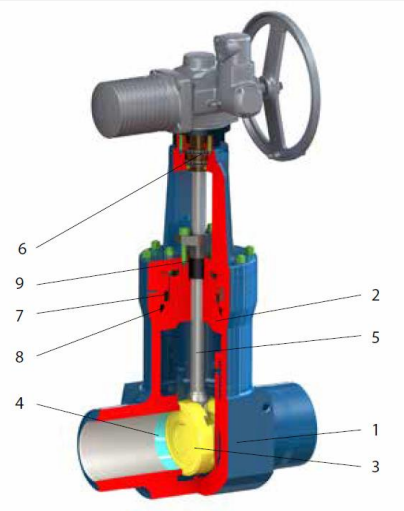
The gate valves are subjected to the following tests performed with water:

- Shell strength test according to EN 12266 or API 598
- Shell tightness test according to EN 12266 or API 598
- Seat tightness test according to EN 12266; ANSI/FCI or API 598. Leak rate according to specification.
- Functionality test
- Other tests by agreement.

3.1.7 Installation

Gate valves type ET-000S43EX can be installed in any position

3.2 Type ET-000S43.1EX



3.2.1 Characteristics

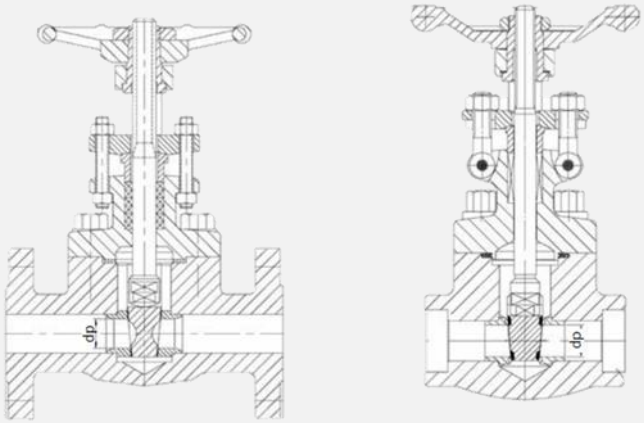
Diameters: according to European norms: DN 50 up to DN 350
according to ASME: NPS ½" up to 2"
Pressure classes: according to European norms: PN 16 up to PN 63
according to ASME: Class 150# up to Class 1500#
Temperature range: 600°C (538°C according to ASME)
Body design: yoke gate valve
Rising stem
Non rising wheel

3.2.2 Materials according to EN (Europe)

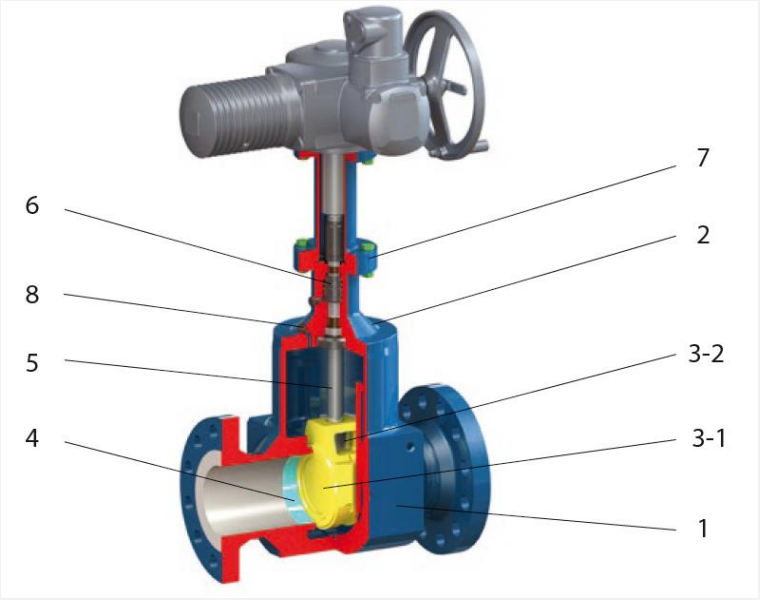
Pos	Component	450°C	530°C	560°C	570°C	600°C
1, 2	Body and bonnet	1.0460	1.5415	1.7335	1.7715	1.7383
5	Stem	1.4122				
4	Seat + overlay	Stellite				
3	Wedge + overlay	Stellite				
9	Packing	Graphite				

3.2.3 Materials according to ASME (USA)

Pos	Component	450°C	538°C	595°C
1	Body	A105	A182 F316	A182 F22
2	Bonnet	A105	A182 F316	A182 F22
3	Wedge + overlay	A276 410T	A182 F316 + stellite	A182 F22 + stellite
4	Seat + overlay	SS410 + stellite	A182 F316 + stellite	A182 F22 + stellite
5	Stem	A182 F6	A182 F316	A182 F6
6	Bolt	A193 B7	A193 B8	A193 B7



3.3 Type ET-000S43.3EX

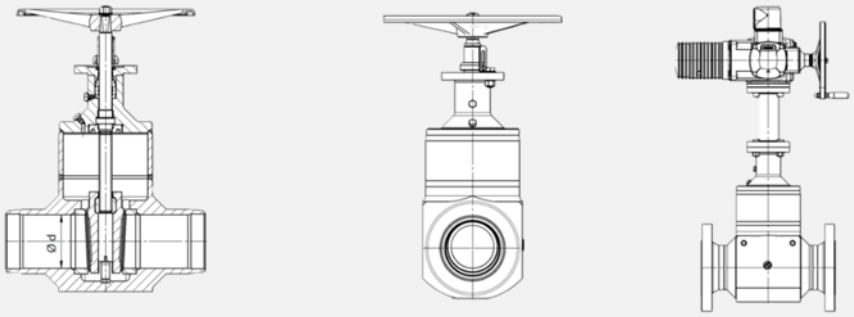


3.3.1 Characteristics

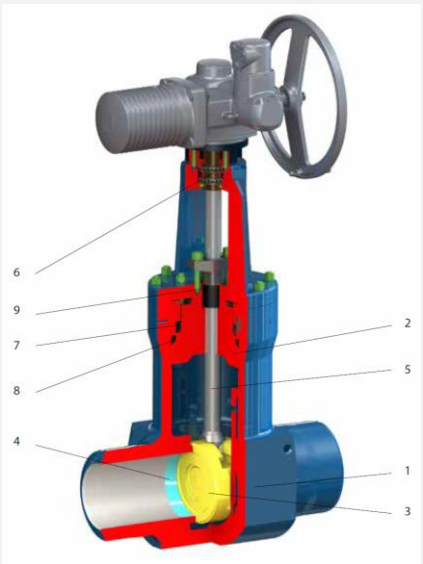
Diameters:	according to European norms: DN 50 up to DN 400
Pressure classes:	according to European norms: PN 16 up to PN 100
Temperature range:	100°C
Body design:	yoke gate valve
Rising stem	
Non rising wheel	

3.3.2 Materials

Pos	Component	-46°C up to 100°C	-46°C up to 100°C	-46°C up to 100°C
1-1	Body	A350 LF2	A350 LF2 Re 340 MPa	A350 LF2 Re 340 MPa
1-2	Extension	A350 LF2	A350 LF2 Re 340 MPa	A350 LF2 Re 340 MPa
1-3	Top flange	A350 LF2	A350 LF2 Re 340 MPa	A694 F52
2	Bonnet	A350 LF2	A350 LF2 Re 340 MPa	A350 LF2 Re 340 MPa
3-1	Wedge + overlay	A350 LF2 + stellite	A350 LF2 + stellite	A350 LF2 + stellite
3-2	Stem nut	Bronze	Bronze	Bronze
4	Seat +overlay	A350 LF2 + stellite	A350 LF2 + stellite	A350 LF2 + stellite
5	Stem	1.4923	1.4923	1.4923
6	Stem sealing	1.4021	1.4021	1.4021
7	Actuator flange	1.0570	1.0570	1.0570
8	Vent plug	1.4021	1.4021	1.4021
9	Position indicator	1.0570	1.0570	1.0570



3.4 Type ET-000S43.5EX



3.4.1 Characteristics

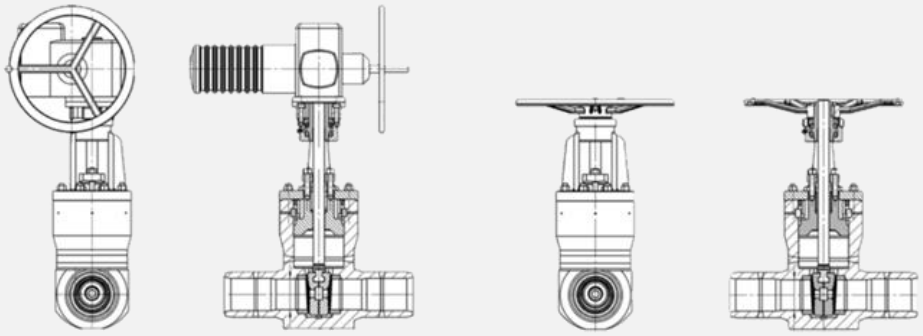
Diameters: according to European norms: DN 65 up to DN 400
according to ASME: NPS 2” up to 16”
Pressure classes: according to European norms: PN 160 up to PN 420
according to ASME: Class 900# up to Class 2500#
Temperature range: 650°C
Body design: yoke gate valve
Rising stem
Flexible wedge

3.4.2 Materials according to EN (Europe)

Pos	Component	450°C	530°C	570°C	570°C	600°C	450°C	650°C
1	Body	1.0460	1.5415	1.7335	1.7715	1.7383	1.6368	1.4903
2	Pressure seal bonnet	1.0460	1.5415	1.7335	1.7715	1.7380	1.6368	1.4903
3	Wedge + overlay	1.0460 + stellite	1.5415 + stellite	1.7335 + stellite	1.7715 + stellite	1.7380 + stellite	1.6368 + stellite	1.4903+ stellite
4	Seat + overlay	1.0460 + stellite	1.5415 + stellite	1.7335 + stellite	1.7715 + stellite	1.7380 + stellite	1.6368 + stellite	1.4903 + stellite
5	Stem	1.4923						
6	Stem nut	Bronze						
7	Segmented ring	1.7715					1.6368	1.4903
8	Gasket	Pressed graphite						
9	Packing	Pressed graphite						

3.4.3 Materials according to ASME (USA)

Pos	Component	425°C	593°C	593°C	650°C
1	Body	A105N	A182 F12	A182 F22	A182 F91
2	Pressure seal bonnet	A105	A182 F12	A182 F22	A182 F91
3	Wedge + overlay	A105 + stellite	A182 F12 + stellite	A182 F22+ stellite	A182 F91 + stellite
4	Seat + overlay	A105 + stellite	A182 F12 + stellite	A182 F22+ stellite	A182 F91 + stellite
5	Stem	1.4923			
6	Stem nut	bronze			
7	Segmented ring	A182 F22			A182 F91
8	Gasket	Pressed graphite			
9	Packing	Pressed graphite			



4 Gate Valves for control

4.1 General

4.1.1 Applications

- Conventional and nuclear power engineering where a specified performance characteristic depending on the valve travel for different flow rates is required.
- Gas industry where pipes with different pressures are to be connected or where gas is to be discharged in a defined way.
- Heat production and distribution where a defined quantity of the fluid is transported in order to guarantee a certain performance of the installation.

4.1.2 Fluids

Control valves type are used mainly for

- Water
- Steam
- Gases
- Other fluids

4.1.3 Technical description

The control gate valves are valves used to control the flow of the service fluid which may flow in either direction. The control gate valves are not isolating valves. The design of control gate valves is based on the design of conventional gate valves. The control features of the gate valves are provided by the unique construction of the throttle plate, seats, and guides. The throttle plate and the seats are equipped with special holes or grooves that overlap each other during the process of opening so that the regulating characteristic is guaranteed exactly in accordance with the customer's specification. The control gate valves supplied by EXaL Technology are designed by means of sophisticated computer programs and the throttling components of each gate valve have holes of different shapes for the performance characteristic of the gate valve to be in full conformance with
requirements of the customer.

4.1.4 Connections to the pipe

- Flanged ends according to EN 1092-1, ISO 7005-1 or ASME B16.5
  Face-to-face dimensions according to EN 558 Series 14, 15 and 26, ASME B16.10
- Welded ends - acc. to EN 12627 or ASME B16.25
  Face to face dimensions according to ASME B16.10
- Socket weld ends according to ASME B16.11
- Threaded ends according to ASME B1.20

On request other type of process connections or face to face dimensions can be supplied.

4.1.5 Operation

The valves can be supplied with following actuators

- Manual with hand wheel
- Electric actuator
- Pneumatic actuator
- External actuation with chain

A locking device can be supplied on request

4.1.6 Test

The gate valves are subjected to the following tests performed with water:

- Shell strength test according to EN 12266 or API 598
- Shell tightness test according to EN 12266 or API 598
- Seat tightness test according to EN 12266; ANSI/FCI or API 598. Leak rate according to specification. Full tightness cannot be achieved with control valves
- Functionality test
- Other tests by agreement.

4.1.7 Installation

Control gate valves can be installed in any position

4.2 Type ET-000S33CEX

4.2.1 Characteristics

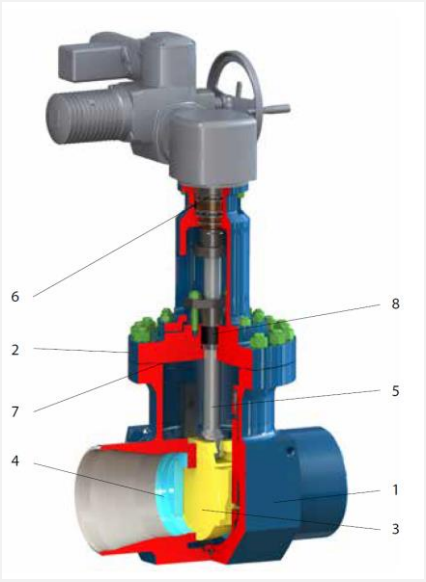
Diameters: according to European norms: DN 50 up to DN 600
Pressure classes: according to European norms: PN 16
Temperature range: 250°C
Body design: yoke gate valve
Non rising stem

4.2.2 Materials

Pos	Component	Carbon steel	Alloy steel	Carbon steel for low temperatures	Stainless steel
1	Body	1.0619	1.7357	1.6220	1.4408
2	Bonnet	1.0619	1.7357	1.6220	1.4408
3	Wedge + overlay	1.0619 + 13Cr	1.7357 + stellite 6	1.6220 + F304	1.4408
4	Seat + overlay	1.0460 + 13Cr	1.7335 + stellite 6	1.0566 + stellite 6	1.4401
5	Stem	1.4021	1.4923	1.4301	1.4401
6	Bonnet bolts*	1.7218*	1.7709*	1.7225*	1.4401*
7	Bonnet nuts*	1.1191*	1.7709*	1.7225*	1.4401*
8	Stem nut	Ni alloy, Al bronze			
9	Back seat	1.4006 + hard coating		1.4301 + hard coating	1.4401 + hard coating
10	Gasket	Graphite with stainless steel inserts			
11	Packing	Pressed graphite			

*or according to customers request

4.3 Type ET-000S43CEX



4.3.1 Characteristics

Diameters: according to European norms: DN 150 up to DN 600
Pressure classes: according to European norms: PN 63 up to PN 420
Temperature range: 600°C
Body design: yoke gate valve
Non rising stem

4.3.2 Materials

Pos	Component	450°C	530°C	570°C	570°C	600°C	450°C	650°C
1	Body	1.0460	1.5415	1.7335	1.7715	1.7383	1.6368	1.4903
2	Pressure seal bonnet	1.0460	1.5415	1.7335	1.7715	1.7380	1.6368	1.4903
3	Wedge + overlay	1.0460 + stellite	1.5415 + stellite	1.7335 + stellite	1.7715 + stellite	1.7380 + stellite	1.6368 + stellite	1.4903+ stellite
4	Seat + overlay	1.0460 + stellite	1.5415 + stellite	1.7335 + stellite	1.7715 + stellite	1.7380 + stellite	1.6368 + stellite	1.4903 + stellite
5	Stem	1.4923						
6	Stem nut	Bronze						
7	Segmented ring	1.7715					1.6368	1.4903
8	Gasket	Pressed graphite						
9	Packing	Pressed graphite						

5. Comparison between European and American materials

EN Material	ASTM Material
1.0619	A216 WCB
1.6220	A352 LCC
1.7357	A217 WC6
1.4408	A351 CF8M
1.0460	A105
1.0425	A516 Gr 60
1.0481	A516 Gr 70
1.0566	A350 LF2
1.4006	A276 410T / A182 F6A
1.4021	A276 420T
1.4301	A182 F304
1.4401	A182 F316
1.7218	
1.1191	A194 2H
1.7225	A193 B7, A329 L7, A194 7
1.7709	
1.4301	A193 B8 Cl2, A320 B8 Cl 2, A194 8
1.4401	A193 B8M Cl 2, A320 B8M Cl 2, A194 8
1.0577	A 537 Cl 1

6. Temperature range of materials

Material	Temperature range
1.0619	-20°C up to 450°C
A216 WCB	-29°C up to 425°C
1.6220	-50°C up to 300°C
A352 LCC	-46°C up to 345°C
1.7357	-20°C up to 570°C
A217 WC6	-29°C up to 595°C
1.4408	-196°C up to 570°C
A351 CF8M	-196°C up to 538°C
1.0425	-10°C up to 450°C
A516 Gr 60	-29°C up to 455°C
1.0566	-40°C up to 400°C
A350 LF2	-46°C up to 425°C
1.0577	-25°C up to 100°C