SIEKMANN econosto

ROYAL ECONOSTO GROUP

Pressure Seal Gate Valves

Operation Instruction

Siekmann Econosto GmbH & Co. KG
P.O. Box 150440, D-44344 Dortmund
Freigrafenweg 2, D-44357 Dortmund
Germany

Tel.: 0049 - 231 937 50
Fax : 0049 - 231 937 5188
E-mail: info@siekmann-econosto.de
Web: www.siekmann-econosto.de

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1. Forewords

1.1 Thanks for your selection of Siekmann's gate valve. As a type of pressure equipment, valve has potential hazards of pressure and creation of explosive atmosphere resulting from leakage of process fluid. For the safety purpose, user shall read this instruction to know what Siekmann has already taken into account in our design and manufacture, and what action shall be taken by user according to essential health and safety requirements of European Directive 97/23/EC(PED) and 94/9/EC (Atex).

2. Essential health & safety requirements of PED/Atex and solution

2.1 What's Siekmann design idea

-Gate valve are designed as standard product, no consideration of each specific service condition since its too wide.

-Gate valve is designed to API 600, valve has adequate strength according to ASME B16.34 pressure-temperature rating. The gate valve was EC-type approved by European Notified Body.

-Valve has different sealing materials in accordance with API 600, which are corrosion/wear resistance to certain type of fluid.

-Valve contains no light metal (such as Mg) and all parts are electricity conductive and connected together to prevent ignite resource.

-Valve is designed with hand wheel, or gear operator or electric actuator according to its size and torque, and operation requirements.

2.2 What action user shall taken

2.2.1 General

2.2.1.1 In any occurrence, first ensure personnel safety.

2.2.1.2 Use the valves in accordance with ASME B16.34 pressure-temperature rating.

2.2.1.3 Make sure that the selected valve materials are corrosion/wear resistance to the service fluid.

2.2.1.4 Where the service fluid is flammable/explosive, to limit the working temperature.

2.2.1.5 When performing Repair/maintenance operations, make sure that the valves are always depressurized, vented and drained.

2.2.1.6 For actuator operated valves, make sure all supply lines (Electrical, hydraulic, Air) are disconnected before starting any operation.

2.2.1.7 When performing Repair/maintenance operations, always use appropriate protection e.g. protective clothing, (oxygen) masks, gloves, etc.

2.2.1.8 When performing Repair/maintenance operations, do not smoke, do not use any portable no-Ex-proof electrical device in the area and do not use open fire without a valid work permit.

2.2.1.9 Valve must periodically checked on:
-Tightness of bolted connection (body/bonnet, gland, flange connection).
-Corrosion/wear damages (crack, pitting, thickness of the valve).
-Make sure the valves are in fully open/fully closed position.

2.2.2 Specifics

Risk	Preventive Action
Accidental contact with dangerous service fluid* Due to: Gasket or Packing Blow out	1. See 2.2.1 General
	2. Immediately replace Gasket and packing after a Blow-out (use approved/suitable materials only
	3. Use recommended torque as in Table 9 and Table 10
Accidental contact with dangerous service fluid* during disassembly or maintenance operations	1. See 2.2.1 General
	2. After removal from the production line, open and close valve to guarantee depressurized cavity.
	3. Drain any remainder fluid or substances with suitable devices before disassembly.
Structural yielding of valves body with consequent risk of contact with dangerous service medium*, explosion or fire	1. See 2.2.1 General
	2. Create precautions to avoid additional forces on the valves
	3. Avoid absolutely water hammer: install precaution devices if necessary (e.g. brakes, anti shock devices, etc.)
	4. Avoid submitting excessive vibrations to the valves.
	5. Avoid quick Pressure and/or Temperature deviations.
Accidental contact with High or Low temperature parts	1. See 2.2.1 General
	2. Predispose apposite insulation on the valve.
	3. Alert by means of warning signs about risk of burns.
	4. For Cryogenic-/High Temperature service use only valves equipped with Cryogenic-/High Temp. Extension.
Fire or explosion in case of service with flammable fluids	1. See 2.2.1 General
	2. Install only Ex-proof electrical devices in the area
	3. While performing maintenance in the area, shut down all electrical devices.
Explosion in case of oxygen service	1. See 2.2.1 General
	2. Install only Ex-proof electrical devices in the area
	3. Install and use only valves completely degreased.
	4. Use valves only made with materials suitable for oxygen service (see EN 1797-1)

* Dangerous service fluid as there are: Toxic-, Corrosive-, Flammable-, High- or Low temperature etc. fluid
no consideration is taken for corrosive fluid.

3. Scope and Technical Parameters

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3.1 Scope

The series valves are widely used in petroleum, chemical, power plant and allied industries for shut off or connection of pipeline.

3.2 Technical Parameters:

Design standard: API600, ASME B16.34
Flange dimension: ASME B16.5
Structure length: ASME B16.10
Nominal pipeline size: 50~600 mm (2~24")
Nominal pressure: 100~420 bars (600~2500LB)
Temperature range: see Table 7
Medium: see Table 7
Body material: ASTM material, see Table 5
Trim material: API 600 trim material, see Table 6
Valve testing: API598

4. Valve Structure

Please refer to Figure 1 and 2 for valve structure, Table 1 to 4 for connection and main outline dimensions.

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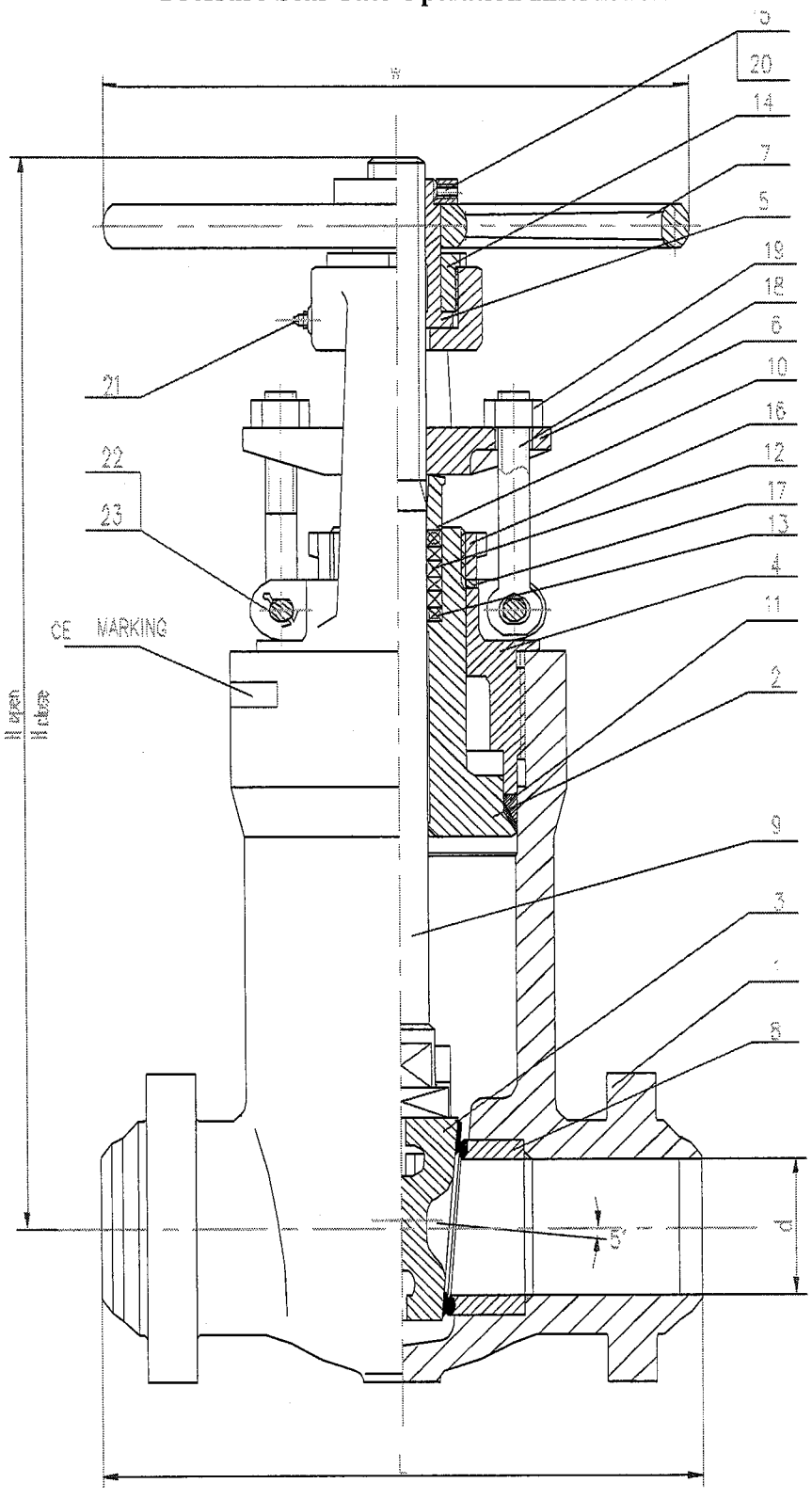

Fig.1: 2"~4"(600,900,1500,2500LB) pressure seal gate valve structure

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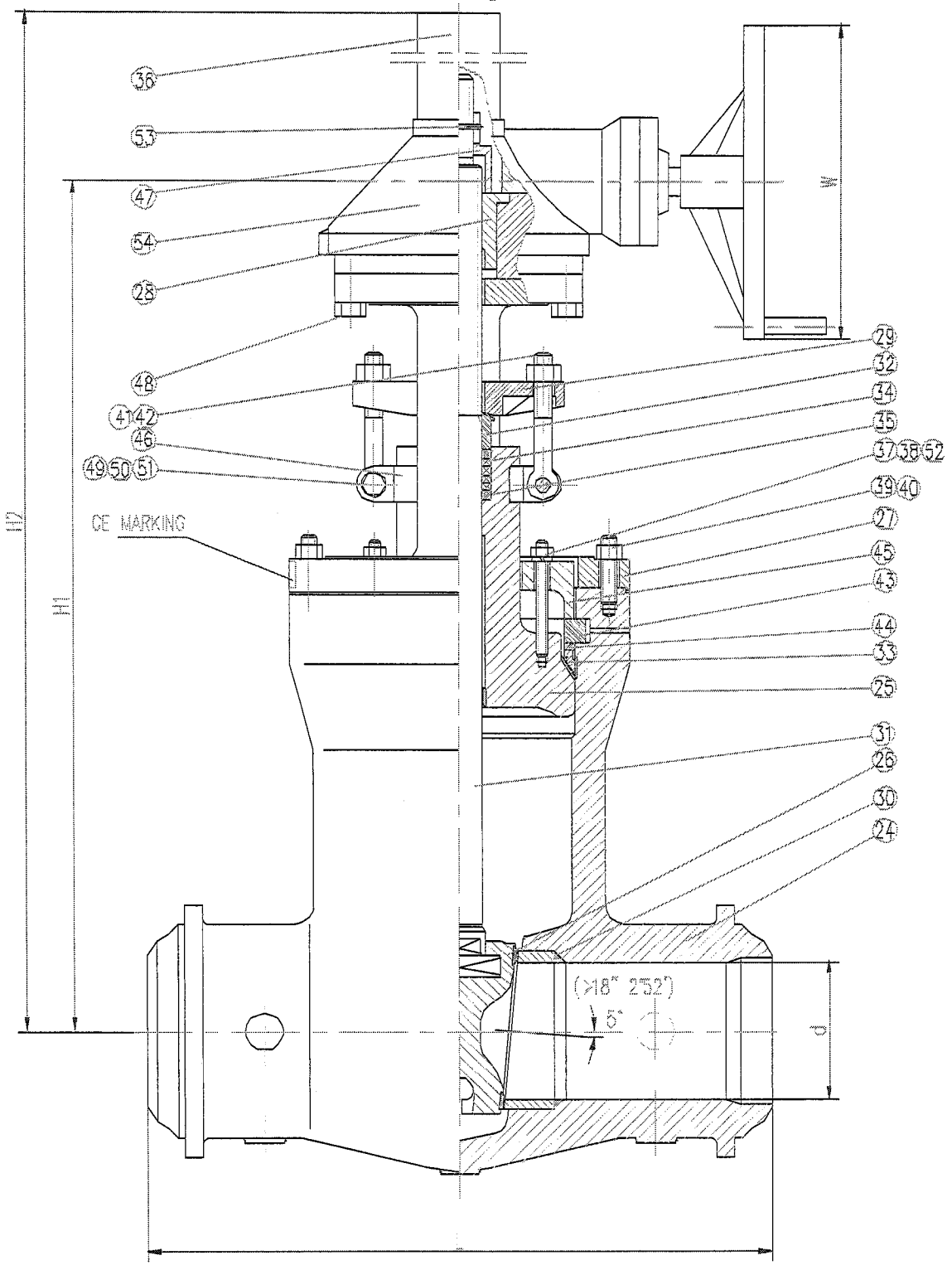

Fig.2: 6"~24"(600LB), 6"~12"(900,1500,2500LB) pressure seal gate valve structure

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Table 1 DN50~600 (2~24") 100bars(600LB) pressure seal gate valve main dimensions

DN	d	L	W	H1	H2	H(open)	H(close)	Weigh(kg)
50	51	292	200	-	-	483	422	62
65	64	330	250			538	463	80
80	76	356	250	-	-	593	504	84
100	102	432	300	-	-	706	590	115
150	152	559	305	830	1080	-	-	171
200	203	660	305	987	1267	-	-	215
250	248	787	458	1082	1382	-	-	268
300	298	838	458	1211	1581	-	-	318
350	327	889	610	1323	1833	-	-	435
400	375	991	610	1512	2162	-	-	570
450	419	1092	610	1651	2251	-	-	720
500	464	1194	610	1743	2403	-	-	890
600	559	1397	610	2280	3000			

Table2 DN50~300(2~12") 150bars(900LB) pressure seal gate valve main dimensions

DN	d	L	W	H1	H2	H(open)	H(close)	Weigh(kg)
50	47	216	250	-	-	594	508	42
65	57	254	250			626	633	67
80	73	305	300	-	-	657	558	84
100	98	356	350	-	-	736	624	105
150	146	508	305	823	1013	-	-	194
200	191	660	458	1021	1321	-	-	520
250	238	787	610	1174	1538	-	-	772
300	282	914	610	1316	1730	-	-	1103

Table 3 DN50~300 (2~12") 250bars(1500LB) pressure seal gate valve main dimensions

DN	d	L	W	H1	H2	H(open)	H(close)	Weigh(kg)
50	47	216	250	-	-	594	508	42
65	57	254	250			626	633	67
80	70	305	350	-	-	657	558	84
100	92	406	500	-	-	736	624	155
150	136	559	305	1047	1301	-	-	367
200	178	711	610	1049	1349	-	-	718
250	222	864	610	1230	1535	-	-	1071
300	263	991	610	1405	1870	-	-	1523

Table4 DN50~300 (2~12") 420bars(2500LB) pressure seal gate valve main dimensions

DN	d	L	W	H1	H2	H(open)	H(close)	Weigh(kg)
50	38	279	350	-	-	594	508	53
65	47	330	450			640	545	95
80	57	368	450	-	-	657	558	100
100	73	457	500	-	-	736	624	200
150	111	610	458	879	1129	-	-	488
200	146	762	610	1094	1389	-	-	850
250	184	914	610	1373	1748	-	-	1680
300	219	1041	610	1453	1873	-	-	2330

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5. Main Parts and Material

The user or the pipeline system designer must select valve body material and the class according to the working temperature, working pressure, the type of fluid and temperature-pressure rating as specified in ASME B16.34. The manufacturer takes only the responsibilities for use the order material and the valve class, no responsibility for incoherence of user selected material and valve class with the working condition.

Table5 Valve main parts and material

No.	Parts Name	Materials								
1,24	Body	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8	ASTM A351-CF8M	ASTM A351-CF3	ASTM A351-CF3M
2,25	Bonnet	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8	ASTM A351-CF8M	ASTM A351-CF3	ASTM A351-CF3M
4,27	Yoke	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8			
5,28	Stem nut	ASTM A439-D2								
6,29	Grand flange	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8			
7	Hand wheel	DUCTILEIRON								
10,32	Grand	ASTM A276-420								
11,,33	Seal ring	ASTM A182-F304, FLEXIBLE GRAPHITE								
12,13 34,35	Packing	GRAPHITE								
14	Nut	CARBON STEEL					ASTM A182-F304			
15	Wheel nut	CARBON STEEL					ASTM A182-F304			
16	Yoke nut	CARBON STEEL					ASTM A182-F304			
36	Stem Enclosure	CARBON STEEL								
17	Washer	ASTM A276-420								
37	Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
38	Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
18,41	Eye bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
19,42	Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
39	Bolt	ASTM A193 B7	ASTM A320 L7M	ASTM A320 L7M	ASTM A193 B16	ASTM A193 B16	ASTM A193 B8			
40	Nut	ASTM A194 2H	ASTM A320 7M	ASTM A320 7M	ASTM A194 4	ASTM A194 4	ASTM A194 8			
43	Quarto Ring	ASTM A276-420, ASTM A182-F316								
44	Gasket	ASTM A276-420, ASTM A182-F316								
45	Bearing Plate	ASTM A276-420, ASTM A182-F316								
20	Bolt	CARBON STEEL					STAINLESS STEEL			
21	Grease Fitting	CARBON STEEL					STAINLESS STEEL			
22	Rivet	CARBON STEEL	STAINLESS STEEL							
23	Pin	CARBON STEEL	STAINLESS STEEL							
46	Clipping Ring	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351-CF8	ASTM A351-CF8M	ASTM A351-CF3	ASTM A351-CF3M
47	Nut	CARBON STEEL					STAINLESS STEEL			
48,49	Bolt	CARBON STEEL					STAINLESS STEEL			
50	Nut	CARBON STEEL					STAINLESS STEEL			
51,52	Washer	CARBON STEEL					STAINLESS STEEL			
53	Pin	CARBON STEEL					STAINLESS STEEL			
54	Manual Device									

Table 6 Common used trim material

API 600 Trim No.	Seat ring	Disc sealing	Stem
1	ER410	ER410	ASTM A182 F6a
2	304	304	ASTM A182 F304
5	STL	STL	ASTM A182 F6a
8	STL	ER410	ASTM A182 F6a
9	Monel	Monel	Monel
10	316	316	ASTM A182 F316
12	STL	316	ASTM A182 F316
16	STL	STL	ASTM A182 F316

Table7 body material suitable for fluid and temperature range

	ASTM A216-WCB	ASTM A352-LCB	ASTM A352-LCC	ASTM A217-WC6	ASTM A217-WC9	ASTM A351- CF8	ASTM A351-CF8M	ASTM A351- CF3	ASTM A351 - CF3M
RECOMMEND TEMPERATURE LIMITS	-29~427	-46~343	-46~343	-29~593	-29~593	-196~537	-196~537	-196~427	-196~454
APPLICATION	STEAM,WATER, OIL VAPOUR,GAS and GENERAL SERVICE	LOW TEMPERATURE SERVICE STEAM,WATER,OIL VAPOUR,GAS		HIGH TEMPERATURE SERVICE STEAM,WATER,OIL VAPOUR,GAS		HIGH and LOW TEMPERATURE SERVICE CORROSION RESISTANCE			

Note: where the process fluid is flammable/explosive, it must limit the working temperature of the pipeline system.

6. Working Principle and Structure Description

6.1 Working principle

The series valve is straight pattern one. When hand-wheel rotate clockwise, the gate descends and the valve shuts off; when rotate counter clockwise, the gate ascends and the valve opens. Pre-fasten the bolt, the bonnet raised and a pressure stressing among the body, bonnet and wedge sealing is established, meanwhile the internal pressure on bonnet increases the stressing for sealing.

6.2 Structure description

6.2.1 Flange end or but welding end may be selected as to purchaser optimum.

6.2.2 Packing seal structure and flexible graphite combination packing is used for the series valve.

6.2.3 Pressure sealing uses a wedge-shaped metal or graphite gasket.

6.2.4 Wedge seal is used for the valve and the seal material is selected to API 600 or to the customer requirements.

6.2.5 For big valve, hand-wheel is replaced by gear operator, electric actuator, hydraulic or pneumatic actuator that shall conform to associated EC Directive and bear CE marking.

7. Valve Transportation

Valves are heavy and metal products, care shall be taken to avoid physical injury during transportation. Cord and lift device and transportation tool shall be ready, valve

package inspected and broken package repaired. Packaging shall conform to specification requirements, it is forbidden to rotate the hand-wheel when valve is packaged. Valve shall be in full-close status. For mis-opened valve, the sealing surface shall be cleaned and valve re-closed and ends of bore blocked. Actuator and valve shall be packaged separately.
During transportation or lifting, cord shall be tied to the yoke, no tied to the hand-wheel or stem. Valve shall be handled with care, no bump to other thing.
The paint, nameplate and flange sealing surface shall be protected during transportation, no drag valve on the ground especially with the end sealing surface contacted the ground.
Don't unpack when the valve is not ready for installation at the construction field. The valve shall be placed at a safety location against rain and dust..

8. Valve Storage

8.1 Valve shall be stored in air and dry room with bore blanked for protection.

8.2 Long-time-stored valve shall be re-inspected prior to use. Close attention shall be paid against sealing damage when removal of dirties for the cleanness of sealing surface. Of necessary, valve shall be pressure tested once more.

9. Valve Installation

9.1 Carefully check valve identification against valve specifications before installation.

9.2 Check the inside of bore and the sealing surface before installation, any attached dirty shall be removed with clean soft cloth.

9.3 Check the sensibility of actuator to prevent block before installation.

9.4 Valve operation device is recommended to be installed at location 1.2m from the ground for convenient of operation. Where the center of valve and the hand-wheel is over 1.8m from the ground, a platform shall be built for the frequently operated valve. For pipeline with numbers of valves, valves shall be installed on the same platform as likely as possible for convenient of operation.
For single valve installed at location over 1.8m and less operated, apparatus may be used such as chain-wheel, extension bar, move platform and move ladder etc. Where valve is installed underground, extension bar or ground-well shall be set. For safety reason, the ground-well shall be covered.

9.5 For valve installed on horizontal pipeline, the stem is suitable at uprightness position; or, the downward stem shall be inconvenience for operation and maintenance, as well the valve is liable to corrosion. If the ground valve slant installed, operation and maintenance shall also be inconvenience.

9.6 When valves are installed in pipeline side by side, enough space shall be considerate for operation, maintenance and dismantle. The clearance of hand-wheels shall not less than 100mm; in case of narrow clearance, valves shall be installed interleaving.

9.7 For valve with flange end, user shall select proper bolt, gasket according to the

working temperature, working pressure and fluid, equally fasten the bolts and nuts. Bolt shall be with full thread and 8UN serial thread shall be used for bolt over 1 inch in diameter.

9.8 For valve with butt-welding end, user shall perform welding and post welding heat treatment using qualified WPS and welder in accordance with the requirements of ASME B31.3.

10. Valve Operation and Maintenance

10.1 After installation and for the pressure test of the pipeline or the system, the wedge must be fully opened or fully closed. It is not recommended to partly open the valve for adjustment of flow rate or emergent pressure relief blow-off. Siekmann is not responsible for damage, loss or expense arising out of such usage.

10.2 Usually gate valves have no heat insulation structure, never touch the surface of valves to prevent burn when the process fluid has a high/low working temperature.

10.3 Dust, grease and medium residual trend to accumulate at the surfaces of body, and moving parts such as stem, gearbox, the guide of yoke etc., wear and erode the valve, and even generate friction heat that is dangerous in explosive atmosphere, and shall be cleaned frequently according to the working conditions.

10.4 The thickness of body and bonnet must be checked to ensure safety operation at an interval of three months. Where the thickness is less than value in Table8, the valve must be scrapped.

Table 8 Body minimum wall thickness

	20bars 150lb	50bars 300lb	100bars 600lb	150bars 900lb	250bars 1500lb	420bars 2500lb
DN50(2")	5.59	6.35	6.35	7.88	11.18	15.75
DN65(2-1/2")	5.59	6.35	7.12	8.64	12.70	19.05
DN80(3")	5.59	7.12	7.88	10.42	15.75	22.36
DN100(4")	6.35	7.88	9.40	12.70	20.58	27.69
DN125(5")	7.12	8.64	11.18	15.00	23.12	34.04
DN150(6")	7.12	9.66	12.70	18.29	27.69	40.39
DN200(8")	7.88	11.18	15.75	22.36	35.82	52.33
DN250(10")	8.64	12.70	19.05	26.93	43.69	65.79
DN300(12")	9.66	14.23	23.12	31.75	50.80	76.97
DN350(14")	10.42	15.75	24.64	35.06	55.63	
DN400(16")	11.18	17.53	27.69	39.63	63.50	
DN450(18")	11.94	19.05	31.00			
DN500(20")	12.70	20.58	34.04			
DN600(24")	14.48	23.88	40.39			
DN700(28")	15.75	27.18				
DN750(30")	16.77	28.96				
DN800(32")	18.2					
DN900(36")	18.93					

10.5 After put into service, valve shall be checked and maintained periodically especially for the situation of sealing surfaces and worn, the age of packing and the corrosion of body. In case of such situation, valve shall be repaired or replaced. It is suggested that inspection and maintenance of valve shall be perform every three months provided the fluid is water or oil, every month or to local law provided the fluid is strong corrosive.

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10.6 After reparation, valve shall be re-assembled and adjusted using recommended torque as listed in Table 9 and Table 10. After reassembly, valve shall be pressure tested.

Table 9 Recommended torque for flange connection bolting

Thread size	Torque (N.M)	Thread size	Torque (N.M)
1/2-13UNC	50~60	1-1/4 -8UN	850~1000
9/16-12 UNC	70~80	1-3/8-8 UN	1100~1300
5/8-11 UNC	100~130	1-1/2-8 UN	1400~1800
3/4-10 UNC	160~210	1-5/8-8 UN	1800~2200
7/8-9 UNC	280~330	1-3/4-8 UN	2200~2600
1-8 UNC	420~500	1-7/8-8 UN	2800~3300
1-1/8-8 UN	500~600	2-8 UN	3500~4200

Table 10 Recommended torque for stuff box bolting

Thread size	Torque (N.M)	Thread size	Torque (N.M)
3/8	10~20	3/4	90~110
1/2	20~30	7/8	130~150
9/16	30~40	1	160~180
5/8	50~60	1-1/8	220~250

10.7 When performing Repair/maintenance operations, user shall use valve packing, gasket, bolt and nut of the same size and material as the original one. Valve packing and gasket may be ordered as spare parts for maintenance and replacement. It is forbidden to open the bonnet or replace the bolt, nut or packing when the valve contains pressure. After replacement of packing, gasket, bolt and nut, valve shall be closure test prior to reuse.

10.8 User may repair the valve-sealing surface providing a successful closure test is performed and the sealing is ok.

10.9 Generally valve trim prefers replacement to reparation. It is better to use provided part as replacement. If part produced by valve manufacturer is not available due to emergency, user shall produce the part to Siekmann's technical documentation. Siekmann takes no responsibility for loss caused out of part produced other than Siekmann.

10.10 It is not recommended for reparation of valve pressure-containing part by user. If the pressure-containing part is used for a long time and consequently defection occurs and affect safety use, user shall replace the valve with a new one.

10.11 Welding repair on valve online is forbidden.

10.12 The online valve shall not be knocked, walked on or used as weight support.

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11. Potential Failure and Troubleshooting

Failure	Cause	Troubleshooting
Leakage of packing	1. Gland flange nuts loose 2. Rings of packing not enough 3. Packing aged or failure 4. Stem sealing damaged	1. Equally tighten eyebolt nuts 2. Add packing 3. Replace packing 4. Stem shall be maintained periodically by reparation or replacement conjunction with the maintenance of pipeline facilities
Leakage between sealing surfaces	1. Dirties between sealing surfaces 2. Sealing surfaces damaged	1. Clean sealing surface 2. Repair the sealing surfaces
Operation failure	1. Packing too tight 2. Thread of stem nut over worn 3. Stem bent 4.Foreigner existence between stem and stem nut or gland or gland flange	1. Proper loose gland flange nuts 2. Replace stem nut 3. Rectify or replace stem 4. Clean foreign matter
Body and bonnet broken and leaked	1. Pre-fasten bolt loose 2. Sealing damage 3. Water hammer 4. Fatigue 5. Freezing broken	1. Tight the bolt 2. Repair or replace the sealing 3. Carefully operation to prevent suddenly stopping pumping and rapidly shutting. 4. Replace valve that exceeds guarantee period or is found with early fatigue defection 5. Drain away water in winter when valve is not used
Disc failed to open	1.Disc blocked in the body. 2.Stem is overheated and blocks the disc.	1.Use proper torque 2.When the valve is closed and the pipeline is heated, rotate the hand-wheel some bit counter clockwise for unload at interval.

12. Quality Warrant

12.1 Siekmann warrants its valves to the original purchaser for a period of 18 months from and after the date of delivery to the original customer, against defects in material and workmanship under proper and normal use and service and not caused of resulting from improper application or usage, improper installations, improper maintenance and repairs, modifications or alterations.

12.2 Purchaser shall give notice to Siekmann upon finding of any defect or assuming defect, Siekmann has privilege to check the facts of the defect.

12.3 Siekmann sole obligation under this warranty shall be limited to the follows:
—repair of the material or,
—replacement of the parts and materials or,
—refund the purchase price or collect the defected products from the original purchaser.

12.4 Siekmann is not responsible to claims caused from unexpected natural disaster such as earthquake, typhoon of any kind arising out of the defect.

12.5 The scope and limitation of warranty can be changed through the agreement between Siekmann and purchaser.

13. Servicing

13.1 Where contractually specified, Siekmann may provide field installation and adjustment.

13.2 Siekmann will trace the quality of sold valve and provide service to customer requirements.