

**MODEL**

# CC CHANNEL GATES



## GENERAL DESCRIPTION

The Orbinox model CC Channel Gate is designed for open channel installation with a highly versatile flow control in waste water treatment plants, irrigation, hydraulic works and hydro-electric power plants.

The sealing system is incorporated on both laterals and bottom area of the slide, resulting in a perfect seal without the need of wedges on the gate. From sizes 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm), the CC model has a unique seal design for applications requiring accurate flow regulation and optimum performance. The leakage rate on the Orbinox channel gate is lower than the maximum allowable recommended by AWWA (C513-05) under normal conditions.

The frame of the CC model is typically embedded in a concrete channel for both uni-directional or bi-directional sealing. Orbinox can also offer different mounting options such as wall mount and existing channel mount where required. Our engineering team can also design and manufacture the CC Channel Gate in larger dimensions, and for higher service conditions while maintaining a leakage rate below the allowable standard from AWWA. For more information, please contact an Orbinox representative.



## DESIGN CONSTRUCTION

The CC Channel Gate is manufactured in general accordance to:

- AWWA C513-05
- DIN 19569
- BS 7775

The standard CC model is manufactured in stainless steel which has a higher corrosion resistance in many applications which results into a longer life cycle with little or no maintenance. Other materials of construction are available upon request, such as AISI 904L, Duplex stainless, etc.



ORBINOX reserves the right to change specifications without notice.

OBXC 09-2011

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## DESIGN FEATURES

- Stainless steel fabricated modular design (corrosion resistance).
- Mounting options: Embedded in Concrete, Wall Mount and Face Mount in Existing Channel.
- Option of Uni-Directional or Bi-Directional sealing.
- Option of Rising or Non-Rising Stem configurations.
- Suitable for actuation with manual, electric, pneumatic or hydraulic actuators.
- Self adjusting seal design.
- Orbinox Channel Gates are completely factory assembled and tested eliminating the need for on site adjustment.
- All fasteners are stainless steel.

### Allowable Leakage:

The leakage rate on the model CC is lower than the maximum allowable recommended by AWWA under normal conditions for both seating and unseating head pressures.

- AWWA standard leakage rate: 0.1 USGPM per foot of perimeter (1.24 l/min per meter.)
- ORBINOX standard leakage rate: 0.05 USGPM per foot of perimeter (.62 l/min per meter.)

### Seating and Unseating Design Head:

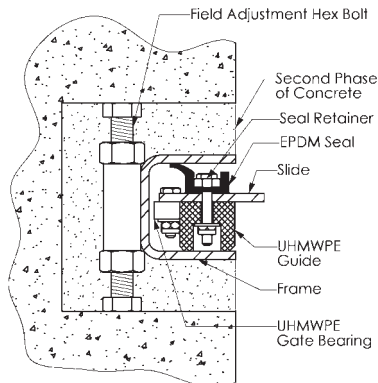
The CC model is designed to withstand a water pressure equal to the height of the slide. The uni-directional CC Channel Gate is very appropriate for seating head pressure conditions, offering a very economical solution. The bi-directional CC Channel Gate is designed for both seating and unseating head pressure conditions.

### Seal design:

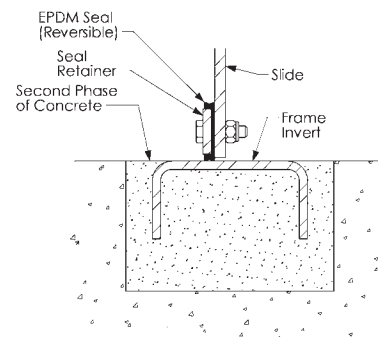
The CC model has a unique seal design. The self-adjusting "lip-design" side seals ensure a substantially watertight performance. This design allows the EPDM seals to be installed on the slide leaving the opening unobstructed when the gate is in the open position, allowing easy access to reverse or replace all seals if damaged resulting in a cost savings in maintenance time. The UHMWPE guides and bearings ensure no metal-to-metal contact between the frame and slide which reduces the friction during operation and extends seal life.

### Seal Design: CC Uni-Directional and Embedded in Concrete

SIDE SEAL



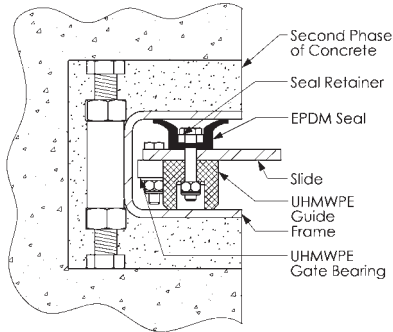
BOTTOM SEAL



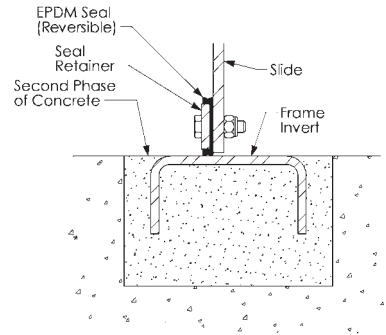
**DESIGN FEATURES**

**Seal Design: CC Bi-Directional and Embedded in Concrete**

SIDE SEAL

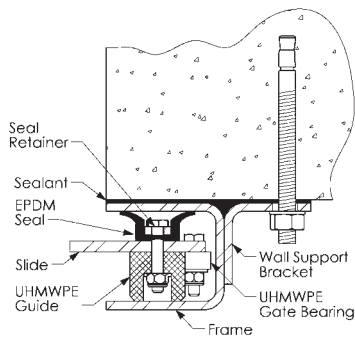


BOTTOM SEAL

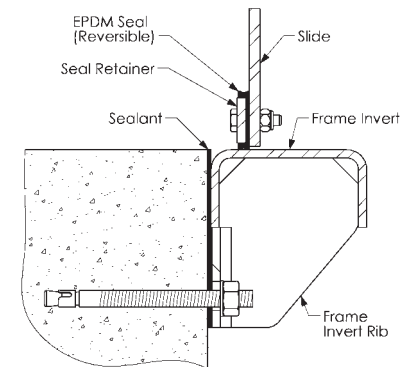


**Seal Design: CC Bi-Directional and Wall Mounted (Uni-Directional optional)**

SIDE SEAL

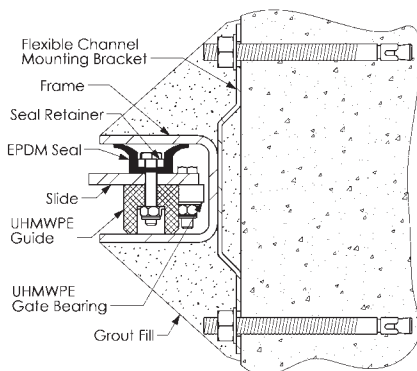


BOTTOM SEAL

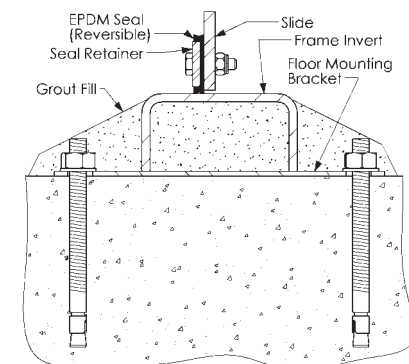


**Seal Design: CC Bi-Directional and Face Mounted (Uni-Directional optional)**

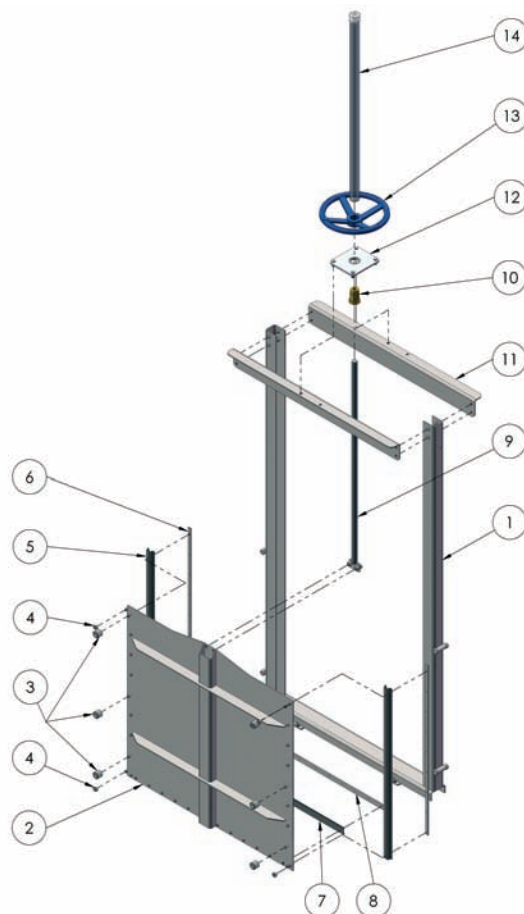
SIDE SEAL



BOTTOM SEAL



**STANDARD MATERIALS OF CONSTRUCTION**



ITEM	DESCRIPTION	MATERIAL (standard)
1	Frame	Stainless Steel ASTM A-240 / Type 304L or 316L
2	Slide	Stainless Steel ASTM A-240 / Type 304L or 316L
3	Guides	Ultra High Molecular Weight Polyethylene (UHMWPE) ASTM D-4020
4	Gate Bearings	Ultra High Molecular Weight Polyethylene (UHMWPE) ASTM D-4020
5	Seal	EPDM
6	Seal Retainer	Stainless Steel ASTM A-240 / Type 304L or 316L
7	Bottom Seal	EPDM
8	Bottom Seal Retainer	Stainless Steel ASTM A-240 / Type 304L or 316L
9	Stem	Stainless Steel ASTM A-240 / Type 303 (standard), other on request
10	Stem Nut	Bronze
11	Yoke	Stainless Steel ASTM A-240 / Type 304L or 316L
12	Stem Nut Bracket	Stainless Steel ASTM A-240 / Type 304L or 316L
13	Handwheel	Cast Iron (RS*) / Aluminum (NRS*)
14	Stem Protector	Carbon Steel / Clear Polycarbonate (RS* only)

Note: For materials other than the above, please consult an Orbinox representative.

\* RS: Rising Stem; NRS: Non Rising Stem.

**MODEL**

# CC CHANNEL GATES

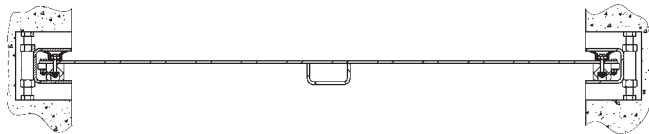


## MOUNTING OPTIONS

The following drawings show the most common mounting options for CC Channel Gates. For other mounting options please contact an ORBINOX representative.

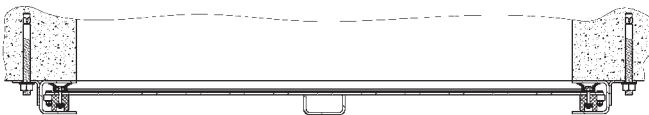
### EMBEDDED IN CONCRETE (EC)

**Model: CC-EC**



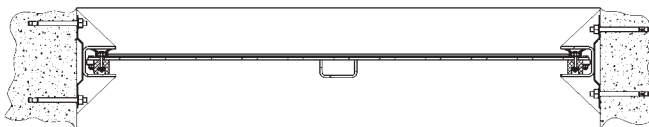
### WALL MOUNTED (WM)

**Model: CC-WM**



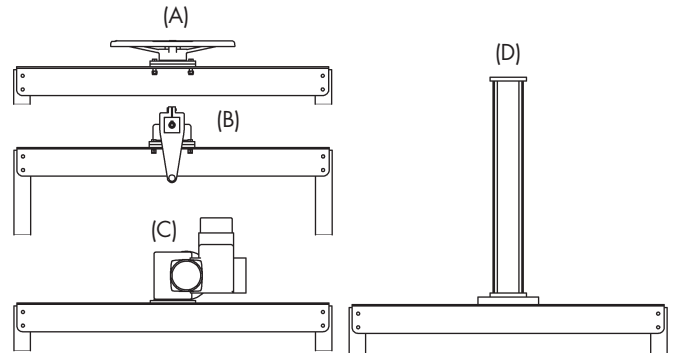
### FACE MOUNTED IN EXISTING CHANNEL (FM)

**Model: CC-FM**



## ACTUATORS

All Orbinox actuators can be yoke or floor stand mounted. Below are some examples of the most common actuator types used on CC Channel Gates:



### Various types of actuators as shown above:

- (A) Handwheel
- (B) Bevel gear and crank  
(crank installed in 2" square nut)
- (C) Electric motor
- (D) Hydraulic or pneumatic cylinder

### Accessories:

- Mechanical Stops
- Actuator manual overrides
- Locking devices
- Solenoid Valves
- Positioners
- Limit / Proximity switches

## INSTALLATION, OPERATION AND MAINTENANCE (IOM)

This section briefly describes the installation, operation and maintenance of CC Channel Gates. For more detailed information please refer to the IOM Manual.

### Installation:

A) Embedded in Concrete (EC): Field adjusting bolts are supplied to center the gate frame in the appropriate recess prior to embedding in concrete.

B) Wall Mount (WM): The CC Channel Gate is installed by means of mechanical anchor bolts (Hilti Kwilt 3 or equivalent) and construction sealant (Sikabond or equivalent).

C) Face Mounted in Existing Channel (FM): The CC Channel Gate is installed by means of mechanical anchor bolts (Hilti Kwilt 3 or equivalent). All the gaps shall be grout filled afterwards and shaped in order to assure a smooth transition.

The minimum concrete strength shall be 3,000 PSI (20.7 MPa). The tolerance of the concrete construction (flatness, levelness and plumbness) shall be in accordance to ACI 117-10 standard.

For detailed information about the type, size and quantity of the required anchor bolts or other installation materials, please refer to the notes on the "General Arrangement Drawing".

### Maintenance and Operation:

The Orbinox CC Channel Gates need practically no maintenance. The stem should be kept lubricated and seals should be replaced in case of damage. The gate is closed by applying a clockwise rotation. Applying excessive force on the operator when closing the gate may cause damage to the stem.

MODEL

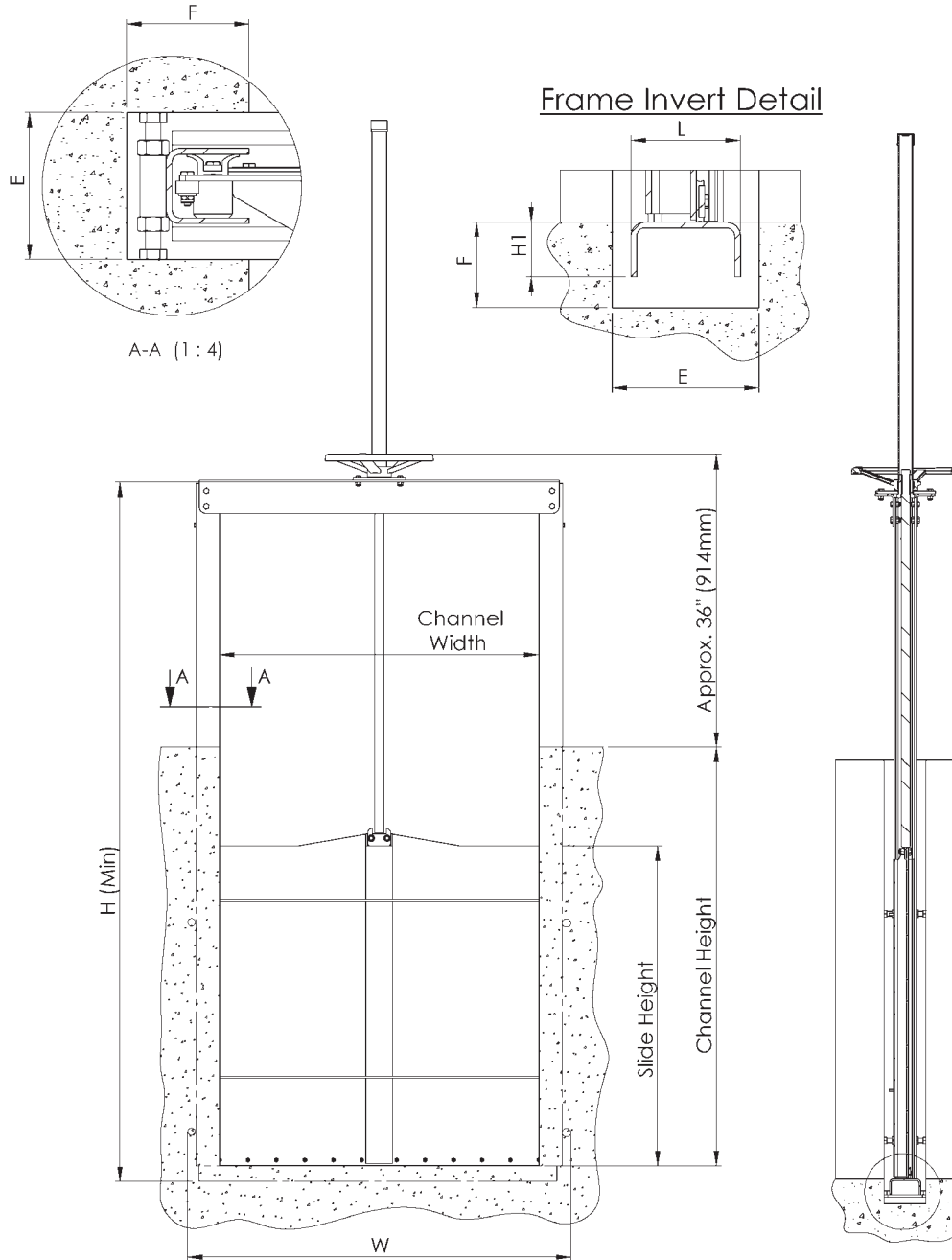
CC CHANNEL GATES



CC-EC · BI-DIRECTIONAL · RISING STEM · DIMENSIONS

The following drawings show the most common stem configurations and mounting options, as well as the respective dimensional charts.

SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)



**MODEL****CC CHANNEL GATES****CC-EC · BI-DIRECTIONAL · RISING STEM · DIMENSIONS****SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**

SIZE Channel Width	SIZE Slide Height	W	H Min	L	H1	ExF
6"	6"	13 1/16	15 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
8"	8"	15 1/16	19 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
12"	12"	19 1/16	27 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
16"	16"	23 1/16	35 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
20"	20"	27 1/16	45 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
24"	24"	31 1/16	53 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
28"	28"	35 1/16	61 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
32"	32"	39 1/16	69 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
36"	36"	43 1/16	77 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
40"	40"	47 1/16	85 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
44"	44"	51 1/16	102 1/8	4 5/16	2 9/16	9 3/16 x 4 15/16
48"	48"	55 1/16	110 1/8	4 5/16	2 9/16	9 3/16 x 4 15/16
52"	52"	59 1/16	118 1/8	4 5/16	2 9/16	9 3/16 x 4 15/16
56"	56"	63 1/16	126 1/8	4 5/16	2 9/16	9 3/16 x 4 15/16
60"	60"	67 5/8	136 1/8	5 1/2	4	9 3/16 x 4 15/16
64"	64"	71 5/8	144 7/8	5 1/2	4	9 3/16 x 4 15/16
68"	68"	75 5/8	152 7/8	5 1/2	4	9 3/16 x 4 15/16
72"	72"	79 5/8	160 7/8	5 1/2	4	9 3/16 x 4 15/16
76"	76"	83 5/8	168 7/8	5 1/2	4	9 3/16 x 4 15/16
80"	80"	87 5/8	168 7/8	5 1/2	4	9 3/16 x 4 15/16

Note: For dimensions other than above, please contact an Orbinox representative.  
 These dimensions are for information only. Do not use for installation or submittal purposes.



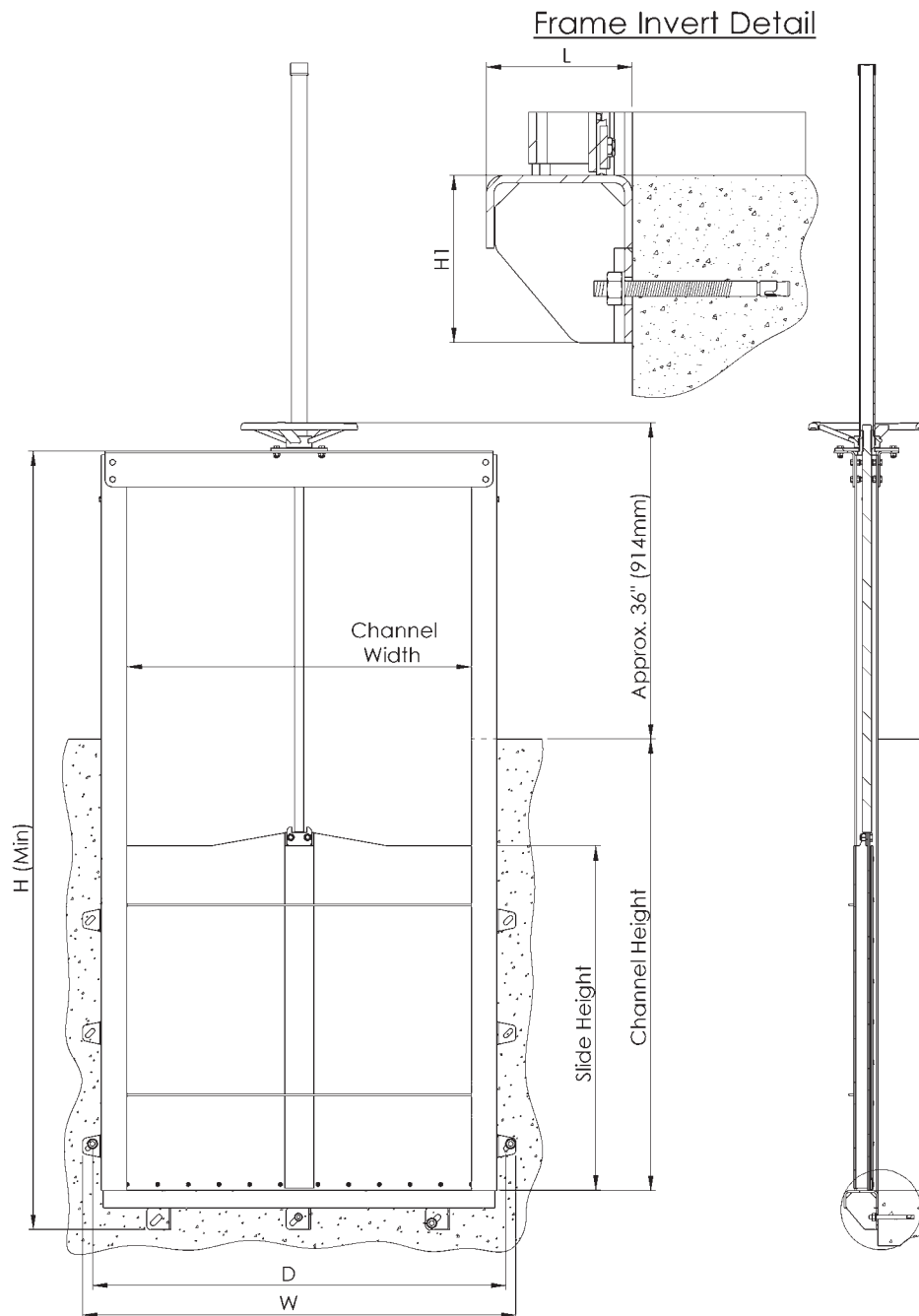
MODEL

**CC** CHANNEL GATES



**CC-WM · BI-DIRECTIONAL · RISING STEM · DIMENSIONS**

**SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**



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OBXC | 09-2011  
CC-9

**MODEL****CC CHANNEL GATES****CC-WM· BI-DIRECTIONAL · RISING STEM · DIMENSIONS****SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**

SIZE Channel Width	SIZE Slide Height	W	D	H Min	L	H1
6"	6"	15 1/4	13 5/16	15 3/4	3 9/16	4 1/16
8"	8"	17 1/4	15 5/16	19 3/4	3 9/16	4 1/16
12"	12"	21 1/4	19 5/16	27 3/4	3 9/16	4 1/16
16"	16"	25 1/4	23 5/16	35 3/4	3 9/16	4 1/16
20"	20"	29 1/4	27 5/16	45 5/16	3 9/16	4 1/16
24"	24"	33 1/4	31 5/16	53 5/16	3 9/16	4 1/16
28"	28"	37 1/4	35 5/16	61 5/16	3 9/16	4 1/16
32"	32"	41 1/4	39 5/16	69 5/16	3 9/16	4 1/16
36"	36"	45 1/4	43 5/16	77 5/16	3 9/16	4 1/16
40"	40"	49 1/4	47 5/16	85 5/16	3 9/16	4 1/16
44"	44"	53 1/4	51 5/16	102 1/8	4 5/16	4 1/8
48"	48"	57 1/4	55 5/16	110 1/8	4 5/16	4 1/8
52"	52"	61 1/4	59 5/16	118 1/8	4 5/16	4 1/8
56"	56"	65 1/4	63 5/16	126 1/8	4 5/16	4 1/8
60"	60"	69 13/16	67 7/8	136 1/8	5 1/2	6 1/4
64"	64"	73 13/16	71 7/8	144 7/8	5 1/2	6 1/4
68"	68"	77 13/16	75 7/8	152 7/8	5 1/2	6 1/4
72"	72"	81 13/16	79 7/8	160 7/8	5 1/2	6 1/4
76"	76"	85 13/16	83 7/8	168 7/8	5 1/2	6 1/4
80"	80"	89 13/16	87 7/8	168 7/8	5 1/2	6 1/4

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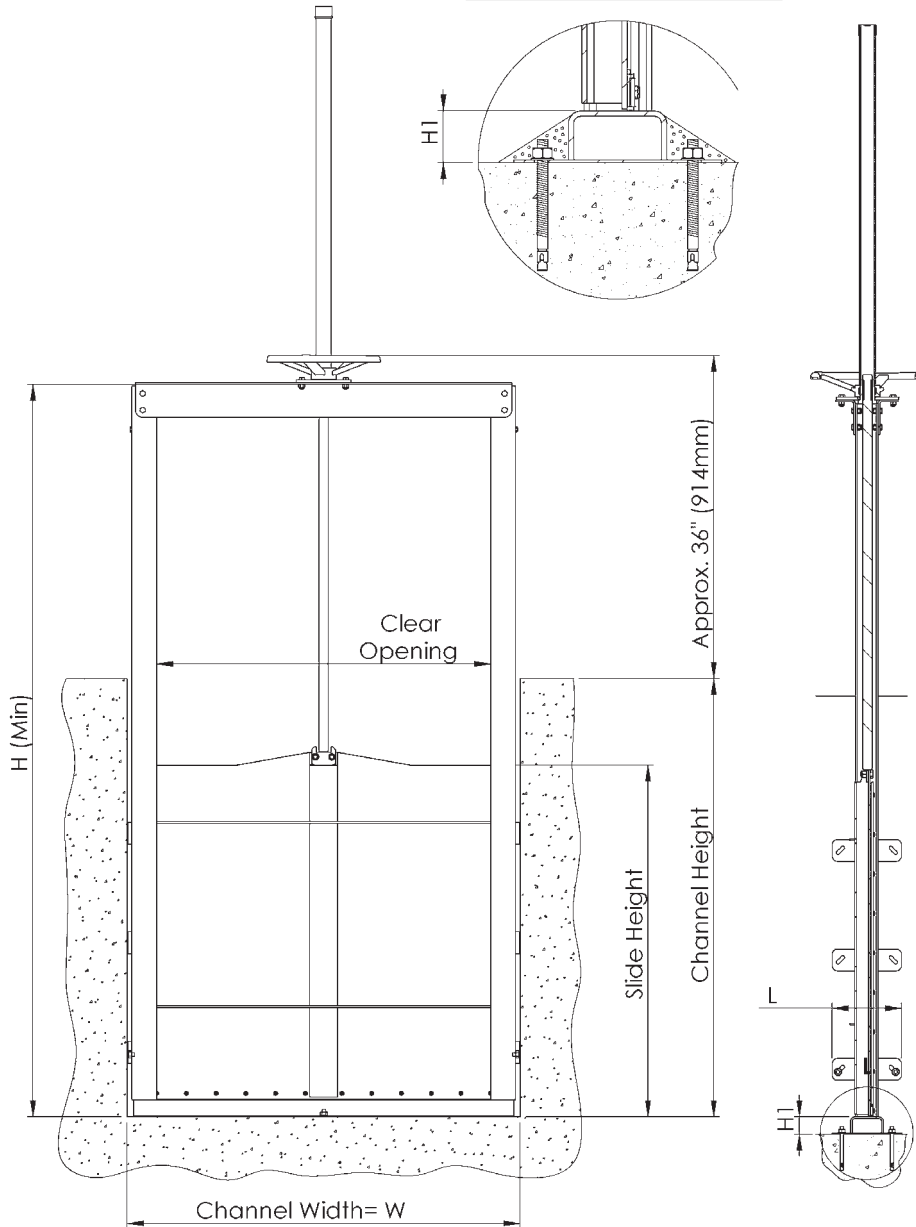
**CC** CHANNEL GATES



**CC-FM • BI-DIRECTIONAL • RISING STEM • DIMENSIONS**

**SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**

Frame Invert Detail



**MODEL****CC CHANNEL GATES****CC-FM • BI-DIRECTIONAL • RISING STEM • DIMENSIONS****SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**

SIZE Channel Width	SIZE Slide Height	W	H Min	Clear Opening	L	H1
6"	6"	6	15 3/4	5/16	7 1/2	1 15/16
8"	8"	8	19 3/4	2 5/16	7 1/2	1 15/16
12"	12"	12	27 3/4	6 5/16	7 1/2	1 15/16
16"	16"	16	35 3/4	10 5/16	7 1/2	1 15/16
20"	20"	20	45 5/16	14 5/16	7 1/2	1 15/16
24"	24"	24	53 5/16	18 5/16	7 1/2	1 15/16
28"	28"	28	61 5/16	22 5/16	7 1/2	1 15/16
32"	32"	32	69 5/16	26 5/16	7 1/2	1 15/16
36"	36"	36	77 5/16	30 5/16	7 1/2	1 15/16
40"	40"	40	85 5/16	34 5/16	7 1/2	1 15/16
44"	44"	44	94 2/16	38 5/16	7 1/2	2 1/2
48"	48"	48	102 1/8	42 5/16	7 1/2	2 1/2
52"	52"	52	110 1/8	46 5/16	7 1/2	2 1/2
56"	56"	56	118 1/8	50 5/16	7 1/2	2 1/2
60"	60"	60	126 1/8	53 11/16	8 7/8	4 1/16
64"	64"	64	136 1/8	57 11/16	8 7/8	4 1/16
68"	68"	68	144 7/8	61 11/16	8 7/8	4 1/16
72"	72"	72	152 7/8	65 11/16	8 7/8	4 1/16
76"	76"	76	160 7/8	69 11/16	8 7/8	4 1/16
80"	80"	80	168 7/8	73 11/16	8 7/8	4 1/16

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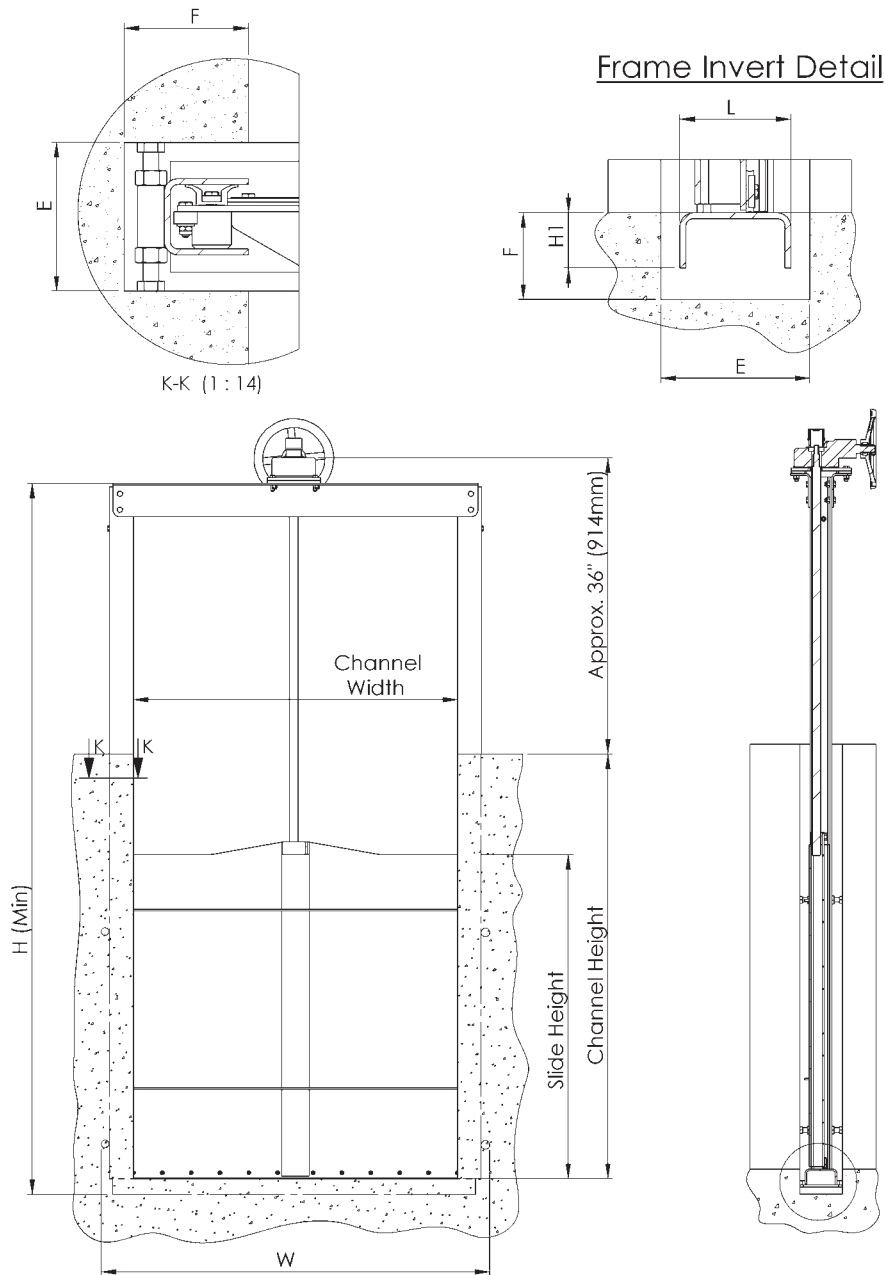
**MODEL**

**CC CHANNEL GATES**



**CC-EC · BI-DIRECTIONAL · NON RISING STEM · DIMENSIONS**

**SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**



**MODEL****CC CHANNEL GATES****CC-EC · BI-DIRECTIONAL · NON RISING STEM · DIMENSIONS****SIZES: 6" x 6" (150mm x 150mm) to 80" x 80" (2000mm x 2000mm)**

SIZE Channel Width	SIZE Slide Height	W	H Min	L	H1	ExF
6"	6"	13 1/16	15 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
8"	8"	15 1/16	19 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
12"	12"	19 1/16	27 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
16"	16"	23 1/16	35 3/4	3 9/16	1 3/4	4 3/4 x 3 15/16
20"	20"	27 1/16	45 5/16	3 9/16	1 3/4	4 3/4 x 3 15/16
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80"	80"	87 5/8	168 7/8	5 1/2	4	9 3/16 x 4 15/16

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## STANDARD SPECIFICATION

**Model CC Channel Gate 6" x 6" - 80" x 80" (150mm x 150mm - 2000mm x 2000mm)**

### GENERAL CONDITIONS

The equipment provided under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, engineering data, instructions and recommendations of the equipment manufacturer unless exceptions are noted by the engineer.

Gates and operators shall be supplied with all the necessary parts and accessories indicated on the drawings, specified or otherwise required for a complete, properly operating installation, and shall be the latest standard product of a manufacturer regularly engaged in the production of fabricated gates.

Gates supplied under this section shall be Model CC Stainless Steel Channel Gates as manufactured by ORBINOX.

**GOVERNING STANDARDS.** The gates specified in this section shall be manufactured in general accordance to AWWA C513, latest edition.

**QUALITY ASSURANCE.** The manufacturer shall have experience in the production of substantially similar equipment, and shall show evidence of satisfactory operation in at least 50 installations. The manufacturer's shop welds, welding procedures and welders shall be qualified and certified in accordance with the requirement of the latest edition of ASME, Section IX.

**SUBMITTALS.** The manufacturer shall submit for approval by the purchaser, drawings showing the principal dimensions, general construction and materials used in the gate and lift mechanism.

### PERFORMANCE

**LEAKAGE.** Channel Gates shall be substantially watertight under the design head conditions. Under the design seating head, the leakage shall be 0.05 U.S. gallon per minute per foot (0.62 l/min per meter) of seating perimeter or better. Under the design unseating head the leakage shall be 0.05 U.S. gallon per minute per foot (0.62 l/min per meter) of seating perimeter or better.

**DESIGN HEAD.** The channel gate shall be designed to withstand the design head shown in the schedule.

### PRODUCT (CHANNEL GATE)

**GENERAL DESIGN.** Gates shall be self-contained of the rising stem or non-rising stem configuration as indicated on the gate schedule. All components of the gate shall be designed to withstand the maximum head indicated on the drawings in both seating and unseating directions and the maximum output of the actuator.

**FRAME.** The gate frame shall be constructed of structural members or formed plate welded to form a rigid one-piece frame. The frame shall be suitable for mounting embedded in concrete (EC), wall mounted (WM) or face mounted in a existing channel (FM).

The frame configuration shall be of the flush-bottom type and shall allow the replacement of the seals without removing the gate frame from the concrete.

The design stress shall not exceed the lesser of 50% of the yield strength or 25% of the ultimate strength of the materials for maximum load conditions.

**SLIDE.** The slide shall consist of a flat plate reinforced with formed plates or structural members to limit its deflection to 1/360 of the gate's span under the design head. The minimum thickness of the slide shall be 1/4".

The design stress shall not exceed the lesser of 50% of the yield strength or 25% of the ultimate strength of the materials for maximum load conditions.

**GUIDES, BEARINGS AND SEALS.** The guides and bearings shall be made of UHMWPE (ultra high molecular weight polyethylene). Side seals shall be made of EPDM and the design shall be able to obtain the same leakage rate on both seating and unseating head pressure as per the schedule. The seat system shall maintain efficient sealing in any position of the slide and allow the water to flow only in the opened part of the gate, as long as the water level is below the height of the slide.

The bottom seal shall be made of resilient EPDM set onto the bottom member of the slide and shall be replaceable without removing the gate frame from the wall or channel.

## STANDARD SPECIFICATION

### OPERATORS AND STEM

**STEM AND COUPLINGS.** The operating stem shall be of stainless steel designed to transmit in compression at least 2 times the rated output of the operating manual mechanism with a 40 lbs (178 N) effort on the crank or hand wheel. The stem shall have a slenderness ratio less than 200. The threaded portion of the stem shall have machined cut threads of the Acme type or equivalent.

Where a hydraulic, pneumatic or electric operator is used, the stem design force shall not be less than 1.25 times the output thrust of the hydraulic or pneumatic cylinder with a pressure equal to the maximum working pressure of the supply, or 1.25 times the output thrust of the electric motor in the stalled condition.

As a general rule, gates having a width greater than two times their height shall be provided with two lifting mechanism connected by a tandem shaft.

**STEM COVER.** Rising stem gates shall be provided with a carbon steel or clear polycarbonate stem cover. The clear polycarbonate stem cover shall have a cap and condensation vents and a clear position indicating tape. The tape shall be field applied to the stem cover after the gate has been installed and positioned.

**LIFTING MECHANISM.** Manual operators of the types listed in the schedule shall be provided by the gate manufacturer.

All bearings and gears shall be totally enclosed in a weather tight housing. The pinion shaft of crank operated mechanisms shall be constructed of stainless steel and supported by roller or needle bearings.

Each manual operator shall be designed to operate the gate under the maximum specified seating and unseating heads by using a maximum effort of 40 lbs (178 N) on the crank or hand wheel, and shall be able to withstand, without damage, an effort of 80 lbs (356 N).

The crank shall be removable and fitted with a corrosion-resistant rotating handle. The maximum crank radius shall be 15 inches (381mm) and the maximum hand wheel diameter shall be 30 inches (750mm) unless specified.

Electric motors shall meet AWWA 542-09 Standard. Pneumatic and hydraulic actuators shall meet AWWA 541-08 Standard.

### MATERIALS

Part	Material
Frame, Gate, Seal Retainer and Yoke	Stainless Steel ASTM A-240 / Type 304L or 316L
Guides and Front Guides	Ultra High Molecular Weight Polyethylene (UHMWPE) ASTM D-4020
Side Seal and Bottom Seal	EPDM
Stem	Stainless Steel ASTM A-240 / Type 303L or 316L
Stem Nut	Bronze
Stem Protector	Polycarbonate ASTM D-3935 or Carbon Steel ASTM A-501
Hardware	ASTM F593 and F594 GR1 for 304L Frame and GR2 for 316L Frame

### SCHEDULE

#### Gate Identification

#### Size (Channel Width x Slide Height)

#### Invert Elevation

#### Operating Floor Elevation

#### Seating Head

#### Unseating Head

#### Mounting Type

- EC: Embedded in Concrete
- WM: Wall Mounted
- FM: Face Mounted in Existing Channel

#### Stem configuration

- RS: Rising Stem
- NRS: Non Rising Stem

### EXECUTION

#### INSTALLATION:

Gates and appurtenances shall be handled and installed in accordance with the manufacturer's recommendations.



**MODEL**

# CC CHANNEL GATES



## CC CHANNEL GATE SELECTION FORM

Customer: \_\_\_\_\_ Tag No.: \_\_\_\_\_ Date: \_\_\_\_\_  
 Order Number: \_\_\_\_\_ Qty.: \_\_\_\_\_

### CHANNEL GATE DESIGN (Size= Channel Width x Slide Height)

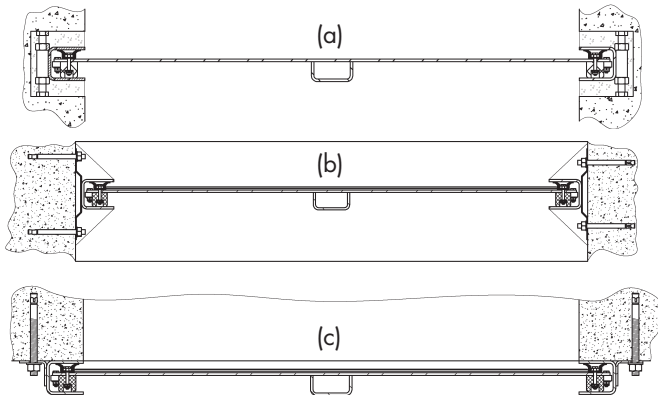
Units: mm  inch   
 Channel Width: \_\_\_\_\_ Channel Height: \_\_\_\_\_  
 Slide Height: \_\_\_\_\_ Slide Travel: \_\_\_\_\_

Seating Water Head: \_\_\_\_\_  
 Unseating Water Head: \_\_\_\_\_

- Non Rising Stem     Uni-Directional  
 Rising Stem         Bi-Directional

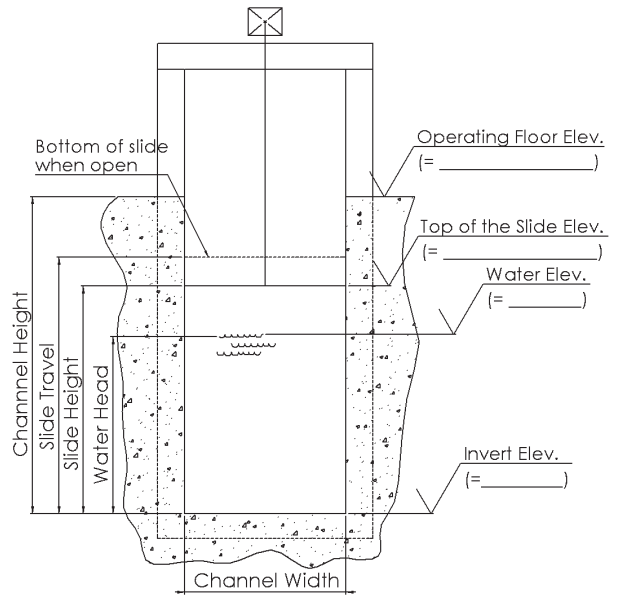
### CHANNEL GATE MOUNTING

- Embedded in Concrete (a)  
 Face Mounted In Existing Channel (b)  
 Wall Mounted (c)



### Frame Invert Mounting:

- Embedded in Concrete  
 Face Mounted In Existing Channel  
 Wall Mounted



### ACTUATORS

- Handwheel  
 Crank (w/ B.Gear and 2" Sqr. Nut)  
 2" Square Nut (NRS Only)  
 Bevel Gear  
 Electric Motor  
 Pneumatic Cylinder  
 Hydraulic Cylinder

### Position Indicator:

- (For RS Only)  
 Mylar Tape  
 Limit Switch  
 Proximity Switch

### MATERIALS

- |               |                                       |  |              |
|---------------|---------------------------------------|--|--------------|
| Frame & Slide | <input type="checkbox"/> 304L SS      | <input type="checkbox"/> 316L SS             | Other: _____ |
| Stem          | <input type="checkbox"/> 303 SS       | <input type="checkbox"/> 316 SS              | Other: _____ |
| Extension     | <input type="checkbox"/> 304L SS      | <input type="checkbox"/> 316L SS             | Other: _____ |
| Floor Stand   | <input type="checkbox"/> Carbon Steel |  | Other: _____ |
| Seal          | <input type="checkbox"/> EPDM         |  | Other: _____ |
| Stem Cover    | <input type="checkbox"/> Carbon Steel | <input type="checkbox"/> Clear Polycarbonate |              |

### REMARKS

Name: \_\_\_\_\_ Signature: \_\_\_\_\_