Part 642 – Specifications

Chapter 3 – National Standard Material Specifications

Material Specification 571—Slide Gates

A. Scope

This specification covers the quality of metal slide gates for water control.

B. Class and Type of Gate

The class of gate is expressed as an alpha numerical symbol composed of the seating head (L = Light, M = Moderate, H = Heavy, and unseating head (1,2,3). The two are separated by a hyphen with the seating head listed first. For this purpose, the unseating head must be expressed in terms of feet of water. Gates must be of the specified types as defined:

Light duty	
Type MLS-1	Cast iron with cast iron seat facings.
Type MLS-2	Fabricated metal.
Moderate duty	
Type MMS-1	Cast iron with bronze seat facings, cast iron or galvanized structural steel guides, and galvanized steel, bronze, or stainless steel fasteners.
Type MMS-2	Cast iron with bronze seat facings, cost iron or stainless steel guides, and bronze or stainless steel fasteners. Guides and fasteners are stainless steel, when specified.
Heavy duty	
Type MHS-1	Have gray cast iron slides, frames, guides, and yokes, and are fitted with bronze seat facings, bronze wedges and wedge blocks or wedge seat facings, and bronze stem blocks or thrust nuts; bronze or stainless steel fasteners; and cold rolled steel stems except where stainless steel stems are specified.
Type MHS-2	Have gray cast iron slides, frames, guides, and yokes, and are fitted with stainless steel seat facings, wedges, wedge seat facings, stems and fasteners; and austenitic cast iron stem blocks or thrust nuts.
Type MHS-3	Have austenitic gray cast iron slides, frames, guides, and yokes, and are fitted with nickel-copper alloy seat facings, wedges, wedge seat facings, stems and fasteners; and austenitic cast iron stem blocks or thrust nuts.

C. Quality of Material

(1) Material for slide gates and appurtenances must conform to the requirements of the applicable specifications listed below for the alloy, grade, type, or class of material and the condition and finish appropriate to the structural and operational requirements.

(2) Galvanizing (zinc coating) must conform to the requirements of Material Specification 582.

Material	ASTM specification
Cast iron and gray cast iron	A48 Class 30, A126 Class B
Austenitic cast iron	A436
Structural steel shapes, plates, and bars	A36
Cold rolled steel	A108
Carbon steel bars	A108 or A575
Stainless steel	A240, A276, A269, A582; Type 302, 303, 304, or 304L
Castings, nickel and nickel alloy	A494
Carbon steel sheets and strips	A1011
Zinc-coated carbon steel sheets	A653 or A924
Bronze bar, rods, and shapes	B21 or B98
Naval bronze	B21
Phosphor bronze	B103 or B139
Manganese bronze	B138 or B584
Silicon bronze	B98 or B584
Cast bronze	B584
Nickel-copper alloy plate, sheet, or strip	B127
Nickel-copper alloy rod or bar	B164
Rubber for gaskets and seals	D395, D412, D471, D572, or D2240

D. Fabricated Metal Gates (Light Duty Gates)

Fabricated metal gates must be built to withstand the seating head expressed by the gate class designation. Unless otherwise specified, the gates must be galvanized steel with flat-back frames.

E. Cast Iron Gates (Light Duty Gates)

(1) The frame must be cast iron of the specified type. The front face must be machined to receive the gate guides.

(2) The gate slide must be cast iron and be fabricated to withstand the seating and unseating heads expressed by the gate class designation as defined in section 2 of this specification.

(3) Grooves must be cast on the vertical sides of the slide to match the guide angles.
(4) The gate guides must be galvanized structural steel or stainless steel and be fabricated to withstand the total thrust of the gate slide from water pressure and wedge action under maximum operating conditions.
(5) Wedges and wedge seats must have smooth bearing surfaces. Wedges may be cast as integral parts of the slide. Removable wedges and wedge seats must be fastened to the slide, frame, or guides by means of suitable studs, screws, or bolts and be firmly locked in place after final adjustment. Each interacting set of wedge and wedge seat must be adjustable as needed to ensure accurate and effective contact. Adjusting bolts or screws must be bronze or galvanized steel.
(6) Seat facings must be machined to a smooth finish to ensure proper watertight contact.

F. Frame or Seat (Moderate and Heavy Duty Gates)

The frame must be cast iron and of the specified type. The front face must be machined to receive the gate guides, and the rear face must be machined as required to match the specified attaching means. For heavy duty gates, a dovetailed groove must be machined on the perimeter of the front face to receive the seat facing.

G. Gate Slide (Moderate and Heavy Duty Gates)

(1) The gate slide must be cast iron, rectangular in shape, and have horizontal and vertical stiffening ribs of sufficient section to withstand the seating and unseating heads expressed by the gate class designation as defined in section 2 of this specification. For heavy duty gates, a dovetailed groove must be machined on the perimeter of the slide face to receive the seat facing.
(2) Tongues must be machined on the vertical sides of the slide along its entire height to match the guide grooves and angles with a maximum clearance of 1/16 inch for gates smaller than 54 inches by 54 inches, and 1/8 inch for larger gates.
(3) A nut pocket with reinforcing ribs must be integrally cast on the vertical centerline and above the horizontal centerline of the slide. The pocket must be of a shape adequate to receive a flat-backed thrust nut or stem block and be built to withstand the opening and closing thrust of the stem.

H. Gate Guides (Moderate and Heavy Duty Gates)

(1) The gate guides must be built to withstand the total thrust of the gate slide from water pressure and wedge action. The gate guides must be cast iron for heavy duty gates.
(2) Grooves must be machine-in cast iron guides to receive the tongue on the gate slide throughout the entire length of the guide.
(3) The guides must be of adequate length to retain a minimum of one-half the height of the gate slide when the gate is fully opened.

I. Wedges and Wedge Seats (Moderate and Heavy Duty Gates)

(1) Pads for supporting wedges, wedge seats (or blocks), and wedge loops (or stirrups) must be cast as integral parts of the gate frame, slide, or guides and be accurately machined to receive those parts.
(2) Wedges and wedge seats must have smooth bearing surfaces for moderate duty gates and have machine finish bearing surfaces for heavy duty gates. Removable wedges may be cast as integral part of the slide for moderate duty gates. Wedges must be fastened to the gate slide, frame, or guides with suitable studs, screws, or bolts and be firmly locked in place after final adjustment. Each interacting set of wedge and wedge seat must be adjustable as needed to ensure accurate and effective contact.

J. Seat Facing

(1) Moderate duty gates—Seat facings must be machined to a smooth finish to ensure proper watertight contact. Bronze facings must be securely attached by welding or other approved methods.
(2) Heavy duty gates—Seat facings must be pressed or impacted into the machined dovetailed grooves on the gate slide and frame and machined to a smooth finish to ensure proper watertight contact.

K. Yoke

When a self-contained gate is specified, the yoke must be of such design as to withstand the loads resulting from normal operation of the gate. For moderate and heavy duty gates, cast iron yokes must be provided with machined pads for connecting to the ends of gate guides and to receive the stem thrust cap or handwheel lift.

L. Flush Bottom Seal (Heavy Duty Gate)

When a flush bottom sealing gate is specified, a solid, square-corner type rubber seal must be provided at the bottom of the gate opening. It must be securely attached either to the bottom of the slide or to the frame. Metal surfaces bearing on the rubber seal must be smooth and rounded as necessary to prevent cutting of the seal during gate operation.

M. Gate Stem and Lift (or Hoist)

(1) The gate stem and lift/hoist must be of the specified type, size, and capacity and, if hand operated, must be capable of moving the gate slide under normal conditions, following unseating from the wedging device, with a pull on the handwheel or crank of not more than 25 pounds with the specified seating and/or unseating head of water against the gate.
(2) Unless otherwise specified, the stem must be carbon steel and be furnished in sections as necessary to permit reasonable ease in installation. Couplings must be bolted, pinned, or keyed to the stem. The stem must be furnished with rolled or machine-cut 29 degree Acme threads of sufficient length to completely open the gate. The threads must be smooth and of uniform lead and cross-section, such that the nut can travel the full length without binding or excessive friction. For moderate and heavy duty gates, the stem must be threaded for connection to the stem block or thrust nut on the gate slide.
(3) The lift must be compatible with the type of stem furnished. Unless otherwise specified, the lift nut must be cast bronze for light and moderate duty gates and cast manganese bronze for heavy duty gates and be fitted with ball or roller thrust bearings designed to withstand the normal thrust developed during opening and closing of the gate at the maximum operating heads. All gears, sprockets, and pinions must be machine-cut, with ratios and strength adequate to withstand expected operating loads. Sufficient grease fittings must be provided to allow lubrication of all moving parts. An arrow and the word "open" must be cast on the rim of the handwheel or on the lift housing to indicate the direction of gate opening. Unless otherwise specified, the lift for the nonrising-stem gate must be provided with an indicator capable of showing both when the gate is fully open and when it is fully closed for the moderate and heavy duty gates.
(4) Provisions must be made to prevent stem rotation within the stem block or thrust nut or at the connection of the gate slide.
(5) Stop collars must be provided to prevent overtravel in opening and closing the gate.

N. Stem Guides

Unless otherwise specified, stem guides must be cast iron for light duty gates and cast iron with bronze bushed collars for moderate and heavy duty gates. They must be fully adjustable in two directions.

O. Wall Thimble (Moderate and Heavy Duty Gates)

(1) When a wall thimble is specified, it must be of the same cast iron used in the gate frame and of the section, type, and depth specified. The front flange must be machined to match the gate frame and drilled and tapped to accurately receive the gate attachment studs.
(2) Gaskets or mastic to be installed between the thimble and the gate frame must conform to the recommendations of the gate manufacturer and be furnished with the thimble.

P. Fasteners

Unless otherwise specified, all anchor bolts and other fasteners must be galvanized steel or bronze for light duty gates; galvanized steel or stainless steel or bronze for moderate duty gates; and, of the quality and size as recommended by the gate manufacturer for heavy duty gates. All anchor bolts, assembly bolts, screws, nuts, and other fasteners must be of ample section to withstand the forces created by operation of the gate while subjected to the specified seating and unseating heads. Anchor bolts must be furnished with two nuts to facilitate installation.

Q. Installation Instructions

Before installation, provide the engineer with the manufacturer's complete installation data, instructions for adjustments, and drawings or templates showing the location of all anchor bolts for each gate.

R. Painting

When specified, gates and accessories must be painted by the designated paint system.

S. Certification

The supporting data submitted to the engineer must include the name of the manufacturer, the manufacturer's model number (for standard catalogue items), or the seating and unseating heads for which the gate is designed together with such drawings and specifications as may be necessary to show that the gate conforms to the requirements of this specification.