

FUNCTIONAL STANDARDS

These standards were developed by the staff of Division 2 of the Division of Water Resources to better define what is acceptable to the Division when installing structures and devices deemed necessary for the proper administration of the water resources within the Division pursuant to C.R.S. 37-84-112.

C.R.S. 37-84-112

Headgates - specifications - failure to maintain - penalty.

(1) The owners of any irrigation ditch, canal, flume, or reservoir in this state, taking water from any stream, shall erect where necessary and maintain in good repair, at the point of intake of such ditch, canal, flume, or reservoir, a suitable and proper headgate of height and strength and with embankments sufficient to control the water at all ordinary stages and suitable and proper measuring flumes, weirs, and devices and shall also erect and maintain in good repair suitable wastegates where necessary in connection with such ditch, canal, flume, or reservoir intake. The framework of such headgate shall be constructed of timber not less than four inches square, and the bottom, sides, and gate shall be of plank not less than two inches in thickness, or said gate may be made of other material of equal strength and durability or may be made and constructed upon plans and specifications approved by the state engineer. No such headgate shall be deemed complete until provided with suitable locks and fastenings (except when the division engineer deems such locks and fastenings unnecessary therefore) and keys therefore are delivered to the division engineer of the division who has control thereof during the seasons of the distribution of water.

(2) If the owners of any such irrigation ditch, canal, flume, or reservoir fail or neglect to erect or maintain in good repair said headgate, measuring flume, weir, or devices, in the manner and form provided in this section, then the state engineer or division engineer, upon ten days' previous notice in writing, duly served upon such owners, or upon any agent or employee representing them or controlling such ditch, canal, flume, or reservoir, shall refuse to deliver any water from such stream to such owners, or to such ditch, canal, flume, or reservoir, until such owners erect or repair the headgate, measuring flume, weirs, or devices of such ditch, canal, flume, or reservoir. The owners of all such ditches, canals, flumes, or reservoirs shall be liable for all damages resulting from their neglect or refusal to comply with the provisions of sections 37-84-112 to 37-84-117. Such owners who divert water from any such stream and into any such ditch, canal, flume, or reservoir contrary to the orders of the state engineer or division engineer are guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not more than five hundred dollars, and each day of violation shall be deemed a separate offense.

ORDINARY STAGES

For the purposes of 37-84-112, "ordinary stages" shall mean any stage of flow where a condition exists that downstream water rights are short of their entitlement and are calling for water and there exists a reasonable expectation that curtailment of a junior right will result in a material increase in supply to a calling senior right. Ordinary stages specifically include, but are not limited to, all stages of spring runoff and large precipitation/runoff events.

HEADGATE

For the purposes of 37-84-112, a controllable, lockable headgate shall be defined as any permanently installed combination of headgate, embankments, diversion dam, spillway, waste gate or sluice system or any other means that positively prevents ANY diversion of water, intentional or otherwise, when not in priority; and which allows the Water Commissioner to accurately adjust the flow of water with reasonable effort and within a reasonable amount of time and to secure the structure at the adjusted condition so as to prevent any unauthorized adjustment.

DWR typical is a Waterman Industries SR slide gate or Waterman C-10 canal gate installed in a concrete headwall which has sufficient freeboard to prevent overtopping into the ditch and which incorporates a lowered spillway section upstream of the headwall sized to waste all excess water back to the stream. (See DWR drawing "Typical Headgate/Flume Installation")

MEASUREMENT DEVICE

Water measurement device shall mean any flow measurement device which can be demonstrated to accurately measure flows within $\pm 5\%$ of the standard rating (or an empirically created custom rating) for the device throughout the full range of anticipated flows. This device must be co-located with the control structure to enable the water commissioner to promptly judge headgate adjustments, must be properly

installed to engineering specifications to insure proper measurement, must be maintained in condition to provide accurate measurement throughout full anticipated range of flows and shall not be deemed complete until such time that a rating table accurately calibrated to the measuring device has been made available to the water commissioner. Any measurement device that is not installed to manufacturer's specifications may be required to be verified at owner/operator expense.

DWR typical is the Parshall, Cutthroat, or Montana flume properly installed in a free-flow condition with sufficient upstream stilling basin to provide proper approach flow conditions, sufficient elevation to ensure hydraulic "jump" to prevent submergence at all anticipated stages. (See DWR drawing "Typical Headgate/Flume Installation")

RECORDING DEVICE

Recording device shall mean any device acceptable to the Water Commissioner and/or the Division Engineer which is minimally capable of continuous recording of stage data at a resolution of .01 foot or other equivalent positive determinant of discharge at a resolution of comparable accuracy through an approved measurement device at no greater than 15-minute intervals over a period of time also acceptable to the Water Commissioner. The recording device must include a means to verify on-site that the device is properly calibrated to the gage height or other discharge determinant. Such recording device shall not be deemed to be complete and acceptable until all equipment and software necessary to download and process recorded data is supplied to the Water Commissioner and/or the Division Engineer. See "Division Two, Administration Protocol, Data Logger Criteria" for a more complete explanation of minimal standards.

DWR typical is the Sutron Data Logging Shaft Encoder or equivalent properly installed in a lockable protective shelter.

Note: DWR may **require** replacement of existing chart-type recorders with data-logging technology as needed to control workload.

PROTECTIVE SHELTER

The protective structure size and exact requirements can vary. The structure should be acceptable to the Water Commissioner and/or Division Engineer. Future needs of the recording device should be thought through to ensure the shelter can accommodate all future equipment needs. (See DWR Drawings "Typical Gage House", "Typical Half Shelter" and "Typical Stilling Well *").

*When installing the inlet pipe from the measuring device to the stilling well, consider increasing the inlet size to avoid plugging/clogging

TELEMETRY

Telemetry shall mean any method of determining and transmitting discharge or streamflows on a real-time or near real-time basis (only as limited by technology) by satellite monitoring, dedicated land or cellular phone or any other means of communication that is accessible by DWR and the public at large. Such telemetry must include a means to transmit stage and discharge, plus other parameters as required and shall not be deemed complete until a suitable calibration of the telemetry and measurement method is accepted by the Division Engineer.

AUTOMATIC SELF-REGULATING DIVERSION CONTROL

The purpose of such controls is to regulate fluctuations to the rate of diversion that would otherwise occur as a result of changes in head pressure associated with variable rates of streamflow or obstructions to streamflow. An acceptable automatic self-regulating diversion control shall mean any system of flow rate sensors, connected to headgate and/or wastegate controls capable of autonomously re-regulating fluctuations in rate of diversion of up to 10% of the desired rate within a period of no more than 15 minutes.