

Article 290–Below Grade Well Head Discharge

Adopted by the CGA Board of Directors on October 12, 1996

BACKGROUND

The vast majority of California wells are constructed such that pump and piping systems discharge above ground. There are both practical considerations, including ease of installation and maintenance, and sanitary reasons for this general practice. Where below grade discharge is necessary, two general construction methods are employed; well vaults (pits) and pitless adapters. DWR Bulletin 74-90 discourages the use of vaults "because of their susceptibility to the entrance of poor-quality water, contaminants, and pollutants". Pitless adapters are recommended instead. In specifically recommending one of these construction methods over the other, Bulletin 74-90 fails to acknowledge that, if properly constructed, well vaults can provide an equally safe and viable solution to below grade discharge; and that, if not properly installed, pitless adapters also present a potential for contamination.

In addressing well vaults, DWR imposes certain requirements that are impractical or even impossible to accomplish. These include requiring bonding the vault to the annular seal material (concrete or bentonite) while it is still 'wet'; and cementing between the excavation and the vault walls. At the same time, other construction methods that would improve, or in many cases even guarantee the prevention of contamination are omitted. Drainage around the top of the vault, drainage within the vault, height of casing above the vault floor, and sound venting are not adequately addressed.

Concerning the use of pitless adapters, certain sanitation and practical considerations are not addressed within Bulletin 74-90. Among these are surface construction, sealing capabilities, durability, and structural integrity.

DISCUSSION

CGA recommends both well vaults and pitless adapters should be avoided wherever possible and advocates the advantages of above ground discharge generally. However, some situations or conditions require the use of sub-surface discharge. These include assuring freeze protection; protecting against vandalism; where well head is near or in roads, driveways, and parking lots; and where well heads are near or on playing field.

There are several construction considerations common to all well heads, whether termination is above or below ground; and regardless of whether vaults or pitless adapters are employed. Primary among these is insuring there is no conduit for surface contamination. Too often in installations involving below ground discharge, requirements are slighted and sanitation is compromised. In spite of listed requirements, perhaps even because of the confusion and/or difficulties in interpretation and compliance with some stricter aspects, actual inspection and enforcement policies by local agencies may allow sub-standard installation. This can compound the problem of entrance of contaminants and, in the case of vaults, further preclude their use.

Additional considerations include ease of installation and maintenance. There must be access to the well head for repair of pumping equipment. Sanitary access should also be available for sounding, sampling, and disinfection procedures.

Whether a vault or a pitless adapter provides the best solution for a particular sub-surface discharge installation depends on specific job and site conditions. CGA does not categorically recommend one method over the other.

RECOMMENDATIONS

Well Vaults

1. Where a vault is used it should be structurally sound and should prevent surface water from entering the well. It should extend from the top of the annular seal to above grade. Adequate drainage away from the top of the vault should be maintained in all directions.

2. The vault should be placed into a concrete base a minimum of 4 inches thick and should be positioned before the concrete has set. The base should be free of cracks or voids and must provide a structurally sound and watertight connection to the annular seal. If practical to do so, a superior contact will be made if the base is poured into the annular sealing material before it has fully set (when cement based sealing material is used) or fully hydrated (when bentonite based sealing material is used). Otherwise, measures should be taken to insure a watertight bond between the base and the annular seal through the use of binding materials and compounds.

Gravel, rock, or soil bottoms are unacceptable and should never be used.

3. A proper drain should be installed in the base. The drain size should be decided by the size of the vault, capacity of the pump in the well, and the maximum volume of any water that could runoff into the vault. The minimum size of the drain pipe should be 2" I.D. The drain pipe should terminate at daylight and should be fitted

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with a protective screen. If it is not possible to exit at daylight, then in lieu of a drain a completely watertight seal may be provided. If neither of these options is available then a vault should not be used.

4. The vault cover or lid should be weather protected. The vault and its lid should be strong enough to support vehicular traffic if such traffic could occur and should have appropriate load rating for the job conditions. The lid or cover should be clearly and permanently labeled "WATER WELL."

5. Venting of gases should be provided, either through the lid or through an auxiliary vent pipe. Openings or conduits for venting should terminate above flood plain or anticipated water levels. Vent should be topped with a screened, close return bend. *Exception: venting should not be provided for vacuum designed wells.*

6. The top of the well casing contained within the vault shall be covered according to requirements under Section 10, Subsection A of DWR Bulletin 74-90. The casing top should terminate a minimum of 6" above the concrete floor.

7. The vault should be large enough to provide safe working space for the particular installation and should allow sufficient space for approved electrical splices.

8. The space between the outer walls of the vault and the excavation into which it is placed may be filled with natural soil. Where immediate vehicular traffic is anticipated, the soil should be compacted.

Pitless Adapters

1. Surface construction may be either above or below grade. The top of the casing shall be equipped with a watertight seal with removable access ports into the well for purposes of sounding and disinfection.

2. Access for venting of gases should be provided. Openings or conduits for venting should terminate above flood plain or anticipated water levels. Vent should be topped with a screened, close return bend. *Exception: venting should not be provided for vacuum designed wells.*

3. If top of casing terminates below grade it shall either be covered by a poured concrete monument (adequately marked) or by a locatable sub-surface marker.

4. A watertight seal shall be provided where discharge piping exits from casing wall. The seal shall be capable of withstanding (with safety factor) maximum system pressure, including surge. If applicable, a watertight seal shall also be provided where electrical wire exits from casing wall.

5. When installation causes the annular seal to be breached new concrete should be poured around the pitless discharge.

6. The pitless adapter or unit shall be properly rated for all down hole piping and equipment weight. Water weight should be included in wells with low static water level.

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