CONCRETE STORAGE TANK COVER SLOPE AND PONDING

Rule Affected: Title 30 Texas Administrative Code (30 TAC) §290.43(c)

Background

The first rule in 30 TAC Administrative Code revision to stipulate that storage tank covers must be sloped to prevent the collection of water was published in 1967. In 1988, the rules were revised to require tanks be designed and erected so no roof water ponding occurs at any point, and no area of the storage tank roof a slope of less than 0.75 inches per foot.

The purpose of the sloped roof requirement is to efficiently shed water from the roof and protect the concrete structure from unintended loads caused by water ponding. To minimize the potential for roof damage that may result from these unintended roof loads over time, we have prepared this guidance document to ensure that the public water system is able to maintain performance of the concrete tank roof.

This guidance document does not apply to domed roofs. If a domed roof complies with the minimum design and construction requirements specified in an American Water Works Association (AWWA) Standard, such as American National Standards Institute (ANSI)/AWWA Standard D110 or D115, the tank has been designed to shed water. If it cannot be verified that the dome was constructed in accordance with an AWWA Standard, it is recommended that the PWS evaluate (or have the PWS consulting engineer evaluate) the tank geometry to determine approximate percentage of roof slope that meets the minimum (0.75)-inch per foot slope requirement. If the domed tank roof complies with either an AWWA Standard or at least 95% of the roof slope meets the (0.75)-inch per foot slope requirement, the exception with no conditions may be granted. If more than 5% of the domed roof (of a non-AWWA Standard tank) fails to meet the (0.75)-inch per foot slope requirement, consult with a senior PTRs staff member on the best way to proceed.

Plan Review Guidance

If the submittal indicates that a roof of the concrete tank has a dome shaped roof, is designed as per the most current AWWA Standard (AWWA D110 or D115), and specifies the rise-to-span ratios in accordance with these standards, an exception to the roof slope requirement is not required for that the *tank.*

Exception Guidance

For non-domed tanks that fail to meet the minimum roof slope requirement, the PWS must submit a condition assessment of their Ground storage tank (GST) to Technical Review and Oversight Team (TROT) for review. If the condition assessment of the GST does not support approval of a long-term exception request, a temporary exception may be considered to provide the PWS time to design and construct modifications to the existing tank. If the GST is found to be in good condition, an exception can be granted

for metal tank covers with a roof slope less than the minimum slope of 0.75 inches per foot but greater than 0.25 inches per foot with the following conditions:

1. Within 12 hours following each rain event, if the rain event is greater than ¼ inches, the PWS staff must inspect the roof to ensure no water ponding has occurred. If ponding has occurred, corrective action must be initiated by the water system operator to remove the excess water from the roof. A record of monitoring and of completed corrective actions following rain events must be kept on file for at least two years and made available for review by TCEQ staff upon request.
2. The PWS must conduct visual inspections of the GST for surface cracks on at least an annual basis. These inspection records must be kept on file for at least two years and made available for review by TCEQ staff upon request.
3. Surface cracks greater than 1/32-inch in width shall be repaired with a high-pressure epoxy injection grouting system. Any acceptable method of repair must be compliant with *AWWA D110 Section 5.14* (see also *American Concrete Institute [ACI] 350R—Environmental Engineering Concrete Structures)*. The surface of the crack shall then be finished flush with the adjacent surfaces and should not have indentations. The repair work shall be guaranteed by the repair contractor against failure of the epoxy bond in the repair areas for a minimum period of one year. A record of any repair activities must be retained for a period of at least two years in accordance with 30 TAC §290.46(f)(3)(A)(vi) and must be made available for review by TCEQ staff upon request.
4. In small areas of honeycombed or spalled concrete (pits), the repair of the defect must include the application of non-shrink aggregate grout bonded to the concrete with an epoxy bonding agent. The minimum material strength used in the repair shall equal or exceed that specified for the concrete. The surface of the pit shall then be finished flush with the adjacent surfaces and shall show no indentations. The repair work shall be guaranteed by the repair contractor against failure of the epoxy bond in the repair areas for a minimum period of one year. A record of any repair activities must be retained for a period of at least two years in accordance with 30 TAC §290.46(f)(3)(A)(vi) and must be made available for review by TCEQ staff upon request.

Failure to meet any of these conditions will require the TCEQ to reevaluate the approved exception with the possibility of revocation of the exception.

If the slope of the tank is less than 0.25-inch per foot, the exception should be denied.

Finalized and Approved by:

5/7/18

Joel Klumpp, Plan and Technical Review Section Manager, 05/07/2018

If no formal expiration date has been established for this staff guidance, it will remain in effect until superseded or canceled.

Revision History

Date	**Action**	**Action by**
2009	Approved	Elston Johnson
09/23/2013	Approved	Ada Lichaa
07/27/2016	Approved	Joel Klumpp
10/12/2017	Revised	David Williams
02/19/2018	Revised	Yadhira Resendez
05/07/2018	Approved	Joel Klumpp