

Quad O – EPA 40 Code Federal Regulations, Part 60, Subpart OOOO

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The focus of this paper is the impact of Quad O on Storage Tanks, and how Tank Safety Equipment can play an important role in reducing tank emissions.

What is Quad O?

“Quad O” is an abbreviation for EPA 40 Code of Federal Regulations, Part 60, Subpart OOOO. The EPA has developed new emissions standards defining what processes and equipment are affected, and by when. Emissions of volatile organic compounds (VOC’s) contribute to the formation of ground-level ozone, or smog. And exposure to ozone is linked to a wide range of health effects. “Fracking” (the hydraulic fracturing of shale rocks to release natural gas) set the stage for the EPA to re-examine emissions standards. The final Quad O regulation was issued on August 16, 2012, after a proposal stage and review stage.

Which Industry Does it Impact?

Quad O applies to all onshore oil & gas facilities constructed, modified, or re-constructed after August 23, 2011.

What are the Affected Facilities?

The affected facilities include:

- Storage vessels (tanks)
- Hydraulically fractured well completions
- Continuous bleed pneumatic controllers
- Reciprocating and centrifugal compressors
- Equipment leak detection and repair
- SO₂ sweetening units
- Glycol dehydrators

For each of these, the EPA has quantified the necessary emissions reductions.

What are the Compliance Deadlines?

To allow producers time to implement adjustments, the EPA assigned a compliance deadline for the affected facilities:

2012	2013	2014	2015
October 15	October 15	April 15	After January 1
Pneumatic controllers at gas plants must be no-bleed	Pneumatic controllers at production facilities	Group 2 storage tanks	Well completions must use REC's
Compressors			April 15
LDAR Program			Group 1 storage tanks
Sweetening units			
Well completions use flaring or REC's			October 15
Small glycol dehydrators			Existing small glycol dehydrators

As you can see, the majority of the deadlines have passed. However, as of this writing, the deadlines of 2015 still remain. Here is an explanation of what is required for compliance, for each of the affected facilities.

- Storage vessels (tanks)

Tanks that emit more than 6 tons of VOC's (volatile organic compounds) per year are considered affected facilities. Per Quad O, emissions need to be reduced by 95%. Emission control devices such as closed vent systems, enclosed combustion devices, and vapor recovery units are outlined in the regulation.

Compliance dates have been staged by “Group 1” and “Group 2” tanks. Group 2 tanks are those that were commissioned after April 12, 2013. The deadline for compliance was April 15, 2014. **Group 1 tanks are those commissioned between August 23, 2011 and April 12, 2013. The deadline for these is April 15, 2015.**

- Hydraulically fractured well completions

Well Completions is broken into a two-phase process that began for wells drilled or modified after August 23, 2011. Phase 1 is for those wells completed before January 1, 2015. Emissions are to be reduced by either flaring devices or through reduced emission completions (REC’s) to either burn or capture natural gas. Phase 2 applies to those wells completed after January 1, 2015. For these, emissions need to be reduced by using REC’s and by capturing natural gas during the flowback period.

- Continuous bleed pneumatic controllers

Pneumatic controllers bleed pressurized gas to the atmosphere to maintain process variables. Most well sites produce natural gas to power pneumatic controllers.

This application is separated into Production Facilities and Gas Plant Facilities. For Production Facilities, the natural gas bleed limit was set at 6 scfh (standard cubic feet per hour). The rule set for Gas Plant Facilities was that these cannot bleed natural gas. Compliance deadlines for both of these have passed.

- Reciprocating and centrifugal compressors

Compressors are used to move natural gas at gathering and boosting stations and processing plants up to the point that gas enters the transmission pipeline.

Centrifugal compressors must reduce emissions by 95% through flaring or by routing gas captured back to the compressor suction or fuel system. Reciprocating compressors require the periodic replacement of rod packing. These compliance deadlines were in 2012.

- Equipment leak detection and repair

The threshold for leakage on equipment is 500 ppm (parts per million). This leak detection and repair (LDAR) program's deadline was also in 2012.

- SO₂ sweetening units

Sweetening units must reduce emissions by up to 99.9%, depending upon the size of the unit and the rate of sulfur production. This compliance deadline was also in 2012.

- Glycol dehydrators

These are systems that remove water from natural gas. Small glycol dehydrators processing less than 85,000 m³/day must meet a specific limit of benzene, ethylbenzene, toluene, and xylene. Small glycol dehydrators installed prior to August 23, 2011 are considered "existing" and have an effective date of October 15, 2015.

How are Quad O and Tank Safety Equipment Related?

- Tight Valves = Less Emissions

Storage tanks require protection against high pressure, as pressures will rise during the normal course of operation, due to filling of the tank and increases in temperature. The most common venting solution is a PVRV, or pressure vacuum relief vent. Once its pressure set point is reached, vapors will be exhausted. The objective is to exhaust the minimum amount of vapor necessary to maintain proper tank pressure. This will control emissions and will also conserve the product stored in the tank. Gauges hatches may also be used for this purpose in smaller tanks. Tighter sealing PVRV's and hatches mean less emissions.

Tanks also require protection against an "upset pressure" or "emergency" condition that causes pressure to rise quickly to high levels. An emergency vent is the typical solution to protect against such a scenario. With its large opening, an emergency vent is capable of relieving such abnormally high pressures. An emergency vent should also seal tightly closed when pressures are within a normal operating range. If it does not, then the potential for emissions is great due to its large circumference.

- Facilitation of Vapor Control System

PVRV's also provide a pipe connection to send tank vapors to a vapor control system when this is the required application. In this case, a tighter sealing PVRV means a more efficient vapor control system. Although vapors will be controlled in the system, limiting the amount of vapors means less energy spent in controlling them.

Once a vapor control system is deemed necessary, flame and detonation arrestors also come into play to protect the system from a flame travelling back into a tank or series of tanks. A flame arrestor is positioned in the piping, in between the tank(s) and the vapor control system. The arrestor contains a large flame element that absorbs the heat from any flame that is moving toward the tank(s). This safety protection is very important, and when the system is functioning normally, the arrestor should not restrict vapor flow. Therefore, flame and detonation arrestors with less pressure drop are preferred, all other things being equal.

In Conclusion

The 2015 Quad O compliance deadlines are eminent. Of these, the April 15, 2015 deadline pertaining to "Group 1" tanks may affect the most oil & gas facilities.

Tanks that emit more than 6 tons of VOC's (volatile organic compounds) per year are considered affected facilities. Per Quad O, emissions need to be reduced by 95%. Emission control devices such as closed vent systems, enclosed combustion devices, and vapor recovery units are outlined in the regulation. In addition to these, Tank Safety Equipment can help in the reduction of VOC's. Tighter sealing pressure valves and gauges translate to lower emissions. When vapor control systems are used, Tank Safety Equipment plays an important role in providing the delivery of vapors to the system, limiting the amount of vapor release, and in protecting it through the use of arrestors.