

Incident Summary #II-1110240-2020 (#19900) (FINAL)

SUPPORTING INFORMATION	Incident Date	November 19, 2020	
	Location	Peace River Region	
	Regulated industry sector	Boilers, PV & refrigeration - Boiler and pressure vessel system	
	Impact	Qty injuries	0
		Injury description	Not Applicable
		Injury rating	None
	Damage	Damage description	Fire at flange connection of pressure vessel causing damage to a spiral wound gasket.
		Damage rating	Minor
	Incident rating	Minor	
Incident overview	Early morning on a remote gas facility an operator identified flames coming from the top flange connection of a pressure vessel. Fire was confirmed and the Emergency Response Plan(ERP) was activated, the location was secured, and the fire was extinguished.		
INVESTIGATION CONCLUSIONS	Site, system and components	A gas facility is a system of vessels, piping, valves, tanks and other equipment used to gather, pump, compress, process, measure, store or dispose of petroleum, natural gas, water or other substance(s). At this facility a desiccant tower(s) also known as a dehydrator is a vertical pressure vessel which utilizes a zeolite to absorb water from natural gas. Zeolites are minerals commonly used as commercial absorbents. The process of removing water vapor starts when the natural gas is supplied to the dehydrator through a flange connection at the top of the desiccant tower. An inlet deflector at this flange connection aids in dispersing the natural gas evenly throughout the zeolite. As the natural gas is drawn through the zeolite the zeolite becomes saturated with water vapor. At this point the saturated zeolite can no longer remove water vapor and requires a regeneration cycle to remove the water from the zeolite. To regenerate the zeolite the dehydrators internal temperature is raised from approximately 30°C to 265°C. This increase in temperature evaporates the water trapped in the zeolite completing the regeneration cycle. The desiccant tower then returns to approximately 30°C and the cycle repeats itself as natural gas is reintroduced to the zeolite.	
	Failure scenario(s)	In 2019, at the failed flange connection, the deflector was replaced and new deflector that did not fit properly was installed. To accommodate the new deflector a spiral wound gasket without inner ring was used. The bolts at this flange connection were torqued however the bolts were not re-torqued after thermal cycling. Over a period of time fluctuations in temperature compressed the gasket, reducing the tension load on the bolts holding the flange faces tight against the gasket allowing natural gas to escape this flange connection.	
	Facts and evidence	<ul style="list-style-type: none"> Owner reported that a new deflector was installed at the flange location that did not fit properly. Owner reported that this flange connection was not re-torqued after thermal cycling. Owner reported that a spiral wound gasket without inner ring was used when a spiral wound gasket with inner ring should be used. 	
	Causes and contributing factors	It is likely that no bolt re-torque after thermal cycling and incorrect gasket type led to the release of natural gas resulting in a fire from an unknown ignition source.	



Image# 1 Top flange connection of the desiccant tower on fire.



Image# 2 Desiccant Towers.

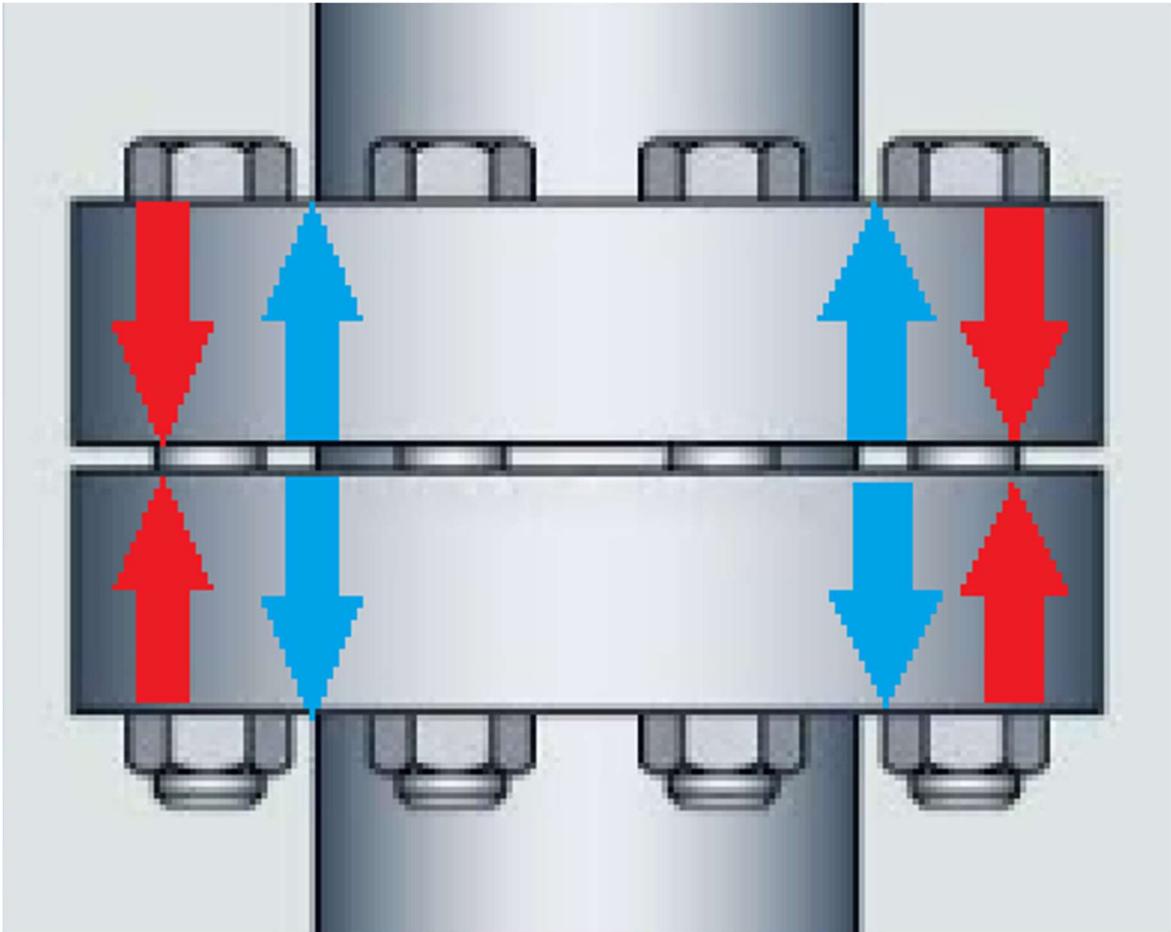


Image# 3 New spiral wound gasket with inner ring.

Style CGI – Flexible Graphite Filler (SEL). 2021, April 20. Flexitallic.com
https://flexitallic.com/ca/shop/?_product-type_cat=spiral-wound-gasket



Image# 4 The damaged spiral wound gasket without inner ring.



Image# 5 Thermal Cycling on a flange. Heat adds compression load and Cold reduces compression load.