METHANE FROM FLARING TOOLKIT

Environmental Impacts: Flare Tip Integrity Inspection # Drone deployed

Do I understand the impacts of the environment on my flare? > Environmental Impacts: Flare Tip Integrity Inspection # Drone deployed

Regular inspection of flare tips (or burners) is recommended to ensure their safe and efficient operation and can be a regulatory requirement in some locations.

Inspection can be used to check the mechanical integrity of the flare tip and its associated ancillaries like flare pilots and ignition system. Flare inspection can also be used to check the functionality of the flare tip, pilots and ignition system. Flares can be inspected when they are in operation and also when they are shutdown. Inspections can be performed manually or remotely with the use of drones, helicopters or cameras.

How it Works – Remote Inspection

Remote inspections can be completed with the flare in or out of operation. Visual inspections can be carried out from a safe distance using a telescope or cameras with zoom. Visual inspections can also be carried out using drones with cameras or from helicopters equipped with cameras. Thermal imaging cameras can be used to detect hot spots and leaks.

Inspection Guidance

Some suggested areas for inspection are;

- Main Flare Tip(s)/Burners
  - Inspect tip for damage, bulging, deformation, corrosion, cracking, etc.
  - Observe condition of welds in tip body and any branch connections
  - Check burner to main riser flange and connecting bolts
  - If flare operational, check for flame burnback into fare tip.
  - Check to damage to wind shrouds, flame stabilisers
  - Look for signs of liquid carry over around burners
- Flare Pilots
  - Assess for mechanical condition of pilot burners (cracks, heat staining, distortion, etc.)
  - Check for correct positioning of pilot burners around main flare tip.
  - Check status of flare ignition equipment (spark plug, ignition rods)
  - Check status of flame detection equipment (ignition rod, thermocouples)
  - Check status of air inspirators
  - Check gas manifolds for distortion, missing bolts, missing brackets
  - Check status of electrical junction boxes, wiring conduits and connections.
  - If in service, check that pilots are lit with thermal camera.
- Flare Ancillaries
  - Check functionality of flare ignition system (electrical, ballistic or flame front generator)
  - Check functionality of pilot flare detection system (thermocouple, ionisation, etc.)
  - Check functionality of flare gas meters.
  - Check functionality of flare staging system.
  - Check flare purge meters and purge rate and adjust if necessary
- Reporting
  - Prepare a written report including pictures taken during inspection, an assessment of status of equipment and any instrumentation checks recorded.
  - Prepared a written report including pictures taken during fly-by and an assessment of status of equipment.
  - Retain electronic copies of pictures and thermal images taken at original file size and native format.

Advantages

- ☑ Inspections can be carried out frequently without requiring plant shutdowns
- ☑

No requirement to enter flare restricted area or to work at height

- [x] The deterioration of defects can be monitored over time
- [x] Detailed photographs and video recordings of equipment can be made. In some cases, video can be livestreamed to experts in another location for immediate assessment
- [x] The operation of flare pilots can be checked, often using a thermal camera
- [x] Burning inside the flare tip (burnback) can be detected and the flare purge rate adjusted as required
- [x] Defective equipment can be identified, and spares purchased ready for installation at the next opportunity

Limitations

- [x] Inspections usually require good weather conditions to ensure the flare can be seen and photographed clearly
- [x] No physical checks of equipment can be made and no repairs to damaged equipment undertaken
- [x] The use of drones can be restricted by local Authorities or Regulators
- [x] The use of helicopters is often subject to approval and control by local aviation authorities particularly in onshore locations
- [x] Helicopter access can be restricted in some areas to avoid the exhaust plume and flare flames

Go Deeper

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Case study

Drone Inspection of Offshore Flare Tip

An inspection of a combined high pressure and low pressure flare tip and associated ancillaries was performed for an which processes oil and gas from subsea wells. The inspection was carried out with the flares in operation using a drone mounted camera system.

Figure 1 - Flare Tips

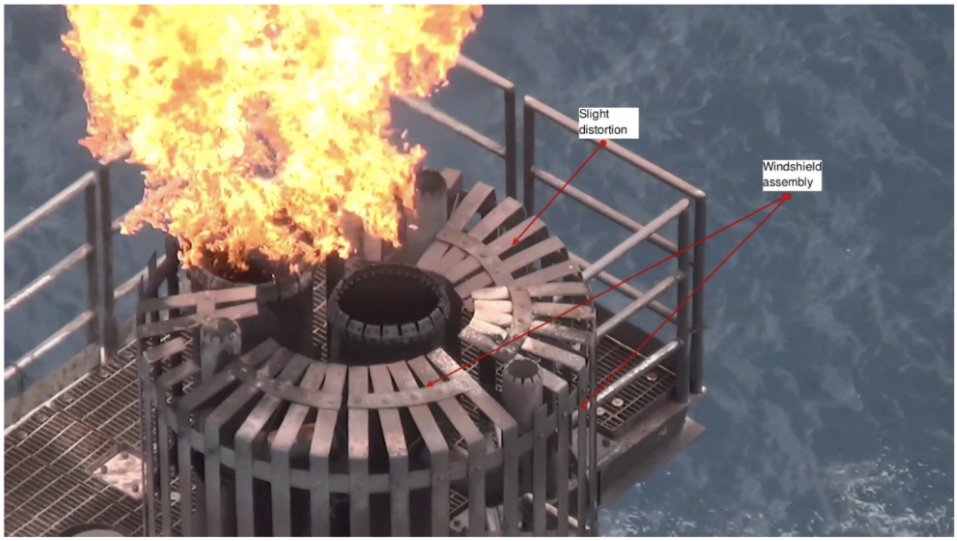


Figure 2 Flare Tip Wind Shield

The inspection was able to show that the main tip was in relatively good condition with no deformation of the tips or damaged welds. The wind shield was showing a small amount of distortion.

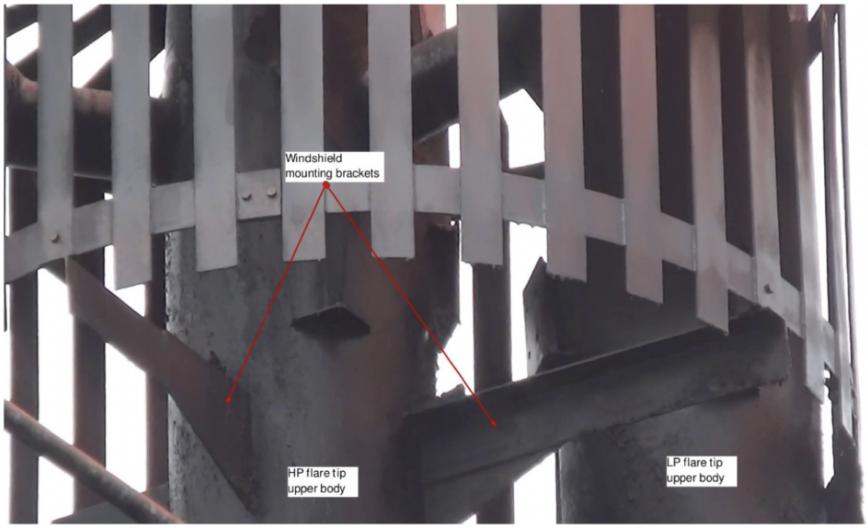


Figure 3 - Wind Shield Brackets

The wind shield mounting brackets were in good condition.

Figure 4 - Flare Tip Flanges

The main flare tip flanges were in reasonable condition with all bolts present. There was also some evidence of contamination of the flare caused by liquid carry over.

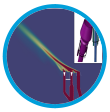
Figure 5 - Ballistic Ignition System Catcher

These flares have no pilots and are ignited by a ballistic ignition system. The components of the system were checked and found to be in good condition.

Do I understand the impacts of the environment on my flare?

Environmental Impacts: Crosswinds – Empirical data and observations

Environmental Impacts: Flare Tip Integrity Inspection # Manual Inspection



Environmental Impacts: Computational Fluid Dynamics (CFD) modelling to determine the effect of crosswind on flares efficiency