

High-Pressure Radioisotope Injector System

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Keywords: radiotracer, injector, high pressure

The radiotracer techniques have advantages compared with other more conventional methods to analyze the equipment in the oil or gas plants, mainly because it is both with high sensitivity and minimum invasive inspection technology. The tests can be done in real-time without modifying the industrial plant routine. Furthermore, it is a high precision technique, and it is independent of the flow profile complexity and can be used in liquids and gaseous phase systems. Generally, in the oil plants, the feed materials are pumping in high pressure and high-temperature systems, and the radiotracer must be instantaneously injected into the system. For this operation, a device is used to inject a controlled radiotracer pulse. This device is essential because, according to the ALARA principle, it is essential to minimize the amount of radiation absorbed by the radiotracer workers. No electrical controls are accepted because there is always a risk of causing fire and an explosion with electric devices in an oil or gas plant operation. The radiotracer injector must be a pneumatic device to ensure safe injections. The injection device is shown in Figure 1, and it consists in:

- (1)- The radiotracer vessel, a 300 ml 314 stainless steel cylinder with 1/4" female NPT threads on both ends. The stainless steel cylinder is corrosion-resistant, hydrostatically tested to the working pressure.
- (2)- Auxiliary pressure system: to supply the compressed air to push the radiotracer pulse; it has an automatic locking system that allows easy and fast connections and disconnections.
- (3)- Connection system1: used to transferring the radiotracer to the stainless steel vessel: at the end, there is a check valve to prevent no radiotracer return.
- (4)- Needle valve: manages the radiotracer flow rate and regulates the radiotracer pulse intensity.

- (5)- Connection system 2: to connected and disconnected the radiotracer injector and the test unit.

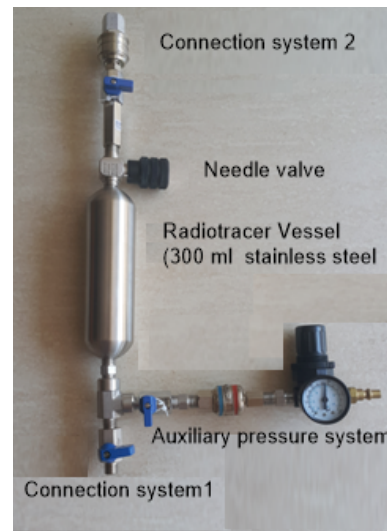


Figure 1. High-Pressure Radioisotope Injector

In experimental tests using as radiotracer the $\text{CH}_3^{123}\text{I}$ and the $\text{CH}_3^{82}\text{Br}$, the device proved to be ideal for injections in the heat exchangers because:

- Appropriate work pressure: between 15 - 300 bar.
- Reproducibility: during the test, the radioactive pulses were very similar; the needle valve controlled the activity injected.
- Different pulse shapes: the device allows both the injection of fast pulses as the injection of step-pulses.
- Excellent portability.
- Ideal Volume: radiotracer reservoir(300 ml) is adequate to store all the activity necessary for a sequence of tests.
- The radiotracer injector is easily connected and disconnected; the coupling operation is fast and secure.

References

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