

# SAFETY MEMO

Month, DD 2023 – HAZOP Method (Part 1 of 2)

Did you know?

## Origin of HAZOP Analysis<sup>1</sup>

In the 1970's, the British company Imperial Chemical Industries (ICI), one of the largest chemical companies in the world, developed the HAZOP method (HAZard Operability study) to improve the performance of its processes and the safety of its installations after an explosion killed 28 people. The objective of a HAZOP is to identify all dangers and quantify the risks that could threaten an industrial site.

The HAZOP study proposes an original approach in determining the hazards and defects of an installation in advance and not after the fact. Each process is analysed taking into account all applicable parameters. Thus, any parameter changes are outlined and analyzed to detect any potential malfunction.

By its nature, this method requires the examination of fluid circulation diagrams, plans or P&ID (Piping and Instrumentation Diagram) diagrams. This method is fully integrated into a process and safety improvement approach for an existing or proposed installation.

Since the development of the HAZOP study by ICI, the HAZOP process has been adopted by the American Petroleum Institute (API) Recommended Practice 750, 1990, which stands as the recommended standard for Canadian process industries. In 1992 the PHA was legislated by OSHA as part of CFR 29, Part 1910. It is also part of British Standard 8800 and Norwegian regulations<sup>2</sup>.

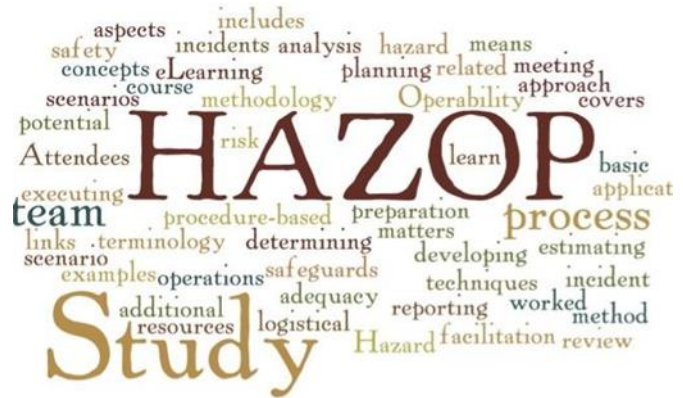
## Normative Aspect

The principles and procedures for hazard identification and exploitability studies are described in the international standard IEC 61822:2016. This is a guide to applying the HAZOP study to systems. It defines a specific set of keywords for analysis. It also provides guidance on the application of the technique and the procedure of the HAZOP study.

The HAZOP method of the Process Hazard Analysis (PHA) is dedicated to the risk analysis of systems for which it is essential to control parameters such as pressure, temperature, flow, etc. HAZOP considers the potential deviations from the main parameters linked to the operation of the installation.

For each constituent part of the system examined, the drifts are then studied systematically by the conjunction:

- **Keywords** like *no; more than; less of, too much*
- **Parameters** associated with the system studied. Common parameters encountered relate to temperature, pressure, flow, concentration but also the time or operations to be performed.



## HAZOP Contribution to the Engineering Industry

The HAZOP study is particularly useful in identifying process weaknesses and is a valuable tool to use for the design and development of new systems. It can be used to examine the dangers and potential problems linked to different states of operation of a given system (startup, standby, normal operation, normal stop, emergency stop, etc.). It can also be used in the batch and unstable manufacturing processes and sequences, as well as in continuous sequences. The HAZOP study can be a tool to integrate safety issues found in the process design phase.

<sup>1</sup> T.A. Kletz. (2009) ICI'S Contribution to process safety. Retrieve from <https://www.icheme.org/media/9503/xxi-paper-005.pdf>

<sup>2</sup> Institute of Hazard Prevention PHA/HAZOP Facilitation Workshop Student manual.

