

# Engineering Services

## Gas and Flame Detector Placement and Quantity

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Design recommendations, plot plans, and 3D mapping reports for gas and flame detectors provide effective and economical performance-based Fire & Gas systems. These system designs by Dräger are based on hazard and risk assessments, regulatory code and standards reviews, and the matching of Dräger's advanced detection technologies to the identified hazards.



**Performance-based fire & gas detection system designs for combustible & toxic gases using risk-based hazard analysis and 3D mapping tools.**

# Benefits

## The performance-based design methods

Traditional Fire and Gas system designs began with prescriptive standards such as those from the National Fire Protection Association (i.e., **NFPA 72**) and ISA (**ISA 60079-29**, **ISA 62990**, and **ISA 12.13.03**.) However, these codes and standards may not provide enough detail to address the many unique requirements of facilities whose processes generate flammable and toxic liquids, gases and vapors. Therefore, performance-based methods involving hazard and risk assessments have become the choice to make the best decisions. These engineering services provide the detail that augments traditional prescriptive codes and standards to bring increased efficacy and efficiency to the fire & gas system design. Using the newest tools in performance-based design such as **ISA TR84.00.07:2018 *Guidance on the Evaluation of Fire, Combustible Gas, and Toxic Gas System Effectiveness*** and 3D mapping software to optimize the coverage recommendations resulting from the ISA TR84.00.07 analyses.

## Engineering designs by peer-reviewed, published standards

The ISA 84.00.07:2018 Technical Report provides the guidance for developing an effective fire and gas system based on the combined experience of process safety and fire protection engineers, HSE professionals, certification agency engineers, industry-wide process equipment failure rate statistics, and established definitions from the referenced codes and standards. The ISA TR84.00.07:2018 has been developed in alignment with both the updates to ANSI/ISA 84, ANSI/ISA 84.91, and in parallel with IEC 61511.

## Codes and standards review

The ISA TR84.00.07:2018 assessment of identified hazard scenarios and risk levels is augmented with a review of the local, state, national, and international fire & gas codes & standards that may have applicability to the facility processes or applications. Recommendations for compliance to these codes and standards are included to inform owners of their potential responsibilities. The review also includes recommendations according to industry best practices for those applications where no code or standard currently applies.

## Optimization of placement and quantity by 3D mapping

Assessments of hazard scenarios and risk levels via the ISA's technical report 84.00.07 can lead to the development of a baseline plot plan for detector placement at the facility. Optimization of the quantity and placement of either gas or flame detectors can be accomplished via either a 3D mapping software program or as a 2D validation of an existing plot plan. For the 3D mapping service, the Dräger fire and gas engineer uses a licensed software tool that requires the importation of a facility's 3D model using universal formats such as Navisworks or 3D CAD. The 3D mapping software then enables revision of the baseline plot plan to produce optimized flame or gas detector coverage to the recommended target values while deploying the least number of devices in each area of the facility.

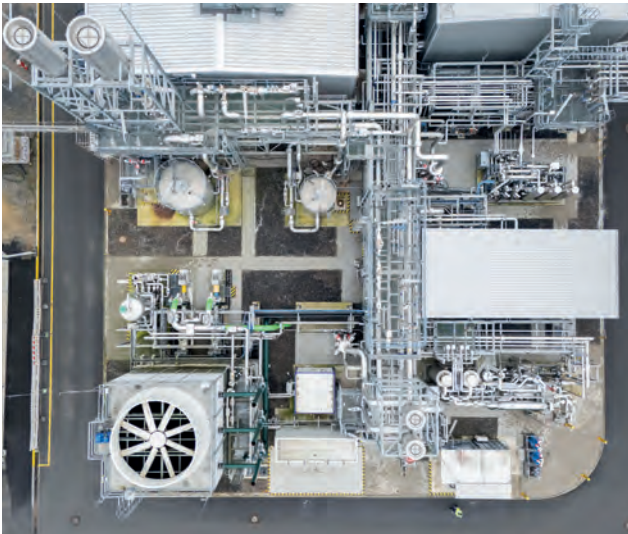
## Control action recommendations

Additional confidence in Control Action strategies using detector voting is possible by measuring the control action confidence in the licensed 3D mapping software tool, HazMap 3D™, Micropack UK. Optimizing the control action recommendations enhances reliability and reduces spurious performance issues. Best practice among most major end users is to consider at least two different alarm detection levels in addition to simple voting. This feature of the 3D mapping software is most beneficial when a higher number of devices is considered necessary to mitigate the consequences of a gas leak, explosion, or fire in a high risk, high hazard scenario.

# Benefits

## In person site surveys

For older facilities without the benefit of 3D models or P&IDs of their process, an experienced Dräger fire & gas engineer can visit the facility to provide an in-person Site Survey. The engineer will survey the assigned areas and produce written recommendations for either new installations of fire and gas devices or for updating a legacy installed system. This site survey is performed according to the methodology of the ISA TR84.00.07:2018 guideline and includes the hazard scenario and risk analysis upon which the recommendations for effective and economical placement & quantities of detectors are recommended. The site survey also includes the codes & standards review to ensure the facility is aware of their current responsibilities, as well as the recommendations for best practices where applicable.



D-194-2025



D-136-2025

# Engineering Service Offerings



D-150-2022

## Site Survey

Dräger Fire & Gas engineer to visit the facility and survey the areas to be assessed for gas or flame detectors according to ISA TR84.00.07:2018. Placement recommendations for Annunciators is available upon request.

**Deliverables:** ISA TR84.00.07 Hazard & Risk Summary

**Report:** To include Code & Standards/Best Practices review and placement recommendations, Recommended detector technologies and alarm set points and control actions

**OPTION:** 2D Plot Plan (Requires 2D scaled CAD drawings of facility.)

**Required Documentation:** 2D Layout (scaled CAD is preferred), Material balance (or stream compositions), (P&IDs if available)



## ISA TR84.00.07:2018 Effectiveness Study

Dräger Fire and Gas Engineer to assess areas per the ISA TR84.00.07:2018 Qualitative and semi-quantitative methodologies for the recommended placement and quantity of either gas or flame detectors.

**Deliverables:**

- 1.) ISA TR84.00.07 Hazard & Risk Summary
- 2.) Report: To include code & standards/best practices reviews, coverage targets for each gas or flame detection requirements, recommended detector technologies and alarm set points, and recommended control actions

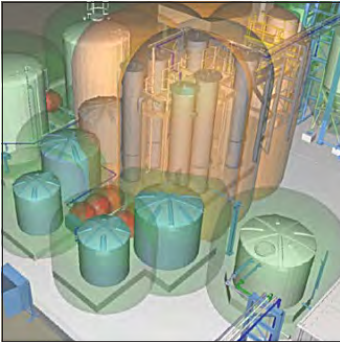
**OPTION:** 2D Plot Plan (Requires 2D scaled CAD drawings of facility.)

**OPTION:** Risk Reduction Factor calculations

**Required Documentation:** 2D Layout (scaled 2D CAD), Material balance (stream compositions), P&IDs, PFDs, End User FGS Philosophy, process equipment specifications, and target process gas MSDS

ISA Technical Report 84.00.07:2018 *Guidance on the Evaluation of Fire, Combustible Gas and Toxic Gas System Effectiveness*, August 10, 2018, Standards for Automation - ISA, <https://www.isa.org>. © International Society of Automation. Used with permission.

# Engineering Service Offerings



## 3D Mapping: Optimization of Placement & Quantity

Dräger Fire and Gas Engineer to perform the 3D mapping software tool to optimize placement & quantity according to the coverage targets as recommended by the ISA TR84.00.07:2018 hazard and risk assessments and summary results.

### Deliverables:

- 1.) ISA TR84.00.07 Hazard & Risk Summary
- 2.) Report: To include summary of results optimizing coverage per the ISA TR84.00.07 target percentages, analysis of a baseline plot plan and the final plot plan to include recommendations for x, y, and z coordinates for each detector in each area.

### OPTIONS:

- 1.) 2D Mapping Verification of an existing Plot Plan  
(Requires 2D scaled CAD drawings)
- 2.) Control Action recommendations (i.e. voting strategies)

**Required Documentation for 3D Mapping:** 3D Model of the facility (in Navisworks file format or 3D CAD), Material balance (stream compositions), P&IDs, PFDs, End User FGS Philosophy, process equipment specifications, and target & process gas MSDS

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