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Revision 2.0
14/04/2026

RISK ASSESSMENT METHOLOGIES

A PRACTICAL GUIDE TO QUALITATIVE AND QUANTITATIVE RISK ASSESSMENT WITHIN INDUSTRIAL OPERATIONS.

OPERATIONAL ASSURANCE GROUP
SPECIALISTS IN SAFE SYSTEMS OF WORK & INDUSTRIAL RISK CONTROL

Risk Assessment Methodologies

A Practical Guide to Qualitative and Quantitative Risk Assessment

Operational Assurance Group

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1. Executive Summary

This document provides a clear, practical guide to understanding and applying qualitative and quantitative risk assessment methodologies within industrial environments. Developed by Operational Assurance Group, it is designed to support organisations in identifying, evaluating, and controlling risk in a structured, compliant, and operationally effective manner.

The focus is on delivering approaches that are not only aligned with UK regulatory expectations, but also usable within live operational settings.

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2. Purpose

The purpose of this document is to:

- Explain key risk assessment methodologies
- Provide guidance on selecting appropriate approaches
- Support consistent and effective risk evaluation
- Reinforce the application of the hierarchy of control
- Enable practical implementation in industrial environments

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3. Scope

This guidance applies to:

- Construction activities
- Chemical and petrochemical operations
- High-risk industrial environments
- Routine and non-routine tasks

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4. Our Mission

“To protect people and businesses by delivering practical, audit-ready safe systems of work and risk control solutions that enable confident operational delivery.”

5. Core Principles

Safety as Standard

Risk assessment must prioritise the protection of people above all else.

Built for the Real World

Approaches must be practical and applicable in live environments.

Compliance Without Complication

Methodologies should meet regulatory requirements without unnecessary complexity.

Operational Alignment

Risk assessments must reflect actual working conditions and constraints.

Audit-Ready by Design

Outputs must be structured, traceable, and defensible.

Clear & Direct Communication

Findings must be clearly understood by those managing and carrying out the work.

6. Understanding Risk Assessment

Risk assessment is the systematic process of:

- Identifying hazards
- Evaluating risks
- Implementing control measures
- Reviewing effectiveness

Effective risk assessment forms the foundation of all Safe Systems of Work.

7. Qualitative Risk Assessment

7.1 Overview

Qualitative risk assessment evaluates risk based on descriptive categories such as likelihood and severity. It is widely used due to its simplicity and practicality.

7.2 Key Features

- Uses risk matrices (e.g., low / medium / high)
- Based on professional judgement and experience
- Suitable for most operational activities

7.3 Advantages

- Easy to understand and apply
- Quick to implement
- Effective for dynamic environments

7.4 Limitations

- Subjective in nature
- May lack precision for complex or high-hazard scenarios

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8. Quantitative Risk Assessment

8.1 Overview

Quantitative risk assessment (QRA) uses numerical data to evaluate risk, often involving statistical analysis and modelling.

8.2 Key Features

- Uses numerical probabilities and consequences
- Often applied in high-hazard industries
- Supports detailed risk modelling

8.3 Advantages

- Provides measurable and comparable results
- Supports high-level decision making
- Useful for major hazard and COMAH sites

8.4 Limitations

- Requires specialist expertise
- More time and resource intensive
- Dependent on quality of data

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9. Selecting the Appropriate Methodology

The choice between qualitative and quantitative approaches should be based on:

- Complexity of the task
- Level of risk
- Regulatory requirements

- Availability of data
- Operational constraints

In many cases, a blended approach provides the most effective outcome.

9A. Risk Matrix (5x5) and Scoring Guidance

A 5x5 risk matrix is a widely used tool to support qualitative risk assessment by assigning numerical values to likelihood and severity.

Likelihood Scale

1 – Rare (Highly unlikely to occur) 2 – Unlikely (Could occur, but not expected) 3 – Possible (Might occur at some time) 4 – Likely (Will probably occur in most circumstances) 5 – Almost Certain (Expected to occur frequently)

Severity Scale

1 – Insignificant (No injury or negligible impact) 2 – Minor (First aid treatment required) 3 – Moderate (Medical treatment / lost time injury) 4 – Major (Serious injury or long-term health effects) 5 – Catastrophic (Fatality or multiple serious injuries)

Risk Scoring Method

Risk Rating = Likelihood × Severity

This produces a score between 1 and 25.

Example Risk Matrix

Severity \ Likelihood	1	2	3	4	5
5 (Catastrophic)	5	10	15	20	25
4 (Major)	4	8	12	16	20
3 (Moderate)	3	6	9	12	15
2 (Minor)	2	4	6	8	10
1 (Insignificant)	1	2	3	4	5

Risk Rating Interpretation

- 1–5: Low Risk (Manage with routine controls)
- 6–10: Medium Risk (Implement additional controls where practicable)
- 12–15: High Risk (Action required to reduce risk)
- 16–25: Very High Risk (Work must not proceed until risk is reduced)

Key Principles for Use

- Apply consistent judgement when assigning scores
- Consider existing control measures before scoring residual risk
- Use the matrix as a decision-support tool—not a substitute for professional judgement
- Ensure alignment with site-specific risk criteria where applicable

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10. Hierarchy of Control

The hierarchy of control provides a structured approach to reducing risk:

1. Elimination
2. Substitution
3. Engineering Controls
4. Administrative Controls
5. Personal Protective Equipment (PPE)

Effective risk management prioritises higher-level controls wherever reasonably practicable.

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11. Our Structured Approach

11.1 Discovery & Scoping

Define scope, hazards, and risk profile

11.2 Site Familiarisation

Understand real-world conditions and constraints

11.3 Assessment & Gap Analysis

Evaluate existing controls and identify improvements

11.4 Methodology Selection

Determine appropriate qualitative, quantitative, or blended approach

11.5 Documentation Development

Produce clear, structured, and compliant outputs

11.6 Implementation Support

Ensure findings are understood and applied

11.7 Review & Approval

Validate effectiveness and alignment with requirements

12. UK Regulatory Framework and HSE Alignment

Risk assessment methodologies must align with UK legislation and HSE guidance:

Health and Safety at Work etc. Act 1974 (HSWA)

- Duty to ensure health, safety, and welfare of employees and others

Management of Health and Safety at Work Regulations 1999 (MHSWR)

- Requires suitable and sufficient risk assessments
- Mandates implementation of control measures

Control of Substances Hazardous to Health Regulations 2002 (COSHH)

- Requires assessment and control of hazardous substances

Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR)

- Requires assessment of fire and explosion risks

Construction (Design and Management) Regulations 2015 (CDM)

- Requires risk management throughout project lifecycle

COMAH Regulations 2015

- Applies to major hazard sites
- Requires detailed quantitative risk assessment where applicable

HSE Guidance

- HSG65: Managing for Health and Safety
- INDG163: Risk Assessment Guidance
- HSG176: Storage of Flammable Liquids
- Sector-specific guidance for construction and process industries

13. Common Challenges

- Over-reliance on generic assessments
- Lack of workforce involvement
- Inappropriate methodology selection
- Failure to apply hierarchy of control effectively
- Poor communication of findings

14. Continuous Improvement

Effective risk assessment requires ongoing review:

- Incident and near-miss learning
- Operational feedback
- Audit findings
- Changes in legislation or processes

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15. What Sets Operational Assurance Group Apart

Industry-Specific Expertise

Deep experience across high-risk sectors

Practical Application

Solutions designed for real-world use

Audit-Ready Outputs

Structured and compliant documentation

Scalable Support

Flexible delivery aligned to client needs

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16. Conclusion

Understanding and applying appropriate risk assessment methodologies is critical to effective risk control.

By combining practical experience with structured approaches, Organisations can deliver risk assessments that are both compliant and operationally effective.

Operational Assurance Group provides the expertise required to achieve this balance.

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17. Contact

Operational Assurance Group Specialist Consultancy in Safe Systems of Work & Industrial Risk Control

For further information or support, please get in touch.

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