AVW Technical Guide

BS EN 17206 – Safety Requirements for Stage Machinery

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1. Introduction

BS EN 17206 defines safety requirements for machinery used in theatres, studios, and other entertainment production environments.

The standard covers the design, manufacture, installation, and operation of stage machinery to reduce the risk of injury to performers, technicians, and other personnel.

Typical systems covered by BS EN 17206 include:

- flying systems and battens
- stage lifts and elevators
- orchestra lifts
- moving stage wagons
- revolving stages
- automated scenery systems

The standard introduces several key safety concepts, including **risk assessment, safety control systems, mechanical safety requirements, and Use Categories (UC)**.

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2. Purpose of BS EN 17206

Stage machinery often operates in environments where people work close to moving equipment. Unlike many industrial machines, stage systems frequently move:

- above performers
- around technicians
- in areas accessible to the public

BS EN 17206 aims to ensure that stage machinery is designed and operated in a way that minimises these risks.

The standard focuses on:

- identifying hazards
- reducing risks through engineering design
- implementing reliable safety control systems

- ensuring proper operation and maintenance

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3. Risk Assessment

Risk assessment forms the foundation of the safety approach described in BS EN 17206.

Before machinery is designed or installed, potential hazards must be identified and evaluated. Typical hazards in stage automation include:

- falling loads
- uncontrolled movement
- collisions between machinery and people
- mechanical failure
- control system faults

Risk assessment determines the **appropriate safety measures required to reduce risk to acceptable levels**.

This process is consistent with other machinery safety standards such as:

- EN ISO 13849
- IEC 61508

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4. Use Categories (UC)

One of the key concepts in BS EN 17206 is the **Use Category (UC)** classification system.

Use Categories describe **how stage machinery interacts with people and the level of risk associated with its operation**.

The standard defines use categories from **UC0 to UC6**, with higher numbers representing greater interaction between machinery and people and therefore higher safety requirements.

Use Category	Typical Situation
UC0	Machinery operating in areas not accessible to people
UC1	Machinery operating where people may be present but without significant interaction
UC2	Machinery operating close to people where contact is possible
UC3	Machinery operating above people
UC4	Machinery where people may be directly exposed to moving machinery
UC5	Machinery carrying or moving people

Use Category	Typical Situation
UC6	Machinery where failure could create particularly severe risk to people

As the **Use Category increases**, stronger safety measures are required.

These may include:

- higher performance levels for safety systems
- redundant control systems
- additional monitoring and fault detection
- enhanced braking systems

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5. Mechanical Safety Requirements

Mechanical design plays a critical role in stage machinery safety.

BS EN 17206 specifies requirements for components such as:

- lifting mechanisms
- structural elements
- braking systems
- load-bearing components

Mechanical safety measures may include:

- adequate safety factors for lifting equipment
- redundant load paths
- fail-safe braking systems
- physical motion limits

These measures help ensure that machinery remains safe even if certain components fail.

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6. Safety Control Systems

Stage automation systems rely on safety-related control systems to prevent hazardous motion.

Typical safety system components include:

- emergency stop circuits
- safety relays or safety PLCs
- position monitoring systems
- load monitoring devices

- motion limit switches

Safety control systems are designed to detect hazardous conditions and bring machinery to a safe state.

Safety functions are often designed according to standards such as:

- EN ISO 13849
- IEC 61508

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7. Emergency Stop Systems

Emergency stop systems provide a means for operators to immediately halt machinery in dangerous situations.

E-Stop systems must:

- override normal control commands
- stop motion safely
- require manual reset before restarting

Emergency stop buttons must be clearly visible and easily accessible to operators.

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8. Load Monitoring and Motion Limits

Many stage automation systems require monitoring of load and motion parameters to ensure safe operation.

Examples include:

- load monitoring for lifting systems
- position limits for moving platforms
- speed monitoring for automated motion systems

These systems help detect faults before they result in hazardous conditions.

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9. Inspection and Maintenance

Safety does not end with the design of stage machinery. Regular inspection and maintenance are essential to ensure continued safe operation.

Maintenance procedures may include:

- inspection of lifting components
- testing of safety systems
- verification of braking systems

- checking emergency stop circuits

Proper documentation and maintenance records are important for demonstrating compliance with safety standards.

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10. Relationship to Other Safety Standards

BS EN 17206 works alongside several other safety standards used in automation and machinery safety.

Examples include:

- EN ISO 13849
- IEC 61508
- EN IEC 60204-1

These standards help define how safety control systems should be designed and implemented.

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11. Practical Takeaways

- BS EN 17206 defines safety requirements for machinery used in entertainment production environments.
- Risk assessment is the foundation of safe stage machinery design.
- Use Categories describe how machinery interacts with people and determine safety requirements.
- Both mechanical design and safety control systems are essential for reducing risk.
- Regular inspection and maintenance are necessary to ensure long-term safety.

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12. Disclaimer

This guide provides a simplified overview of BS EN 17206 for general information purposes. It does not replace the official standard or professional engineering analysis.

About the Author

Anton Woodward works in theatre engineering and stage automation systems.

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www.avw.co.uk