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SANS 10085

What you should know about the new SANS 10085

1. 1. Types of Scaffolding

The SANS 10085-1:2024 standard introduces clearer definitions and requirements for various types of scaffolding, including:

- **Independent Scaffolds**: These scaffolds are free-standing and do not rely on a building for support. The new standard specifies that independent scaffolds must be securely tied at regular intervals, with specific guidance on bracing and stability to prevent sway or collapse.
- **Tower Scaffolds**: These are vertical structures often used for tasks requiring height. The new standard emphasizes load capacity and stability, with additional requirements for base width, height-to-width ratios, and the use of outriggers.
- **Birdcage Scaffolds**: Typically used for ceiling work, birdcage scaffolds require evenly spaced standards and ledgers. The 2024 standard introduces stricter bracing requirements to ensure structural integrity, particularly in large or complex setups.

1.2. Compliance with Scaffold Type

Consultants must ensure that the scaffolding type being used on site is appropriate for the specific task and environment. The new standard provides enhanced guidelines on selecting the correct scaffold type, considering factors such as:

- **Load Requirements**: The standard provides detailed calculations for load-bearing capacity, particularly for tower and birdcage scaffolds that are subjected to dynamic loads.
- **Environmental Conditions**: The updated scope includes considerations for wind, weather, and ground conditions, especially for outdoor scaffolding like independent and tower scaffolds.
- **Special Use Cases**: For scaffolds used in special conditions (e.g., confined spaces or where heavy lifting equipment is used), the new standard has expanded requirements for design approval and specialized inspection protocols.

1.3. Increased Emphasis on Customization and Adaptability

The SANS 10085-1:2024 encourages consultants to customize scaffolding setups based on the specific needs of the site:

- **Modular and Adaptable Designs**: The standard now recognizes the use of modular scaffold systems and stresses the importance of ensuring that components from different systems are compatible and correctly assembled.
- **Engineer-Designed Scaffolds**: For more complex scaffolding structures (e.g., scaffolds over 2 meters or those with cantilevers), the standard requires a design by a qualified engineer, with the design documentation included in the safety file.

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1.4. Safety and Stability Enhancements

The standard reinforces the need for maintaining scaffold stability, with expanded guidelines on:

- **Tying and Bracing**: More precise requirements for tying scaffolds to structures, including specific distances and the use of double ties for taller structures.
- **Foundation and Ground Stability**: Detailed provisions for ensuring scaffolding foundations are solid and capable of bearing the required loads, particularly on soft or uneven ground.
- **Regular Inspections and Adjustments**: The standard emphasizes that scaffolds must be inspected frequently, particularly after modifications or adverse weather conditions.

Practical Implications for Consultants

- **Audit Preparation**: Consultants should be familiar with the specific requirements for each type of scaffold in the new standard, ensuring that their audits account for these differences.
- **Documentation and Records**: All scaffolding types used on site should have corresponding documentation in the safety file, including design drawings, load calculations, and inspection records.
- **Training and Competency**: Ensure that workers and supervisors are trained according to the specific scaffold type being used, with a clear understanding of the expanded requirements in the new standard.

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2. Competency Requirements

2.1. Definition of Competency

The SANS 10085-1:2024 standard defines a competent person as someone who has both the required knowledge and practical experience in scaffold design, erection, inspection, and dismantling. This definition is more stringent than previous standards, requiring not just experience but also formal proof of competency.

Key Points:

- **Knowledge:** The person must have a thorough understanding of the principles of scaffold construction, load calculations, stability requirements, and safety practices.
- **Experience:** The individual should have hands-on experience relevant to the specific type of scaffolding being used.
- **Formal Recognition:** Competency must be proven through certifications or qualifications recognized by a professional body or regulatory authority.

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2.2. **Appointment of Competent Persons**

The 2024 standard mandates that all critical roles related to scaffolding must be carried out by individuals formally appointed as competent persons. This appointment must be documented in writing and should include:

- **Designation of Responsibility:** Clearly outline the specific tasks the competent person is authorized to perform, such as supervising scaffold erection, conducting inspections, or approving modifications.
- **Proof of Competency:** Attach certifications, qualifications, or licenses that validate the person's competency in scaffolding work.

Practical Steps:

- Formal Appointment Letters: Keep signed copies of appointment letters in the safety file, specifying the scope of responsibility and duration of the appointment.
- Competency Certificates: Include copies of competency certificates in the safety file, ensuring they are up to date and relevant to the specific scaffolding type and work being performed.

2.3. **Competency in Specific Scaffold-Related Roles**

The standard identifies several roles that require demonstrated competency, including:

- **Scaffold Designers:** Responsible for creating scaffold designs, particularly for complex structures or those exceeding 2 meters in height. These individuals must have an engineering background and be capable of performing load calculations.
- **Scaffold Erectors:** Workers involved in the physical assembly of scaffolding must be trained and certified in scaffold erection techniques, with a focus on safe practices.
- **Scaffold Inspectors:** Those who inspect scaffolding must have specialized training in identifying potential hazards, ensuring stability, and verifying compliance with the SANS 10085-1:2024 standard.
- **Scaffold Dismantlers:** Like scaffold erectors, these workers must be trained and competent in safely dismantling scaffolding without compromising site safety.

2.4. **Verification of Competency**

The standard places a high priority on verifying the competency of all personnel involved in scaffolding work. Auditors and safety officers must ensure:

- **Written Documentation:** All competency certificates, qualifications, and appointment letters must be accessible and valid. Expired certificates or lack of documentation should trigger immediate corrective actions.

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- **On-Site Assessments:** Conduct regular on-site assessments to verify that the appointed competent persons are actively applying their knowledge and skills. This includes observing scaffold erection and inspection activities.
- **Training Records:** Maintain a log of all training provided to scaffold workers and supervisors, including refresher courses. This ensures ongoing compliance with the latest standards and safety practices.

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3. Design and Load Calculations

3.1. Emphasis on Detailed Scaffold Design

The SANS 10085-1:2024 standard requires more rigorous and detailed design processes for scaffolding structures. This is particularly important for scaffolds that are complex, high, or subject to varying loads.

Key Requirements:

- **Engineer-Approved Designs:** For scaffolding exceeding certain heights (typically over 2 meters), or where the configuration is non-standard, the design must be approved by a registered engineer. This includes independent scaffolds, birdcage scaffolds, and scaffolds with cantilevers or complex loading conditions.
- **Standard vs. Special Scaffolds:** The standard distinguishes between "basic" and "special" scaffolds. Basic scaffolds follow standard configurations and loading conditions, while special scaffolds involve unique designs that require additional analysis and approval.

Implications:

- **Design Documentation:** All scaffolding must have detailed design drawings that include specifications for materials, dimensions, and assembly instructions. These documents should be readily available on-site and included in the safety file.
- **Consultation with Engineers:** For non-standard scaffolds, regular consultation with a structural engineer is necessary to ensure that all design parameters are met.

3.2. Comprehensive Load Calculations

Load calculations are now a critical component of scaffold design under the SANS 10085-1:2024 standard. These calculations must account for all forces acting on the scaffold, ensuring it can safely support its intended loads without risk of failure.

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Key Aspects of Load Calculations:

- **Dead Load:** The weight of the scaffold itself, including all components such as standards, ledgers, platforms, and bracing.
- **Live Load:** The weight of workers, tools, materials, and any dynamic forces that may be applied during use. This must include the maximum number of workers expected on the scaffold at any time and the weight of stored materials.
- **Environmental Load:** External forces such as wind, snow, or rain that could impact the stability of the scaffold. This is especially important for scaffolds erected outdoors or at height.
- **Impact Load:** Sudden forces that may occur due to the movement of materials or workers, particularly when using hoists or lifting equipment attached to the scaffold.

Calculation Methodology:

- **Load Combinations:** The standard specifies that load combinations must be considered to ensure the scaffold can withstand simultaneous loads, such as a full crew working during a windy day.
- **Safety Factors:** The design must include safety factors that account for potential uncertainties, such as variations in material strength or unexpected loads. This ensures the scaffold has a margin of safety beyond the calculated maximum load.
- **Even Distribution:** Load calculations must ensure that weight is evenly distributed across the scaffold structure to prevent localized overloading, which could lead to structural failure.

3.3. Load Testing and Verification

The SANS 10085-1:2024 standard introduces requirements for load testing in certain scenarios, particularly for special scaffolds or where high-risk activities are involved.

Load Testing Requirements:

- **Proof Testing:** For critical or high-risk scaffolding, load testing may be required to verify that the scaffold can safely support the expected loads. This involves applying a calculated load to the scaffold and monitoring for any signs of failure or excessive deflection.
- **Documentation of Load Tests:** Records of any load testing conducted must be included in the safety file, with details on the load applied, the duration of the test, and the results.
- **Re-evaluation:** After load testing, the design must be reevaluated, and any necessary adjustments made before the scaffold is certified for use.

3.4. Structural Integrity and Stability

The updated standard places a strong emphasis on ensuring the structural integrity and stability of scaffolds through design and load calculations.

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Stability Measures:

- **Bracing and Tying:** The design must include sufficient bracing and ties to stabilize the scaffold against lateral forces and prevent collapse. The frequency and placement of ties are critical to maintaining stability.
- **Foundation Requirements:** The load calculations must consider the bearing capacity of the ground or surface on which the scaffold is erected. Soft or uneven ground requires special consideration, such as using sole plates or additional supports.
- **Dynamic Loading Considerations:** If the scaffold will be subjected to dynamic loads, such as moving equipment or swaying due to wind, the design must account for these forces and ensure the scaffold remains stable under all conditions.

3.5. Practical Considerations for Auditors and Inspectors

- **Design Verification:** During audits, inspectors should verify that the scaffold design complies with the SANS 10085-1:2024 requirements, including reviewing the design documentation and load calculations.
- **Inspection of Load-Bearing Elements:** Inspectors must pay close attention to the load-bearing elements of the scaffold, such as standards, ledgers, and ties, to ensure they are installed as per the design and can safely support the calculated loads.
- **Monitoring and Adjustment:** Regular inspections should monitor for any changes in load conditions, such as the addition of materials or changes in the workforce, and adjustments should be made to the scaffold design as necessary.

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4. Marking of Scaffold Components

4.1. Purpose of Component Marking

The introduction of mandatory markings on all scaffold components serves several key purposes:

- **Traceability**: Markings ensure that each component can be traced back to its manufacturer, providing a clear record of its origin. This is vital for quality assurance and for identifying the source in case of defects or failures.
- **Accountability**: By marking components with the manufacturer's details, there is greater accountability for the quality and safety of the materials used. It helps in enforcing standards across the supply chain.
- **Safety**: Markings, especially those indicating load capacity, allow for quick and clear identification of which components are suitable for specific applications. This reduces the risk of using incompatible or inadequate components in scaffolding, thereby enhancing overall safety.

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4.2. Required Markings on Components

The SANS 10085-1:2024 standard specifies that all newly manufactured scaffold components must include the following information:

- **Manufacturer's Identifier**: A clear marking indicating the name or unique identifier of the manufacturer. This ensures that each component's origin is known, which is crucial for quality control and compliance with safety standards.
- **Year of Manufacture**: The year when the component was produced. This helps in tracking the age of components, which is important for assessing their condition over time. Older components may need more frequent inspections or replacement to maintain safety standards.
- **Load Capacity**: The maximum load that the component can safely bear. This is perhaps the most critical piece of information, as it directly impacts how the component can be used in scaffold construction. For instance, knowing the load capacity helps in planning the distribution of weight across the scaffold, ensuring no part is overloaded.

4.3. Application of Markings

The standard provides guidance on how these markings should be applied to scaffold components:

- **Durability**: Markings must be durable and able to withstand the rigors of construction site conditions. They should remain legible even after exposure to harsh weather, rough handling, and prolonged use.
- **Visibility**: The markings should be placed in a location that is easily visible during inspection and assembly. For example, markings on tubes should be positioned so that they can be read without needing to dismantle parts of the scaffold.
- **Standardization**: The format and placement of markings should be consistent across all components to avoid confusion. The standard may specify certain industry-recognized codes or symbols to ensure uniformity.

4.4. Implications for Scaffold Use and Maintenance

The requirement for component markings has several implications for how scaffolding is used, inspected, and maintained:

- **Inspection and Verification**: During scaffold erection, inspectors must verify that all components are properly marked and that the markings correspond to the design specifications. This helps in confirming that the correct components are being used and that they are fit for purpose.
- **Component Lifecycle Management**: The inclusion of the year of manufacture allows for better lifecycle management of scaffold components. Over time, as components age, their integrity may degrade, and the markings help in identifying when components should be replaced or subjected to more rigorous inspections.

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- **Compliance Audits**: For regulatory and safety audits, having marked components simplifies the process of verifying compliance with SANS 10085-1:2024. Auditors can easily check that all components meet the required standards and that no unapproved or substandard materials are in use.

4.5. Practical Considerations for Implementation

To comply with the marking requirements, several practical steps must be taken:

- **Supplier Engagement**: Work closely with scaffold suppliers to ensure that all purchased components are properly marked according to the new standard. This may involve updating procurement specifications to include these marking requirements.
- **Inventory Management**: Maintain an updated inventory of all scaffold components, noting their manufacturer, year of manufacture, and load capacity. This inventory should be cross-referenced with the markings on the components.
- **Training for Personnel**: Train scaffold erectors, inspectors, and site supervisors on the importance of these markings and how to read and interpret them. This training ensures that everyone involved in scaffold work understands the significance of using correctly marked components.
- **Regular Monitoring and Reporting**: Implement a system for regularly checking that all components in use on site remain clearly marked and that the markings are still legible. Any components with missing or damaged markings should be removed from service until they can be properly identified or replaced.

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5. Inspection and Handover

5.1. Enhanced Inspection Frequency and Requirements

One of the most significant updates in the SANS 10085-1:2024 standard is the emphasis on the frequency, timing, and thoroughness of scaffold inspections. This change is designed to ensure that scaffolds remain safe and stable throughout their use, addressing both daily wear and potential impacts from environmental factors.

Key Inspection Requirements:

- **Daily Inspections:** Scaffolds must now be inspected every day before work begins. This is especially critical in environments where conditions can change rapidly or where the scaffold is heavily used. The daily inspection is a comprehensive check to ensure that all components are secure, undamaged, and compliant with the design.
- **Shift-Based Inspections:** In addition to daily checks, the standard requires inspections at the start of each work shift. This is particularly relevant on large construction sites where scaffolds are in continuous use across multiple shifts. These inspections help to identify any issues that may have arisen during the previous shift, such as loosened components, accidental impacts, or changes in load distribution.

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- **Post-Event Inspections:** The standard introduces mandatory inspections after any significant event that could affect scaffold integrity. This includes severe weather conditions (e.g., high winds, heavy rainfall), impacts from machinery or vehicles, and any modifications to the scaffold. These inspections ensure that the scaffold remains stable and safe after such events.

Practical Implications:

- **Record-Keeping:** With the increased frequency of inspections, there is a greater need for meticulous record-keeping. Each inspection must be logged in the scaffold inspection register, noting the date, time, inspector's name, and any issues identified along with the actions taken to resolve them.
- **Increased Accountability:** The requirement for regular inspections increases the accountability of scaffold inspectors and site supervisors. Inspectors must be qualified and diligent, ensuring that no issue, however small, goes unnoticed or unresolved.

5.2. Formalized Handover Procedures

The handover of scaffolding after erection or modification is a formal process that certifies the scaffold is safe and ready for use. The SANS 10085-1:2024 standard provides more detailed guidelines on how this handover should be conducted, documented, and communicated to relevant personnel.

Key Elements of the Handover Process:

- **Handover Certificate:** The standard requires the issuance of a Scaffold Handover Certificate once the scaffold has been inspected and deemed safe for use. This certificate serves as an official record that the scaffold meets all safety and design requirements.
- **Competent Person Involvement:** The handover must be conducted by a competent person who is qualified to assess the scaffold's safety. This person is responsible for ensuring that the scaffold has been erected according to the design, that all components are secure, and that the scaffold can safely support the intended loads.
- **Acceptance by Site Supervisor:** The handover certificate must be signed not only by the competent person who inspected the scaffold but also by the site supervisor or manager who accepts the scaffold for use. This dual sign-off process ensures that both parties acknowledge the scaffold's safety and are aware of its condition.

Documentation and Communication:

- **Detailed Reporting:** The handover process must include a detailed report that covers the inspection findings, any adjustments made, and the final assessment. This report is attached to the handover certificate and stored in the project's safety file.
- **Clear Communication:** The results of the handover should be clearly communicated to all relevant workers and supervisors. This includes notifying them of any restrictions or special conditions, such as load limits or areas of the scaffold that require special attention.

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5.3. Expanded Inspection Scope

The SANS 10085-1:2024 standard expands the scope of what must be inspected during these frequent checks. The inspections are not limited to visual assessments but also include functional tests and verification against the scaffold design.

Key Inspection Criteria:

- **Structural Integrity:** Inspectors must assess the structural integrity of the entire scaffold, checking for signs of wear, deformation, or damage in key components like standards, ledgers, and bracing.
- **Load-Bearing Capacity:** Inspectors must verify that the scaffold is not overloaded, and that it continues to meet the load-bearing requirements specified in the design calculations. This includes ensuring that no additional materials or equipment have been placed on the scaffold that could exceed its capacity.
- **Stability:** Stability is a critical focus, particularly for scaffolds exposed to environmental factors. Inspectors must ensure that the scaffold is properly braced and tied, with no signs of movement or instability.
- **Safety Features:** All safety features, such as guardrails, toe boards, ladders, and access points, must be thoroughly checked to ensure they are intact, properly installed, and free from hazards.

5.4. Continuous Monitoring and Reinspection

The updated standard introduces the concept of continuous monitoring for scaffolds in use. This means that scaffolds must be regularly checked even after the initial handover to ensure they remain safe throughout their lifespan on site.

Ongoing Monitoring Requirements:

- **Routine Spot Checks:** In addition to scheduled inspections, routine spot checks should be conducted by site supervisors to catch any emerging issues before they become serious.
- **Post-Modification Reinspection:** Anytime a scaffold is modified—whether by adding sections, altering the structure, or changing the load—it must undergo a reinspection. This reinspection ensures that the scaffold continues to meet all safety requirements after the changes.
- **Regular Reporting:** Continuous monitoring must be accompanied by regular reporting, with updates provided to site management on the scaffold's condition and any maintenance actions taken.

5.5. Non-Compliance and Consequences

Failure to adhere to the inspection and handover procedures outlined in the SANS 10085-1:2024 standard can lead to serious consequences:

- **Safety Risks:** Inadequate or infrequent inspections increase the risk of scaffold failures, potentially leading to accidents, injuries, or fatalities on site.

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- **Regulatory Penalties:** Non-compliance with the standard can result in fines, work stoppages, and other regulatory actions. Inspectors from regulatory bodies may demand to see inspection records and handover certificates as proof of compliance.
- **Legal Liability:** In the event of an incident involving a scaffold, the absence of proper inspection documentation and handover records can expose the company to legal liability and reputational damage.

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6. Bracing, Ties, and Stability

6.1. Importance of Bracing in Scaffold Stability

Bracing is essential for maintaining the structural integrity of scaffolding. It prevents the scaffold from swaying or collapsing due to lateral forces such as wind, accidental impacts, or uneven load distribution. The new standard emphasizes the need for more frequent and correctly installed bracing to address these challenges, particularly in complex or tall scaffold configurations.

Key Updates in Bracing Requirements:

- **Increased Frequency of Bracing:** The SANS 10085-1:2024 standard requires that bracing be installed more frequently than in previous editions. This is especially important for scaffolds that are over 2 meters in height or have extended horizontal spans. The increased frequency helps to distribute forces more evenly across the structure, reducing the risk of localized weaknesses that could lead to collapse.
- **Types of Bracing:** The standard provides clearer guidelines on the types of bracing that should be used depending on the scaffold configuration. This includes cross-bracing, longitudinal bracing, and diagonal bracing, each of which serves a specific purpose in maintaining stability. For example, diagonal bracing is critical for preventing racking, while cross-bracing enhances rigidity.
- **Bracing in Complex Configurations:** For scaffolds with irregular shapes, multiple levels, or those built around existing structures, the standard mandates customized bracing solutions. This may involve using additional bracing in corners, intersections, and other critical points to ensure that the scaffold remains stable under all conditions.

Practical Implications:

- **Design Considerations:** Scaffold designers must now factor in the increased bracing requirements during the planning phase. This includes calculating the optimal placement and frequency of bracing to meet the standard's requirements.
- **Inspection Focus:** During inspections, special attention must be paid to the presence and condition of bracing. Inspectors should verify that all required bracing is in place, properly secured, and free from damage or corrosion.

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6.2. Enhanced Requirements for Tie Installation

Ties are crucial for anchoring scaffolding to a permanent structure, ensuring that the scaffold remains stable and secure. The updated standard introduces more detailed requirements for tie installation, particularly regarding the frequency, positioning, and strength of ties.

Key Updates in Tie Installation:

- **Increased Tie Frequency:** The SANS 10085-1:2024 standard mandates more frequent ties for scaffolds that are taller, wider, or subject to greater environmental forces. Ties must be installed at regular intervals both horizontally and vertically to ensure uniform stability. For instance, a scaffold exceeding a certain height may require ties every 4 meters horizontally and every 8 meters vertically.
- **Tie Strength and Type:** The standard specifies the type and strength of ties based on the scaffold's configuration and load requirements. Heavy-duty ties are required for scaffolds supporting higher loads or those exposed to strong winds. In some cases, double ties may be necessary to provide additional security.
- **Tie Placement:** Proper tie placement is critical. The standard highlights the need for ties to be placed at strategic points, such as near the top of the scaffold, at platform levels, and at the ends of each scaffold bay. This distribution ensures that the scaffold is anchored evenly, preventing tilting or tipping.
- **Adjustable and Temporary Ties:** The use of adjustable or temporary ties is addressed in the standard. These may be required during scaffold erection or dismantling phases. However, such ties must be replaced with permanent solutions before the scaffold is fully loaded.

Practical Implications:

- **Site-Specific Tie Planning:** Scaffold planning must now include a site-specific tie plan that considers the building or structure to which the scaffold is attached. Factors such as the type of building materials (e.g., brick, concrete, steel) and the scaffold's load will determine the type and placement of ties.
- **Ongoing Monitoring:** Ties must be regularly inspected and adjusted as necessary. For example, if a tie is loosened due to environmental factors or construction activities, it must be re-secured immediately to maintain scaffold stability.

6.3. Overall Scaffold Stability

The SANS 10085-1:2024 standard's emphasis on bracing and ties directly contributes to the overall stability of scaffolding structures. Stability is not just about preventing the scaffold from falling but also about ensuring that it can safely support all expected loads and withstand external forces throughout its use.

Key Stability Considerations:

- **Load Distribution:** The standard reinforces the importance of even load distribution across the scaffold. Bracing and ties play a significant role in ensuring that the weight is spread evenly, preventing overloading of any single component.

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- **Dynamic Forces:** Scaffolds must be designed and erected to resist dynamic forces, such as those caused by wind, movement of materials, or workers. The standard's requirements for more frequent bracing and ties help scaffolds resist these forces without compromising stability.
- **Stability in Changing Conditions:** The standard also accounts for the need to maintain scaffold stability in changing conditions, such as during construction phases where the scaffold may be partially loaded or modified. Temporary solutions like additional bracing or adjustable ties may be required during these times.

Practical Implications:

- **Inspection Focus:** Inspectors must evaluate the scaffold's overall stability during every inspection, considering both the static (fixed) conditions and dynamic (changing) conditions. This includes checking for signs of movement, loosening, or deformation in the scaffold structure.
- **Adaptive Stability Measures:** In complex or high-risk environments, adaptive stability measures may be necessary. This could include adding extra bracing or ties in response to unexpected loads or environmental changes.

6.4. Impact of Non-Compliance

Failure to comply with the enhanced bracing, tie installation, and stability requirements can have severe consequences, both in terms of safety and legal compliance.

Consequences Include:

- **Increased Risk of Scaffold Collapse:** Without adequate bracing and ties, scaffolds are at a higher risk of collapsing, particularly under heavy loads or in adverse weather conditions. This poses a significant danger to workers and anyone nearby.
- **Legal and Regulatory Penalties:** Non-compliance with the SANS 10085-1:2024 standard can lead to fines, work stoppages, and other legal actions from regulatory bodies. Inspectors will closely scrutinize the presence and adequacy of bracing and ties during audits.
- **Operational Delays:** If issues with bracing and ties are identified during an inspection, work may be halted until the scaffold is brought into compliance. This can cause significant delays and increase project costs.

Formula to calculate the load of scaffolding

The load capacity of scaffolding is calculated using various factors, including the design of the scaffold, the type of materials used, the expected loads (live loads, dead loads, and environmental loads), and the configuration of the scaffold structure (e.g., height, width, bracing, and tie spacing).

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General Formula:

There isn't a single formula that applies universally, as load capacity calculations for scaffolding are typically based on engineering principles and the guidelines provided in standards like SANS 10085-1:2024. However, the calculation generally considers:

1. **Dead Load (DL):** The weight of the scaffold itself, including all components such as standards, ledgers, bracing, platforms, and fittings.
2. **Live Load (LL):** The weight of workers, tools, materials, and any dynamic loads applied to the scaffold during use.
3. **Environmental Load (EL):** Additional forces such as wind load, snow load, and other environmental factors that could affect the scaffold's stability.
4. **Safety Factor (SF):** An additional factor applied to ensure the scaffold can support more than the calculated loads. This accounts for uncertainties or variations in material properties or load estimations.

Basic Approach:

The load capacity is calculated using the following general approach:

1. **Determine the Working Load Limit (WLL):**

$$\text{WLL} = \frac{\text{Ultimate Load Capacity}}{\text{Safety Factor (typically 4 or more)}}$$

   - **Ultimate Load Capacity**: The maximum load the scaffold can support without failure.
   - **Safety Factor (SF)**: Typically between 4:1 and 6:1, depending on regulations and conditions.

2. **Calculate the Total Load (TL):**

$$\text{TL} = \text{Dead Load (DL)} + \text{Live Load (LL)} + \text{Environmental Load (EL)}$$

3. **Ensure Compliance:**

$$\text{TL} \leq \text{WLL}$$

   If the total load exceeds the working load limit, the scaffold configuration must be adjusted, or additional supports, ties, or bracing must be added.

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Example Calculation:

Suppose a scaffold is designed with an ultimate load capacity of 10,000 kg and a safety factor of 4:

1. **Calculate the Working Load Limit (WLL):**

$$\text{WLL} = \frac{10,000\,\text{kg}}{4} = 2,500\,\text{kg}$$

2. **Calculate the Total Load (TL):**
   - Dead Load (DL) = 500 kg
   - Live Load (LL) = 1,500 kg
   - Environmental Load (EL) = 200 kg

$$\text{TL} = 500\,\text{kg} + 1,500\,\text{kg} + 200\,\text{kg} = 2,200\,\text{kg}$$

3. **Check Compliance:**

$$\text{TL} = 2,200\,\text{kg} \leq \text{WLL} = 2,500\,\text{kg}$$

Since the total load is within the working load limit, the scaffold is considered safe for use under these conditions.