Decking Joists, Bearers, Frames & Posts Explained

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**Ultra Detailed Outline: "Decking Joists, Bearers, Frames & Posts Explained"**

**I. Introduction**

* **Purpose of the Article:** Explain key structural components of a deck – joists, bearers, frames, and posts – their role in providing support, stability, and longevity.
* **Importance of Proper Installation:** Emphasize the importance of correct installation for ensuring a safe, durable, and level deck structure.
* **Overview of Decking Components:** Introduce the various parts (joists, bearers, frames, posts) and their relationships in deck construction.

**II. Posts: Vertical Support for the Deck**

* **What are Posts?**
  + Vertical supports that transfer the weight of the deck down to the ground or concrete footings.
  + Usually spaced around 1.5m apart for adequate support.
* **Preparing for Post Installation:**
  + **Post Footings:** Concrete footings are poured to hold the posts and prevent movement.
  + **Post Positioning:** Ensure each post is placed correctly based on the layout and level.
* **Securing Posts:**
  + **Bolting Posts:** Use galvanized carriage bolts to secure the posts to the bearers.
  + **Post Brackets:** In some cases, brackets are used for additional support, especially when the posts are mounted on concrete or masonry.
* **Post Spacing and Alignment:**
  + Ensure posts are spaced evenly to maintain the structural integrity of the deck.
  + Posts should be aligned with joists and bearers for maximum support and stability.

**III. Bearers: Foundation for the Deck**

* **What are Bearers?**
  + Large horizontal beams placed on posts to support the weight of the deck.
  + Span between posts and support the joists above.
* **Positioning and Installing Bearers:**
  + **Alignment:** Ensure the bearers are level and parallel to the ledger (support board attached to the house).
  + **Attaching Bearers to Posts:**
    - Use galvanized bolts for secure attachment.
    - Employ clamps during installation to keep the bearer in position.
  + **Joining Bearers:**
    - If the bearer is too long, use a half-flap joint directly over the post to transfer weight effectively.
* **Diagonal Bracing for Added Stability:**
  + Attach diagonal bracing between the bearers to prevent shifting and increase stability.
  + **Installation:** Cut diagonal straps slightly longer and secure them with nails.

**IV. Joists: Essential Support for Decking**

* **What are Joists?**
  + Horizontal beams running across the deck frame, supporting the decking boards.
  + Typically spaced 450mm apart and run perpendicular to the bearers.
* **Joist Placement:**
  + Marking the layout on the frame.
  + Ensuring joists are evenly spaced and properly aligned to prevent sagging.
* **Joist Hangers:**
  + **What are Joist Hangers?** Metal brackets securing joists to the ledger or bearers.
  + **Benefits:** Provides added stability and reduces the need for notching joists.
  + **Installation Tips:** Use galvanized nails or screws to fasten the hangers securely.

**V. Understanding the Frame Structure**

* **What is a Frame?**
  + The framework is the skeleton of the deck, supporting all other components.
  + Consists of joists, bearers, and rim joists, which define the overall shape and level of the deck.
* **Types of Deck Frames:**
  + **Simple Frame:** Basic construction with horizontal bearers and joists for a small or low deck.
  + **Advanced Frame:** More complex with additional bracing, often for larger or elevated decks.
* **Key Factors for Frame Design:**
  + Load distribution and weight capacity.
  + Joist spacing (usually 450mm apart).
  + Material choice, such as pressure-treated timber for durability.

**VI. Finalizing the Deck Frame Assembly**

* **Aligning Joists and Bearers:**
  + Double-check the alignment of all components before finalizing the installation.
  + Use a spirit level to ensure everything is level and even.
* **Joist Hanger Installation:**
  + Final adjustments to joist hangers to ensure proper placement and secure attachment.
  + **Final Joist Placement:** For the last joist, install the joist hanger, adjust the placement, and secure it firmly.
* **Checking for Any High Spots or Imperfections:**
  + Ensure that all joists are flush and that there are no high spots that could affect the decking installation.

**Ideal Options for Deck Flooring**

**1. Material Options**

* **Wood**: Cedar, redwood, and pressure-treated pine are popular choices due to their natural beauty and durability.
* **Composite**: A mix of wood fibers and plastic, it’s low-maintenance and resistant to rot and pests.
* **PVC**: Fully synthetic, durable, and excellent for moisture-prone areas.
* **Hardwood**: Exotic woods like ipe and teak are premium options known for their longevity and rich appearance.

**2. Size of Deck Boards**

* **Width**: Standard widths are typically **4 to 6 inches (100-150 mm)**. Narrower boards are ideal for intricate patterns, while wider boards minimize the number of gaps.
* **Thickness**: Boards are generally **1 to 1.5 inches (25-38 mm)** thick. Thicker boards are stronger and better for heavy-use decks.
* **Length**: Boards are available in standard lengths like **8, 10, 12, 16, and 20 feet** (2.4-6 m). Longer boards reduce the number of seams, creating a cleaner appearance.

**3. Ideal Spacing**

Proper spacing between boards allows for expansion, drainage, and airflow, preventing warping and water pooling.

* **Wood Boards**: Leave a gap of **3-6 mm (1/8 to 1/4 inch)** between boards to accommodate expansion due to moisture.
* **Composite Boards**: Spacing depends on the manufacturer’s guidelines but is usually **5-7 mm (3/16 to 1/4 inch)** to account for thermal expansion.
* **Dry Conditions**: Tighter gaps for humid climates as wood shrinks when dry.
* **Wet Conditions**: Slightly wider gaps as wood expands when wet.

**4. Deck Flooring Placement**

* **Orientation**: Boards are usually placed perpendicular to the joists for structural stability and ease of installation.
* **Patterns**: Consider patterns like straight lay, diagonal, herringbone, or parquet for added visual appeal.
* **Overhang**: Allow a **1-2 inch (25-50 mm)** overhang beyond the fascia for water runoff and a polished edge.

**5. Securing the Deck Boards**

Securely attaching boards ensures safety, durability, and aesthetics:

* **Fasteners**:
  + **Screws**: Use stainless steel or galvanized screws to prevent rust and staining.
  + **Hidden Fasteners**: Clips or brackets provide a clean, screw-free surface.
  + **Nails**: Galvanized or ring-shank nails, though less common than screws.
* **Pre-Drilling**: Avoid wood splitting by pre-drilling holes near board edges.
* **Fastener Placement**: Place screws/nails **1 inch (25 mm)** from the board edges and 1-2 screws per joist connection.
* **Expansion Control**: Secure only one end of the board initially to allow natural expansion and contraction.

**VII. Common Deck Building Challenges and Solutions**

* **Uneven Joist Heights:**
  + Problem: Joists of varying thickness can cause misalignment.
  + Solution: Attach joists first, ensuring their tops are flush with the girders, then secure joist hangers.
* **Inconsistent Lumber Thickness:**
  + Problem: Lumber, especially pressure-treated wood, often comes with varying thicknesses.
  + Solution: Use a power planer to smooth and level joists and girders for an even deck surface.
* **Warped Joists:**
  + Problem: Joists may warp or twist over time, causing alignment issues.
  + Solution: Use clamps to hold warped joists in place during installation or replace them if necessary.

The Decking Frame: Posts, Bearers, and Joists Explained

There is nothing like a beautiful deck to make a home’s outdoor space usable. But what good is a deck if it's not stable?. A stable, long-lasting deck needs five vital components: posts, bearers, joists all of which comprise what is called  the “frame.” And on top of the frame, of course, sits  the floorboards. Let’s break down each component so you can understand what makes a stable and long-lasting deck.

Understanding the Frame

What is a Frame?

The frame is the skeleton of the deck. It’s the support structure, comprised of posts, bearers and joists. The posts are the frame’s legs. They make the deck level and give it ground clearance. The bearers are the main support structures of the upper part of the deck and sit directly on the posts. The joists are the upper-most support structures that attach to the bearers and are the foundation for the deck boards.

Posts: Vertical Support for the Deck

What are Posts?

Think of posts as the legs of your deck. Posts are the vertical support structures that carry all  of the deck’s weight. Usually, posts are placed on a  concrete footing which adds extra stability. The most common sizes for posts are 4” x 4” and 6” x 6” but you can add a couple more inches to these being 4” x 6” or 8” x 8” posts if you are looking for extra stability and longevity.

Material Choice

The material of your posts could affect its stability and longevity.

Cedar

Cedar wood makes for posts which are visually pleasing and emits a pleasant smell. It's also naturally insect-repelling with tannins and oils that keep insects away. The downside of cedar as a decking post is that it is expensive and requires occasional maintenance such as annually applying sealant and staining that protects against UV exposure.

Pressure Treated Wood

The next best wood option is pressure-treated wood. Pressure treated wood is widely available and affordable. It’s easy to cut and it will stay bug-free when properly oiled and stained. However, weather extremes make it contract and expand, compromising its longevity over time.

Powdered Steel

Where there are serious concerns about weather-influenced changes in wood such as warping and splitting or constant insect infestations, steel posts are a great alternative. Steel is perfect for heavy decks especially in traffic intense areas like commercial premises. Powdered steel which has a protective layer allows for the post to exist in wet and humid conditions, preventing rust.

Aluminum

Aluminum posts are a good choice that balance costs and weatherproofing.

Aluminum is not prone to insect attacks or rust. Furthermore, it is also lighter and  more affordable than powdered steel.

Installation

**Footing:** A footing is a concrete or compacted gravel mixture providing a solid anchor for the post. The footing is either cylindrical or square and is placed in a hole in the ground. Generally, the footing is created, and then the post is installed on top of the set footing. This solid base makes the post more stable and minimizes shaking, shifting or tilting of the post and deck.

**Positioning:** Ideally, posts should be on level ground. If it's installed on a slope or uneven ground, it needs to be positioned vertically regardless of the angle.Posts come in a variety of thicknesses and the thicker the post, the more weight it can safely bear.  The typical range between post installation is 6 feet apart, using 4”x4” posts. If you are using  6”x6” posts, 8 feet apart is acceptable. If you want a more rigid deck, you can have more posts and space them closer to each other.

Securing Posts

**Bolting:** Galvanized carriage bolts secure the posts to the bearers (upper structure). They usually come in sizes of 5/16", 3/8", and 1/2" costing anything from 20 cents to about $3 each.

**Post Brackets:** When you mount the posts directly on a footing, you need a way to secure the post to the concrete underneath. This is when a contractor would use brackets. The brackets aresecured both to the footing and the post with anchor bolts, providing a strong, permanent attachment of the post to the footing.

Bearers: Foundation for the Deck

What are Bearers?

Bearers are large horizontal beams that rest on posts and carry the deck’s weight. They are placed perpendicular to the post forming a 90° angle.Their main job is to distribute the deck’s weight to the posts. However, they also serve a secondary function of allowing proper ventilation under the deck and between joists.

Material

As a foundational element to your deck, it's best to use high quality material. Because the bearers are exposed to the elements, building specialists recommend using  H3 treated pine. H3 treatment is a procedure applied to wood to condition it against weather damage in outdoor use. It also makes the wood resistant to decay, fungi buildup and insects.

Positioning and Installing Bearers:

**Alignment:** Correctly aligned bearers rest level and parallel to your home's support board (ledger). This basically means that the bearers are flush to your home, allowing for the homeowner to exit the home onto the deck and have it on the same plane as the home’s flooring. Thus, it's essential that the bearers are straight as to avoid sloping. Not only will sloping make using the deck uncomfortable, but it may also compromise the structural integrity and overall safety of the deck.

**Attaching Bearers to Posts:** A secure attachment of the bearers to the post is essential. A common way of securing the two together is with galvanized bolts.The most common size of galvanized bolts measure ⅜” in diameter for basic residential decks. Use bigger diameter bolts up to 9/16” for more stability in heavily loaded decks. You can also add diagonal bracing to complement the attachment, which helps to prevent shifts in the deck frame after long-term use.

Bearer Sizing

Since bearers are the main support for the upper deck, it's necessary to use thick lumber. The most common size for bearers is 5.5”x 1.77”. However, you can use 7.48”x 1.77” depending on the joist size. If your deck is not wide, you can use 3.45” x 1.77” bearers.

Joists

What are Joists?

Joists are the horizontal beams that lie on bearers and hold the deck’s upper boards. They are usually made from the same material as the bearers being hardwood or treated pine.

Joist Placement

The average width of joist timber is between 1.5 and 2 inches while the average height is between 5.5”-12.5”. The joists can be placed on the bearers or installed flush to the bearers using a notch and bracket connecting the joists to the bearers. If placed on top of the bearer, the joists are secured in place with galvanised bolts.  Spacing between each joist is about 18 inches apart depending on expected load. The correct positioning allows for even distribution and reduces sagging or warping with weather changes. Once all the joist boards are aligned and the surface is confirmed to be level, it is set for deck board installation.

Deck Flooring

Deck flooring is the floorboards of the deck.

The floor boards are about 1 to 1.5 inches wide. The floorboards are spaced 1/8 to 1/4 inches apart for wood or 3/16 to 1/4 inch for composite boards. The spacing accommodates for expansion and contraction from weather changes.

Deck Flooring Material

You can choose from wood, vinyl, or composite decking flooring material. Pressure treated pine is most affordable, while vinyl is more expensive, and composite is even more expensive. Wood requires a lot of maintenance including regular staining and sealing. Vinyl is a great choice, but somewhat ugly and fake looking, as it is just plastic, yet it's great as it's resistant to warping, mold, and pests.  Composite is often a combination of both natural and synthetic materials. It isn’t resistant to mold but does repel pests.

Deck Flooring Placement and Securing

The typical length of deck boards ranges from 8, 10, 12, 16, to 20 feet long. They are laid perpendicular to the joists. You can choose different patterns, the simplest being a straight placement. You can consider more intricate patterns for enhanced appeal. Deck boards are secured into joists using 1 inch screws or nails. You can use stainless steel or galvanized screws and nails for added protection against rust.

Common Deck Building Challenges and Solutions

* **Uneven Joist Heights:**

Problem: Joists of varying thickness can cause misalignment. Joists with different thickness will ruin the deck’s level alignment  and compromise its stability.

Solution: Get joists with equal thickness from one supplier. Place the joists on a flat surface. Use a level to confirm they have equal thickness before install.

* **Inconsistent Lumber Thickness:**

Problem: It’s common to find pressure-treated lumber with different thickness.

Solution: Inspect each component’s thickness ensuring every group's lumber has equal thickness before installation. Where there’s inconsistent thickness, use electric and manual planers to reduce excess thickness. Sand down minor thickness errors.

* **Warped Joists:**

Problem: When using lumber for decking, your frame may warp due to weather changes, especially after a long time.

Solution: Identify the warped joist. Remove the deck floor board directly above it. Wet the warped joist. Attach a strong straight board to it. Clamp together the 2 pieces and allow it to set. Once corrected, use a planer to ensure they’re level. Reinstall the decking floor board. Alternatively, you can replace warped lumber with harder wood or alternative material.

Takeaway: Decking Posts, Bearers, Joists and Frames

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| **Component** | **Purpose** | **Properties** |
| Frames | Forms the deck structure. | Stands on the posts and footing.  Consists of bearers and joists. |
| Posts | The vertical support structure that raises the deck above ground. | Anchored in concrete footing.  Can be made from H3 treated pine, cedar, or treated hardwood composite wood, steel or aluminum.  Measures 3.5”x3.5”, 4”x4” upto 4.5”x4.5”. Thicker posts offer more stability. |
| Bearers | Primary support structure.  Transfers weight to posts. | Horizontal wood boards resting on posts.  Measures 5.5”x1.75”, 7.5”x1.75”, or 4”x2” |
| Joists | Secondary support structure. | Vertical wood boards that rests perpendicular to bearers.  Typically measure between 1.5” and 1.75”.  Spaced in intervals of 18 or 24 inches depending on expected load weight. |

A deck is a simple structure but must have all the key elements in order for it to be safe and long-lasting. Abiding by the proper measurements necessary to allow for proper load-bearing capabilities are required. Deviating from standard timber sizes and spacing can lead to a dangerous and unstable deck. If you are looking for a new deck for your backyard, call us today at.