

TECHNICAL DATA SHEET

WIRE NAIL / COMMON NAIL / IRON NAIL / WOOD NAIL

TECHIONWHEEL Fasteners

GENERAL

A nail is a small part made of metal used as a fastener and commonly applied in woodworking and construction.

The primary function of the nail is to hold the material together in an axial direction by friction and subsequent shearing force. Sometimes the tip of the nail is also bent or clamped after driving to prevent it from coming out.

A nail has three basic parts: The nail **point** in different shapes help in drive into the work pieces, a **shank or shaft** that secures the work pieces together and provides much of the strength and holding power, and a **head** that are designed to accept the pointed end of the nail and helps prevent the nail from pulling through the work pieces.

Several types of nails are sized by length and wire gauge. The wire gauge used for nails is a particular version of the steel wire gauge. The bigger the number, the thinner the nail.

The company is producing not only **standardized** sizes but also **customized** Products in different wire gauges viz 06, 08, 10, 12, 14, 16, 18 in order to cater the customer demand.

Common Penny Nail Sizes and Lengths						
Add: 1/4 Inch to Last Penny Size 2d - 16d				Example	12d	3-1/4 Inch
2d	3d	4d	5d	6d	7d	3-1/2 Inch
9d	10d	12d	16d			
Add: 1/2 Inch to Last Penny Size 20d-60d				Example	20d	4 Inch
20d	30d	40d	50d	60d		4-1/2 Inch

HOW NAIL WORKS

A. FRICTION

When the nail goes into the wood, the wood fibers get compressed tightly around the nail and thus giving a tight hug. That hug creates Friction, which stops the nail from sliding out.

- Longer Nail = More Friction
- Thicker nail = More Surface Area = More Grip
- Softer Wood = More Compression = Tighter hold.

B. SHEAR AND WITHDRAWAL FORCE

As the nail enters, the fibers around it bend, crush, and wrap around the shank. These fibers try to "Spring back" to their original shape, and in that processes they latch onto the nail surface like tiny jaws. This gives the shear resistance (Stops sideways movement) and withdrawal resistance (stops pulling out). The nails are strongest in shear force as most of the load in wood construction is sideways, not pulling out. In case of withdrawal force (pull out), the screws are stronger than nails. Ring shank or Spiral nails add mechanical interlock, not just friction and hence they hold better.

C. BENDING STRENGTH

When a nail is hammered into wood, it often slightly bends internally. This bend creates a "hook effect" inside the wood, so even if friction reduces, the bend nail shape gives extra hold. It is like putting a tiny elbow inside the wood to lock itself.

Construction uses nails because structures see more shear loads. Furniture uses screws because pull-out strength matters more.

A nail is not meant for Cement or Concrete because wood grips due to fibers but cement has no fibers, no compression and no friction lock. Use Masonry nails (hardened steel nails) for cement, if needed, else anchor and screws.

Basically, the nail becomes a metal wedge locked in a wooden cage.



Techionwheel Private Limited

Doc. No.: 90000-91-11-TDS-01

Rev: 00 / 21-01-2026