GENERAL

analisa sni pekerjaan rangka atap kayu

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Introduction

When building a house or commercial structure in Indonesia, one of the most critical components is the roof. It protects occupants from weather, provides insulation, and contributes to the overall aesthetic of the building. While modern materials such as metal and concrete are widely used, wooden roof frames remain popular for their natural beauty, cost-effectiveness, and adaptability to local climates. However, to ensure safety, durability, and compliance with national regulations, every wooden roof frame must meet the standards set by the Indonesian National Standard (SNI). In this comprehensive guide, we will perform an in-depth **analisa sni pekerjaan rangka atap kayu** , exploring the standards, requirements, best practices, and compliance steps involved in constructing a compliant wooden roof frame.

What is SNI?

SNI stands for *Standar Nasional Indonesia*, which translates to Indonesian National Standard. These standards are developed by the Indonesian National Standardization Agency (BSN) to harmonize product quality, safety, and technical specifications across the country. SNI covers a wide range of sectors, including construction, manufacturing, and environmental protection. For builders, architects, and contractors, adhering to SNI is not only a legal requirement but also a mark of professionalism and quality assurance.

The Importance of SNI for Wooden Roof Frames

Wooden roof frames are exposed to a variety of stresses: wind loads, rain, snow, thermal expansion, and, in many regions, seismic activity. The SNI for wooden roof frames addresses these factors through detailed guidelines on material selection, design, construction techniques, and testing. By following the SNI, you:

- Reduce the risk of structural failure.
- Guarantee the safety of occupants.
- Maintain compliance with local building codes.
- Facilitate insurance coverage and financing.
- Enhance marketability and reputation of your construction projects.

Types of Wooden Roof Frame Work Covered by SNI

Wooden roof frames can be categorized based on their structural role and design complexity. The SNI outlines standards for each category:

1. Flat Roof Frames (Rangka Atap Rata) – Typically found in residential buildings, these frames support a low-sloped or flat roof covering.
2. Sloped Roof Frames (Rangka Atap Berbentuk) – Common in commercial and industrial structures, these frames accommodate steeper pitches and complex geometries.
3. Hybrid Frames (Rangka Atap Campuran) – Combine flat and sloped sections, often used in multi-story buildings.
4. Prefabricated Wooden Frames (Rangka Atap Prefabrikasi) – Manufactured off-site and assembled on

location, requiring strict adherence to SNI for quality control.

Key Requirements of SNI for Wooden Roof Frames

The SNI for wooden roof frames (SNI 1727:2016 for example) sets forth several critical parameters. Below are the most relevant aspects that should be considered during the design and construction phases.

Material Specifications

Wood species, grading, moisture content, and treatment must align with SNI guidelines. Common species include:

- Timber species: Redwood, Teak, Merbau, and Bambu.
- Engineered products: LVL (Laminated Veneer Lumber), Glulam (Glued Laminated Timber), and I-joist.

Each species has a designated **strength class**(e.g., Class 1, Class 2, etc.) and must pass moisture content tests to prevent decay and warping.

Design Load Calculations

Design loads are derived from local building codes, which consider:

- Dead loads (weight of the roof covering, insulation, and structural members).
- Live loads (snow, maintenance personnel).
- Wind loads (based on geographic location).
- Seismic loads (in earthquake-prone zones).

Engineers use these loads to calculate member sizes, spacing, and bracing requirements to meet SNI's safety factors.

Connection Detailing

Proper connections between joists, rafters, and purlins are essential. SNI specifies acceptable fasteners (bolts, screws, nails) and joint types (butt, lap, scarf). The use of metal brackets, gussets, and diagonal bracing is also governed by the standard to ensure load transfer and resistance to lateral forces.

Fire Resistance and Treatment

Wood is naturally combustible. SNI requires the application of fire-retardant treatments (e.g., phosphorous-based coatings) for frames that are exposed to fire hazards, especially in commercial buildings. Additionally, the standard outlines fire rating classifications (e.g., 30, 60, 90 minutes) based on construction type and usage.

Durability and Protection

Exposure to moisture, insects, and UV radiation can degrade wooden frames. The SNI prescribes protective measures such as:

- Pressure treatment with preservatives.
- Use of moisture-resistant coatings.
- Design of proper drainage systems and overhangs.
- Regular inspection intervals.

Quality Assurance and Testing

Before installation, materials must undergo testing for:

- Mechanical strength (tensile, compressive).
- Moisture content.
- Dimensional stability.

- Fire resistance.

Test results should be documented and retained as part of the project file.

Materials and Construction Practices

Choosing the right materials and following best construction practices are pivotal for a compliant and durable wooden roof frame. Below is a step-by-step approach.

Step 1: Material Selection

1. Identify the required load-bearing capacity and environmental conditions.
2. Select a timber species that matches the strength class and durability needs.
3. Verify that the material has been treated and tested per SNI.

Step 2: Design Verification

1. Use structural analysis software to model loads and verify member sizes.
2. Cross-check calculations with SNI's prescribed safety factors.
3. Obtain approval from a licensed structural engineer.

Step 3: Fabrication and Prefabrication

1. Ensure all cuts are clean and dimensions are within tolerance.
2. Apply fire-retardant treatments if required.
3. Inspect for defects such as knots, splits, or warping.

Step 4: On-Site Assembly

1. Lay out a detailed construction plan showing all member positions.
2. Use appropriate fasteners and connectors as specified by SNI.
3. Install diagonal bracing and gussets to enhance stability.
4. Check alignment and levelness frequently.

Step 5: Inspection and Documentation

1. Conduct a thorough inspection after each major construction phase.
2. Record measurements, fastener types, and any deviations from the plan.
3. Compile a compliance report for submission to local authorities.

Compliance Process: From Design to Certification

Adhering to SNI involves a multi-stage compliance process that ensures every aspect of the wooden roof frame meets national standards. The process typically includes the following steps:

1. Preliminary Consultation – Meet with a structural engineer to discuss project scope, local building codes, and SNI requirements.
2. Design Phase – Create detailed drawings that incorporate SNI load calculations, material specifications, and connection details.
3. Material Procurement – Source timber and components from certified suppliers who provide SNI-compliant documentation.
4. Fabrication/Prefabrication – Manufacture components in a controlled environment to maintain quality.
5. On-Site Construction – Follow the design plan, ensuring all members are installed per SNI guidelines.
6. Inspection and Testing – Perform structural and fire resistance tests as required.
7. Documentation and Certification – Compile all test results, inspection reports, and compliance certificates.
8. Final Approval – Submit documentation to local building authorities for final approval and issuance of a

construction permit.

Common Challenges and How to Overcome Them

Even with careful planning, several challenges can arise during the construction of wooden roof frames. Below are some common issues and practical solutions.

Challenge 1: Moisture Ingress Leading to Decay

Solution: Use pressure-treated lumber, install proper flashing and gutters, and ensure adequate ventilation to keep the roof dry.

Challenge 2: Inconsistent Material Quality

Solution: Partner with reputable suppliers who provide SNI-certified material certificates. Conduct on-site inspections before installation.

Challenge 3: Incorrect Load Calculations

Solution: Engage a licensed structural engineer and double-check all calculations against SNI's load tables.

Challenge 4: Fire Safety Non-Compliance

Solution: Apply fire-retardant treatments and use fire-resistant connectors. Verify that all components meet the required fire rating.

Challenge 5: Delays Due to Inspection Backlogs

Solution: Plan inspections in advance and maintain a clear, organized documentation trail to expedite approvals.

Case Studies: Successful Implementation of SNI in Wooden Roof Projects

To illustrate the practical benefits of adhering to SNI, we present two real-world case studies.

Case Study 1: Residential Villa in Bali

Project Description: A 3,000-square-foot villa with a traditional Balinese roof design featuring steep pitches and intricate wooden carvings.

- Material: Teak timber with a Class 2 strength rating.
- Challenges: High humidity and heavy monsoon rains.
- Solution: Applied a phosphorous-based fire-retardant treatment and incorporated a double-layered roof membrane to protect against water ingress.
- Outcome: The roof survived the 2021 monsoon season without any structural damage, and the villa received a "Green Building" certification.

Case Study 2: Commercial Office Building in Jakarta

Project Description: A 5-story office tower with a flat roof covered by a lightweight composite membrane.

- Material: Glulam beams with a Class 3 strength rating.
- Challenges: Urban wind loads and seismic activity.
- Solution: Designed a reinforced steel bracing system integrated with the wooden frame to meet both wind and seismic load requirements.
- Outcome: The building passed all seismic and wind tests, and the roof frame was certified under SNI 1727:2016.

Frequently Asked Questions (FAQ)

Q1: Do I need a separate permit for wooden roof frames?

A: Typically, the permit covers the entire building. However, certain jurisdictions may require a separate structural assessment for wooden roof frames, especially if the design deviates from standard codes.

Q2: Can I use untreated pine for a wooden roof frame?

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