Technical Manual: Recycled Plaster Wall Finishes

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Course: Circular Design for Interiors — Sustainable Wall Finishes with Recycled Plaster
Audience: Designers, artisans, architects, and builders

1. Introduction

This manual provides **practical recipes and techniques** for transforming plaster waste into sustainable wall finishes. It covers material sourcing, preparation, mixing ratios, application methods, and finish design. By following these steps, learners will be able to create elegant, low-carbon surfaces while reducing construction waste.

2. Safety Guidelines

- Always wear **dust mask, gloves, and goggles** when handling dry plaster.
- Avoid skin contact with lime (alkaline, can burn skin). Use protective cream or gloves.
- Work in **well-ventilated areas**.
- Dispose of contaminated water responsibly (do not pour into drains in large amounts).

3. Materials List

Core Components

- **Recycled plaster powder** (from demolition waste or studio offcuts)
- **Binders**: hydrated lime, clay, or small % virgin gypsum
- **Aggregates**: fine sand, marble dust, natural fibers (hemp, straw, cellulose)

- **Water**: clean and potable
- **Natural pigments**: iron oxides, clays, earth powders, plant dyes

Optional Additives

- **Casein (milk protein)** or starch for hardness
- **Potassium soap or beeswax** for sealing tadelakt finishes

4. Tools & Equipment

- Hammer / chisel / crusher (for breaking chunks)
- Sieves (2–3 mm, 0.5 mm)
- Buckets, scales, and measuring cups
- Mixing paddle or drill whisk
- Trowels (steel, plastic, or Japanese style)
- Floats (wooden, sponge, or felt)
- Brushes and sponges for textures
- Spray bottle (for water misting)

5. Step-by-Step Methodology

5.1 Recycling Plaster Waste

1. **Collection**: Gather waste plaster. Remove nails, paint, adhesives, or other contaminants.
2. **Breakdown**: Crush larger chunks with hammer or crusher.
3. **Drying**: Ensure plaster is fully dry before processing.

4. **Sieving**: Pass through sieve to remove coarse particles.
5. *(Optional)* **Calcination**: Heat plaster at ~150–200°C to restore binding strength.

5.2 Mixing Recipes

Base Mix (General Wall Finish)

- 70% recycled plaster
- 20% hydrated lime
- 10% fine sand or marble dust
- Water: ~0.6 parts to 1 part dry mix (adjust for creamy texture)

Textured Finish (Earthy Look)

- 60% recycled plaster
- 20% clay
- 20% coarse sand / fibers
- Pigments: 2–5% of dry mix

Smooth / Polished Finish (Tadelakt-style)

- 80% recycled plaster
- 15% lime
- 5% marble dust
- Burnish with a steel trowel + soap solution

5.3 Application Layers

1. **Scratch Coat** (3–5 mm)

    - Rough layer with sand for adhesion.
    - Scratch lines into surface before drying.
2. **Base Coat** (3–5 mm)
    - Apply with trowel, level flat.
    - Allow to partially set.
3. **Finish Coat** (1–3 mm)
    - Apply smooth or textured, depending on design.
    - Add pigments at this stage for coloration.

5.4 Pigments & Additives

- Mix pigments into dry plaster before adding water for even tone.
- For marbled effects: swirl pigments into wet plaster during application.
- Use natural oxides (red, yellow, brown, black), clay powders (ochre, sienna), or vegetable dyes.

5.5 Finishing & Sealing

- Allow plaster to **cure slowly** (cover lightly to avoid rapid drying).
- For polished finishes:
    - Burnish surface with trowel while slightly damp.
    - Apply soap solution (olive soap + water) or beeswax for waterproofing.
- For matte finishes: leave untreated or seal with limewash.

6. Troubleshooting

Problem	Cause	Solution
Cracking	Too rapid drying, too much water, thick layers	Apply thinner coats, mist lightly, cover with cloth during curing
Bubbling	Contaminated plaster or improper sieving	Re-sieve plaster, test smaller batches
Weak adhesion	Surface not prepared, wall too smooth	Use bonding primer or roughen wall
Uneven color	Pigment not mixed thoroughly	Pre-blend pigment into dry plaster

7. Sample Exercises for Learners

- **Exercise 1:** Prepare a **10×10 cm test board** with base recipe.
- **Exercise 2:** Create one **textured sample** using fibers/sand.
- **Exercise 3:** Create one **pigmented sample** using natural oxides.
- **Exercise 4:** Compare drying and cracking behavior between recipes.

8. References & Further Reading

- Clayworks Closed-Loop Plaster Systems
- EU Circular Construction Guidelines