Earthbind® Stabilizer / EBS

Indirect Tensile Strength (ITS) Testing

Overview and Frequently Asked Questions for Stabilization Mix Design

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1. Why Earthbind® Uses ITS Testing

Earthbind® Stabilization (EBS) uses **Indirect Tensile Strength (ITS) testing** to determine the **optimal emulsion content** required to stabilize blended aggregates and/or soils used in base layers.

Our goal is to design mixes that:

- Achieve **measurable performance**
- Meet or exceed a **minimum ITS strength of 40 psi**
- Use the **lowest effective emulsion dosage** for durability and cost efficiency

ITS testing is widely recommended by industry organizations, including the **Asphalt Recycling and Reclaiming Association (ARRA)**, for stabilization and recycling mix design.

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2. What Is ITS Testing?

Indirect Tensile Strength (ITS) testing measures how well a compacted material resists **tensile (pull-apart) forces**.

During the test:

- A cylindrical specimen is loaded across its diameter
- The applied load induces tensile stresses inside the sample
- The resulting failure reflects the material's **cohesion and bonding**

In practical terms, ITS answers a critical question:

How well does this Earthbind-stabilized material hold together under load?

This makes ITS especially well-suited for evaluating **emulsion-stabilized base and soil materials**, where performance depends on binder-aggregate bonding rather than asphalt flow.

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3. Why Tensile Strength Matters for Stabilized Bases

Earthbind® stabilization is used to create **bound base layers**, not flexible asphalt surfaces. These materials:

- Depend on **cohesion and internal strength**
- Must resist cracking, breakup, and raveling
- Do not behave like hot-mix asphalt

Because tensile cracking and cohesion loss are common failure mechanisms in stabilized bases, **tensile strength is a more meaningful performance indicator** than traditional asphalt mix tests.

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4. Why Earthbind® No Longer Uses Marshall Testing for Stabilization

Marshall testing was originally developed for **hot-mix asphalt surface courses**, not for stabilized base materials.

While Marshall testing was used historically in some stabilization work, it has limitations when applied to Earthbind®-treated bases:

Limitations of Marshall Testing for EBS

- Focuses on **stability and flow**, not cohesion
- Designed for **high-temperature asphalt mixtures**
- Does not directly measure tensile cracking resistance
- Less sensitive to changes in emulsion content in soil-aggregate blends

As stabilization practices evolved, ITS testing became the preferred method because it better reflects **how stabilized base materials actually perform in the field**.

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5. Why ITS Is the Preferred Test for Earthbind® Mix Design

Earthbind® relies on controlled binder interaction with aggregates and soils. ITS testing directly evaluates that interaction.

Key Advantages of ITS for EBS

- Direct measure of **cohesion and tensile strength**
- Sensitive to **emulsion dosage changes**
- Applicable to **soil–aggregate blends**
- Correlates well with stabilized base performance
- Supported by modern industry guidance

For these reasons, ITS testing is used as the **primary performance criterion** in Earthbind® stabilization mix designs.

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6. Minimum Strength Target: 40 psi

A minimum ITS value of **40 psi** is commonly used for stabilized base materials and is widely referenced in industry guidance.

This threshold:

- Demonstrates meaningful improvement over untreated material
- Indicates effective binder-aggregate bonding
- Has a proven track record of satisfactory field performance

In Earthbind® mix design, the **optimum emulsion content** is typically selected as the **lowest dosage that consistently meets or exceeds 40 psi**, ensuring performance without over-treatment.

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7. How Earthbind® Uses ITS in Mix Design

Earthbind® mix designs follow a structured, performance-based approach:

1. Multiple EBS concentrations are evaluated (typically 2%, 3%, and 4%)
2. Samples are compacted and cured under controlled conditions
3. ITS testing is performed on each mix

4. Results are compared to the minimum strength target
5. The optimal emulsion content is selected based on:
    - Strength
    - Consistency
    - Constructability
    - Practical field application

This approach ensures Earthbind® stabilization is **engineered**, not guess-based.

Frequently Asked Questions (FAQ)

Q1: What does ITS testing tell me as an owner or contractor?

It confirms that the Earthbind®-stabilized material has **enough internal strength and cohesion** to function as a durable bound base layer.

Q2: Why is 40 psi used as the benchmark?

Because it represents a **recognized performance threshold** that indicates effective stabilization and reliable base performance.

Q3: Does a higher ITS value always mean a better mix?

Not always. The goal is to achieve **adequate strength with the minimum effective emulsion content**. Excess binder can increase cost and may affect constructability.

Q4: Why doesn't Earthbind® use Marshall testing anymore?

Marshall testing was developed for hot-mix asphalt. ITS testing provides a **more relevant and reliable measure of performance** for emulsion-stabilized bases and soils.

Q5: Is ITS testing accepted by the industry?

Yes. ITS testing is widely used by agencies, consultants, and laboratories involved in stabilization and recycling work and is supported by organizations such as ARRA.

Q6: Does ITS testing replace all other lab tests?

No. ITS is a **key performance test**, but it is used alongside gradation, moisture-density relationships, and other material characterization tests as appropriate.

Q7: Is there a specific test method used for Indirect Tensile Strength (ITS) testing in Earthbind® mix designs?

Yes. Indirect Tensile Strength (ITS) testing for Earthbind® Stabilization (EBS) mix designs is performed in **general accordance with ASTM D6931**, *Standard Test Method for Indirect Tensile (IDT) Strength of Bituminous Mixtures*.

Because ASTM D6931 was originally developed for asphalt mixtures, certain specimen preparation, curing, and conditioning steps are **adapted for emulsion-stabilized aggregate and soil materials**. These adaptations are standard practice in stabilization mix design and do not affect the validity of the tensile strength measurement.

ITS testing is used by Earthbind® as a **mix design and optimization tool**, not as construction acceptance testing. A minimum ITS strength of **40 psi** is used as the performance benchmark, consistent with common industry guidance.

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8. Summary

Earthbind® uses Indirect Tensile Strength (ITS) testing because it provides a **direct, meaningful measure of stabilization performance**. ITS testing ensures that each mix design:

- Meets recognized performance targets
- Uses emulsion efficiently
- Reflects real-world base behavior
- Aligns with modern stabilization practices

This approach delivers **durable, cost-effective, and performance-driven stabilization solutions**.