



**INDUSTRIES**  
— ISO 9001: 2015 COMPANY —

# COMBAT LEAKS BEFORE THEY BEGIN: DISCOVER INDIA'S MOST ADVANCED PU GROUT

ENGINEERED BY ADT INDUSTRIES. TRUSTED ON OVER 500 PROJECTS NATIONWIDE.



# TABLE OF CONTENTS

| PAGE | TOPIC                                              |
|------|----------------------------------------------------|
| 3    | Executive Summary & Product Overview               |
| 4    | Understanding Concrete Failure – The Hidden Crisis |
| 5    | Why Traditional Repair Methods Fall Short          |
| 6    | ESSRBOND GS 500 – Technical Innovation Explained   |
| 8    | The Science of Polyurethane Injection Grouting     |
| 10   | Technical Specifications & Performance Data        |
| 12   | Quality Control & Testing Protocols                |
| 14   | Troubleshooting Guide – Expert Solutions           |
| 15   | Safety Protocols & Environmental Compliance        |
| 16   | Quality Assurance & ISO Standards                  |
| 17   | About ADT Industries & Contact Information         |

# EXECUTIVE SUMMARY & PRODUCT OVERVIEW

## The Reality of Concrete Infrastructure

After a decade in structural waterproofing and concrete repair, the evolution of injection grouting from experimental technology to essential infrastructure maintenance. Today's concrete structures face unprecedented challenges: aggressive chemical exposure, extreme weather cycles, and accelerated ageing due to modern construction practices.

ESSRBOND GS 500 represents the culmination of advanced polymer chemistry specifically engineered for Indian construction conditions. This single-component polyurethane injection grout addresses the critical gap between traditional repair methods and the performance demands of modern infrastructure.

## Product Classification

ESSRBOND GS 500 is a one-component, moisture-reactive polyurethane injection grout designed for professional structural repair applications. Upon contact with water, it expands up to 27x of its original volume, creating a closed-cell hydrophobic foam that permanently seals concrete cracks and voids.

## PRIMARY APPLICATIONS

- Active water leak repair in concrete structures
- Crack injection for structural integrity restoration
- Void filling in foundation and basement systems
- Tunnel and underground waterproofing
- Joint sealing in precast concrete elements
- Soil stabilization around foundation systems



## WHY THIS GUIDE MATTER?

Professional contractors need more than product specifications—they need application intelligence. This comprehensive guide delivers both the technical foundation and practical expertise required for consistent project success with ESSRBOND GS 500.

## KEY PERFORMANCE ADVANTAGES

- Rapid Reaction Time: 110-second gel time for active leak situations
- Massive Expansion: Up to 27x volume increase for complete void filling
- Chemical Resistance: Excellent performance against acids, alkalis, and solvents
- Temperature Stability: Maintains performance from -40°C to +80°C
- Long-term Durability: Proven 15+ year performance in harsh environments

# UNDERSTANDING CONCRETE FAILURE

## THE HIDDEN CRISIS

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### **The Economics of Concrete Deterioration**

India's concrete infrastructure crisis is largely invisible until catastrophic failure occurs. Recent industry studies indicate that 60% of concrete structures over 20 years old exhibit some form of water ingress damage, with repair costs escalating exponentially when intervention is delayed.



### **PRIMARY FAILURE MECHANISMS**

**Thermal Movement Cracking** Concrete's coefficient of thermal expansion creates predictable stress patterns. Daily temperature variations of 15–20°C, common across India, generate micro-cracks that propagate over time. These hairline fractures become pathways for water penetration, initiating the deterioration cycle.

**Chemical Attack Degradation** in India's diverse chemical environment—from coastal salt exposure to industrial pollutants—accelerates concrete deterioration. Chloride penetration, sulfate attack, and carbonation reduce the concrete's alkalinity, compromising its structural integrity and enabling water infiltration.

**Construction Joint Failure** Cold joints, construction joints, and interface connections represent the weakest points in concrete systems. Poor workmanship, inadequate sealing, or material incompatibility create pathways for water ingress that traditional surface treatments cannot address.

**Foundation Settlement** Differential settlement, common in India's varied soil conditions, creates stress concentrations that manifest as structural cracks. These cracks often extend through the full thickness of concrete elements, requiring injection treatment for permanent repair.

# WHY TRADITIONAL REPAIR METHODS FALL SHORT

## The Limitations of Conventional Approaches



**Surface Coating Deficiencies:** After supervising hundreds of waterproofing projects, the pattern is consistent: surface-applied solutions fail within 3-5 years. Coatings cannot address structural cracks, resist hydrostatic pressure, or accommodate building movement. They create a false sense of security while water continues to infiltrate through untreated pathways.

**Membrane System Vulnerabilities:** External waterproofing membranes, while effective when properly installed, suffer from accessibility limitations. Existing structures rarely allow complete membrane installation, creating discontinuities that become failure points. Membrane punctures, seam failures, and ageing compromise long-term performance.

**Cementitious Repair Limitations:** Traditional cement-based crack repairs lack the flexibility to accommodate structural movement. Rigid repairs often fail due to differential thermal expansion, creating new pathways for water ingress. The repair becomes the weak point in the system.

## THE INJECTION GROUTING ADVANTAGE

**Modern polyurethane injection technology addresses these limitations by:**

- Treating root causes, not just symptoms
- Providing structural flexibility while maintaining waterproof integrity
- Offering single-application solutions with minimal project disruption
- Supporting extended warranty periods with proven long-term performance
- Delivering superior cost-effectiveness over the building lifecycle

# ESSRBOND GS 500 - TECHNICAL INNOVATION EXPLAINED

## ADVANCED POLYMER CHEMISTRY

ESSRBOND GS 500 represents a significant advancement in polyurethane injection technology. The single-component formulation eliminates mixing errors while providing controlled reaction characteristics essential for professional applications.

## MOLECULAR STRUCTURE ADVANTAGES

- **Prepolymer System** The GS 500 formulation utilizes a carefully engineered prepolymer that remains stable during storage but reacts predictably when exposed to moisture. This provides contractors with extended working time for complex injection procedures while ensuring rapid curing once injection begins.



- **Controlled Cell Structure Formation** Upon water contact, GS 500 forms a closed-cell foam structure with uniform density distribution. This cellular architecture provides optimal compression resistance while maintaining the flexibility necessary for structural movement accommodation.
- **Hydrophobic Chemistry** The cured foam exhibits permanent hydrophobic characteristics, repelling water even under hydrostatic pressure. This prevents secondary deterioration common with water-sensitive repair materials.

## PERFORMANCE ENGINEERING FEATURES

- **Expansion Control Technology** GS 500's expansion characteristics are engineered for professional predictability. The maximum 27x expansion occurs under optimal conditions, but the reaction can be controlled through water ratio management and temperature considerations.
- **Adhesion Enhancement** The polymer chemistry includes adhesion promoters that create strong bonds with concrete substrates. This prevents the foam disbondment that compromises alternative injection materials.
- **Chemical Resistance Formulation** Industrial-grade chemical resistance ensures long-term performance in aggressive environments. The polymer structure resists degradation from acids, alkalis, solvents, and environmental contaminants common in Indian construction conditions.

APPLICATION-SPECIFIC ADVANTAGES



- **Temperature Performance Range:** GS 500 maintains consistent performance characteristics across India's diverse climate zones. From Himalayan cold to desert heat, the material provides reliable injection characteristics and long-term durability.
- **Viscosity Optimization:** The material viscosity is engineered for optimal injection characteristics—low enough for penetration into hairline cracks, yet stable enough for controlled application in larger voids.
- **Cure Profile Management:** The 110-second gel time provides sufficient working time for professional injection procedures while ensuring rapid strength development for active leak situations.

GS 500 uses advanced pre-polymer chemistry. When injected into concrete, it reacts with moisture to form a hydrophobic, closed-cell foam.

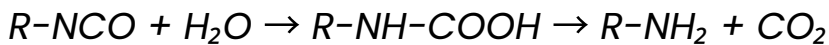
| HOW IT WORKS:                                                                                                                                                                                                           | WHY IT'S BETTER:                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div>1.Moisture contacts resin</div> <div>2.Reaction creates CO<sub>2</sub> and cross-linked foam</div> <div>3.Foam expands up to 27x to seal cracks</div> <div>4.Result: Dense, elastic, water-resistant barrier</div> | <div>1.No shrinkage post-curing</div> <div>2.Bonds firmly to wet concrete</div> <div>3.Forms an inert, non-toxic seal</div> <div>4.Doesn't swell or break down in water</div> |

# THE SCIENCE OF POLYURETHANE INJECTION GROUTING

## REACTION CHEMISTRY FUNDAMENTALS

**Moisture-Activated Polymerization** ESSRBOND GS 500 utilizes isocyanate-terminated prepolymers that react with water molecules to form urea linkages. This reaction simultaneously creates the polymer network and generates CO<sub>2</sub> gas, driving the expansion process.

### THE CHEMICAL REACTION FOLLOWS THIS PATHWAY:



- **Foam Formation Mechanism:** The generated CO<sub>2</sub> creates nucleation sites for foam cell formation. The polymer chains crosslink during gas generation, creating a stable cellular structure with controlled density and mechanical properties.
- **Crosslinking Density Optimization:** GS 500's formulation balances crosslinking density to achieve optimal performance characteristics. Excessive crosslinking creates brittleness, while insufficient crosslinking reduces strength and chemical resistance.

## PHYSICAL PROPERTIES DEVELOPMENT

### Phase Transformation Process

1. Initial Contact: Liquid polymer contacts moisture
2. Reaction Initiation: Chemical reaction begins, viscosity increases
3. Gel Point: Material transitions from liquid to semi-solid
4. Expansion Phase: Gas generation drives volume increase
5. Curing Phase: Crosslinking completes, final properties develop



**Mechanical Property Evolution: The foam develops mechanical properties progressively:**

- 15 seconds: Initial structural integrity
- 60 seconds: Handling strength achieved
- 10 minutes: Operational strength development
- 24 hours: Full mechanical property development

## EXPANSION CONTROL PRINCIPLES

**Water Ratio Management:** The expansion ratio directly correlates with available water content. Professional applications require understanding this relationship for predictable results:

- **1:1 ratio:** Minimum expansion (~500%)
- **2:1 ratio:** Standard expansion (~1,500%)
- **10:1 ratio:** Maximum expansion (~2,700%)

**Temperature Effects** Reaction rate and final expansion vary with temperature:

- **Low temperatures:** Slower reaction, reduced expansion
- **Optimal range (20–25°C):** Predictable performance characteristics
- **High temperatures:** Accelerated reaction, potential over-expansion

Hydrostatic Pressure  
Considerations Expansion  
characteristics change under  
hydrostatic pressure. Professional  
applications require pressure  
compensation calculations for  
accurate material quantity  
determination.

Polyurethane grouting with GS 500  
relies on isocyanate-based  
chemistry that reacts with water.

## CURING TIMELINE:

- 15 sec: Initial set
- 110 sec: Gel point
- 10 mins: Handling strength
- 24 hrs: Full strength

## FOAM EXPANSION CONTROL:

- 1:1 water:resin → 500% expansion
- 10:1 ratio → 2700% expansion

## ENVIRONMENT ADJUSTMENTS:

- Cold slows reaction
- Heat speeds up cure
- Higher humidity = faster foam



**Golden Rule:** Inject bottom-up. Monitor foam travel. Don't over-pressurise.

# TECHNICAL SPECIFICATIONS & PERFORMANCE DATA

## REACTION CHARACTERISTICS

| Parameter            | Value                   | Application Impact         |
|----------------------|-------------------------|----------------------------|
| Gel Time (2:1 ratio) | 110 seconds             | Working time for injection |
| Induction Time       | 15 seconds              | Reaction initiation delay  |
| Max Expansion        | Up to 2,700% @ 25°C     | Void-filling capability    |
| Expansion Rate       | Complete in 5-8 minutes | Predictable timeline       |
| Water Absorption     | <2% by weight           | Hydrophobic performance    |

## QUALITY CONTROL PARAMETERS

### Storage Requirements:

- Temperature: 0°C to 30°C
- Humidity: <85% RH
- Container: Original sealed packaging
- Shelf Life: 12 months sealed, 3 months after opening

### Application Conditions:

- Substrate Temperature: 5°C to 35°C
- Air Temperature: 5°C to 35°C
- Relative Humidity: 40% to 90%
- Minimum Crack Width: 0.1mm

MECHANICAL PROPERTIES (CURED FOAM)

| Property               | Value           | Standard   | Application Relevance   |
|------------------------|-----------------|------------|-------------------------|
| Tensile Shear Strength | 4 N/mm²         | -          | Structural integrity    |
| Compressive Strength   | 0.15-0.25 N/mm² | ASTM D1621 | Load-bearing capability |
| Flexural Strength      | 0.3-0.5 N/mm²   | ASTM D790  | Movement accommodation  |
| Density (Cured)        | 80-120 kg/m³    | -          | Structural loading      |

CHEMICAL RESISTANCE PERFORMANCE

Excellent Resistance:

- Mineral acids (concentration ≤ 30%)
- Alkaline solutions (pH ≤ 12)
- Aliphatic hydrocarbons
- Most organic solvents
- Salt solutions and seawater

Good Resistance:

- Concentrated acids (short-term exposure)
- Strong alkaline solutions
- Aromatic hydrocarbons
- Glycols and alcohols

LIMITED RESISTANCE:

- Strong oxidizing agents
- Chlorinated solvents (extended exposure)
- Concentrated sulfuric acid

# QUALITY CONTROL & TESTING PROTOCOLS

## FIELD TESTING METHODOLOGY

Real-Time Professional demands measures. Waiting for results compromises project timelines and increases risk exposure.

Quality injection real-time quality control

Verification grouting

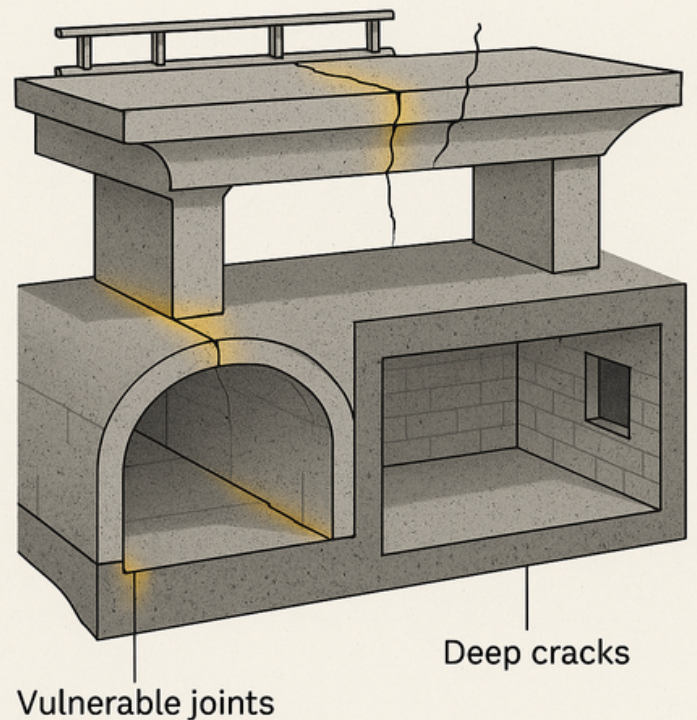
## IMMEDIATE ASSESSMENT TECHNIQUES

### Visual Inspection Criteria

- **Foam Emergence:** Confirmation of complete crack penetration
- **Colour Uniformity:** Consistent curing throughout the injection zone
- **Surface Adherence:** Proper bond development to the concrete substrate

- **Expansion Characteristics:** Appropriate volume increase without over-expansion

where sealing is needed.



**Pressure Testing Protocol** Post-injection pressure testing provides immediate performance verification:

1. **Wait Period:** Allow 30-60 minutes for initial strength development
2. **Test Pressure:** Apply 1.5x anticipated service pressure
3. **Duration:** Maintain test pressure for 15 minutes minimum
4. **Assessment:** No pressure drop indicates successful injection

### Performance Verification Standards

- **Pull-Off Testing:** ASTM D4541 standard methodology
- **Minimum Values:**  $>2.5 \text{ N/mm}^2$  for structural applications
- **Test Frequency:** Minimum 3 tests per  $100\text{m}^2$  injection area
- **Documentation:** Record all test results with location references

**Bond Strength Testing** Field-portable adhesion testing equipment enables immediate bond verification:

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## Long-Term Performance Monitoring

Monitoring Protocol Development Professional applications require structured, long-term monitoring programs. Based on field experience, the following protocol ensures reliable performance tracking:

### INITIAL MONITORING PHASE (0-6 MONTHS)

- **Monthly Visual Inspections:** Document any changes or deterioration
- **Quarterly Performance Testing:** Repeat adhesion and water penetration tests
- **Environmental Monitoring:** Track temperature, humidity, and chemical exposure
- **Documentation:** Maintain comprehensive records for warranty support

### OPERATIONAL MONITORING PHASE (6 MONTHS - 5 YEARS)

- **Semi-Annual Inspections:** Professional assessment of injection integrity
- **Annual Performance Testing:** Comprehensive testing of critical areas
- **Preventive Maintenance:** Address minor issues before they become major problems
- **Performance Documentation:** Update performance records for future reference

## QUALITY ASSURANCE DOCUMENTATION

### Project Documentation Requirements

- **Pre-Application Assessment:** Complete structural and environmental evaluation
- **Installation Records:** Detailed documentation of injection parameters
- **Testing Results:** All field testing data with location references
- **Material Certifications:** Batch testing certificates and compliance verification
- **Warranty Documentation:** Comprehensive warranty support materials

**Professional Certification Standards** Quality assurance extends beyond material performance to application competency:

- **Installer Certification:** Verify technical competency before project assignment
- **Equipment Calibration:** Ensure all testing equipment meets accuracy standards
- **Process Compliance:** Verify adherence to established procedures
- **Continuous Improvement:** Update procedures based on field experience and performance data

# TROUBLESHOOTING GUIDE – RESOLVING

Even the highest quality materials require skilled handling to achieve optimal results. When it comes to polyurethane grouting, challenges can arise, and effective troubleshooting distinguishes experienced professionals from novices in the field.



## ESSRBOND GS500 – Troubleshooting Guide: Resolving Common Issues



### Issue: Incomplete Foaming

Ensure proper water exposure at the crack site.  
Recheck dosage and injection pressure.



### Issue: Poor Adhesion to Surface

Clean and pre-wet the substrate properly.  
Use recommended injection tools.



### Issue: Leakage Persists After Application

Identify hidden voids or secondary cracks.  
Re-inject at slow, steady pressure



### Issue: Premature Reaction in Pump

Flush lines before and after each use, Avoid prolonged idle time during application.



### Best Practices:

- Use PPE while handling materials.
- Follow exact mixing ratio and injection depth.
- Store in a cool, dry place away from sunlight



If you encounter issues with the GS 500 not expanding as intended, the moisture content is often a common factor at play. It is essential to rehydrate the substrate effectively; consider applying additional moisture or revisiting the resin-to-water ratio to ensure it is within the recommended range. In situations where leaks continue to be problematic following the injection process, be diligent about the configuration of your packers. Arranging them in a staggered zigzag pattern can facilitate better foam overlap and enhance sealing efficacy.

Should you notice backflow at the packer, this could indicate two potential issues: excessive pressure build-up or inadequate anchoring of your packers. Adjusting your technique by switching to a lower PSI setting can prevent pressure-related complications, while properly repositioning the packers will help secure a more effective seal.

Another common issue is uneven expansion, which frequently signals drastic variations in temperature. It's crucial to assess the ambient conditions surrounding your work area and check the viscosity of the resin to ensure both are conducive to proper expansion.

A fundamental principle to abide by in this process is: Start low and go slow. Carefully monitor the flow of material, maintain consistent pressure throughout the application, and rely on visual observations to guide your adjustments. When GS 500 is utilized correctly, it proves to be nearly foolproof; however, proactive troubleshooting is essential in safeguarding your professional reputation and ensuring that your projects remain watertight. Adopting these best practices will not only improve your results but also enhance your credibility in the industry.

# SAFETY PROTOCOLS & ENVIRONMENTAL COMPLIANCE

When it comes to polyurethane injection, prioritizing safety is not just a guideline; it is a fundamental requirement. ESSRBOND GS 500 is meticulously engineered for professional applications, meaning that only trained and experienced personnel should handle it, always utilizing appropriate personal protective equipment (PPE) and adhering to stringent protocols.

Applicators are required to wear nitrile gloves to protect their skin, along with safety goggles to shield their eyes from any splashes or airborne particles. Additionally, certified respirators must be worn to ensure that workers are protected from inhaling fumes that could arise during the application process. Given the nature of the work, ensuring adequate ventilation in the work area is paramount; this is especially critical in confined spaces such as tunnels or basements, where air circulation may be limited.

Should there be any direct contact with the skin, it is crucial to act promptly by rinsing the affected area with isopropyl alcohol to help neutralize any residue, followed by a thorough wash with soap and water to ensure complete skin safety.

Proper storage of ESSRBOND GS 500 plays an equally vital role in maintaining safety and effectiveness. It is essential to keep the material tightly sealed in its original container and stored away from direct sources of heat or flames. The ideal storage temperature for this product should be maintained between 0°C and 30°C to preserve its integrity and performance.

The encouraging aspect of using GS 500 is that, once it has fully cured, it becomes completely inert, non-toxic, and emits no harmful volatile organic compounds (VOCs). This means that it is not only a high-performance grout that meets rigorous standards but also a responsible choice for both users and the environment.



## ESSRBOND GS500 SAFETY PROTOCOLS & ENVIRONMENTAL COMPLIANCE



### Non-Toxic, Non-Shrinking

The cured foam is inert, maintaining a constant volume without releasing harmful gases or shrinking over time.



### Water-Resistant & Stable

Performs even under wet or dry conditions—ideal for negative-side waterproofing without risk of reactivation or degradation.



### Minimal Environmental Impact

Water is not a component of the foam structure, ensuring minimal water contamination or leaching during application.



### Safe Application Process

Engineered for deep penetration into microcracks with excellent adhesion—requires standard PPE only.



### Durable & Non-Corrosive

Remains chemically stable and does not react with surrounding materials, ensuring long-term structural safety.

# QUALITY ASSURANCE & ISO STANDARDS

Quality isn't merely a box to tick; it embodies the very culture of our operations. Each batch of ESSRBOND GS 500 undergoes an extensive evaluation process conforming to the rigorous standards established by ISO 9001:2015 protocols before it is allowed to leave our manufacturing facility.

Every step of the testing process is meticulously documented. We assess gel time accuracy to ensure optimal curing conditions, monitor expansion rates to achieve desired foam characteristics, and test bond strength against a master reference to guarantee reliability in structural integrity. If any batch does not meet our stringent quality criteria, it is not shipped—simple as that.



For warranty claims, we require complete and detailed documentation. This includes both pre- and post-injection photographs, results from pull-off tests, and the associated material batch numbers. By adhering to these protocols, your team can take full advantage of our commitment to backing the performance of GS 500 for an impressive duration of up to 15 years.

## COMPARATIVE ANALYSIS – WHY GS 500 OUTPERFORMS



### COMPARATIVE ANALYSIS

#### WHY GS 500 LEADS

- Broad Sector Exposure
- Top Companies Included
- Consistent Performance
- Market Confidence

Selecting the appropriate injection material can significantly influence the success of a project. When comparing ESSRBOND GS 500 with traditional options like cement grouts and epoxies, it emerges as a groundbreaking choice that sets a new benchmark in the industry.

One of the standout features of ESSRBOND GS 500 is its remarkable 2,700% expansion capacity.

This exceptional property allows the material to fill voids, ensuring no gaps remain—an essential requirement especially in situations where there are active leaks. Unlike conventional cement and epoxy materials, which harden into a rigid structure, GS 500 maintains flexibility even after curing. This flexibility is crucial as it enables the material to adapt to thermal expansions and structural movements, reducing the risk of cracking and failure over time.

# ABOUT ADT INDUSTRIES

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ADT Industries is a trusted partner of ESSR Bond products on major e-commerce platforms, transforming access to premium construction materials. Our online presence connects manufacturers with end-users, ensuring high-performance solutions are readily available.

Through strategic partnerships, we offer ESSR Bond's innovative products directly to your doorstep, simplifying the supply chain while upholding product authenticity and quality. Whether you're tackling a small residential project or a large commercial development, world-class materials are just a click away. We also provide product support, technical guidance, and reliable logistics to keep your projects on track.

## CONCLUSION

The world's best buildings demand the world's best materials. ESSR Bond products represent more than just construction materials—they're strategic investments in quality, durability, and performance that refuse to compromise on excellence.

## WHY CHOOSE ESSR BOND GS500?

- Proven performance in the toughest environments
- Engineered for today's sustainability and performance standards
- Supported by a company that puts your project's success first
- Seamless access through trusted e-commerce platforms

As the construction industry continues to evolve, the partnership between innovative manufacturers like ESSR Bond and trusted partner like ADT Industries ensures that premium materials remain accessible to professionals who demand nothing but the best.

**Build smarter. Build safer. Build for the future—with ESSR Bond, delivered by ADT Industries.**

## Quality Assurance: ISO 9001:2015 Certification

ISO 9001:2015 is an internationally recognized standard for quality management systems that demonstrates a company's commitment to delivering consistent, high-quality products and services. This certification ensures that rigorous quality controls are embedded throughout every stage of production and delivery.

### Key benefits of ISO 9001:2015 certification include:

**Consistent Quality:** Standardized processes guarantee that every product meets the same high-quality specifications, reducing variability and defects.

**Continuous Improvement:** The standard requires ongoing evaluation and enhancement of processes, ensuring products evolve to meet changing market demands and technological advances.

**Customer Focus:** Systems are designed around customer satisfaction, ensuring products consistently meet or exceed expectations.

For construction professionals, ISO 9001:2015 certification provides confidence that the materials they specify will perform reliably across different batches, projects, and environmental conditions. This certification represents a manufacturer's dedication to excellence and their investment in systems that prioritize quality above all else.

## ESSRBOND GS500 Injection Grout



**FOR MORE INFORMATION OR TO PLACE AN ORDER,  
REACH OUT TO ADT INDUSTRIES**



**THANK YOU – LET'S BUILD BETTER**

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