

 Edison Coatings, Inc.

# Custom SYSTEM 45

*Composite Repair Compounds for  
Stone, Masonry & Concrete*



*The Palladium Building, New Haven, CT, Listed, National Register of Historic Places, shown here 35 years after application of more than 16,000 lbs. of repair mortar, remains an ongoing testimonial to the exceptional durability, compatibility and aesthetics provided by Custom System 45.*

# Custom SYSTEM 45

Edison **Custom SYSTEM 45** products are two-component, latex-modified, cementitious compounds used to produce highly durable and compatible aesthetic repairs to masonry and concrete. They may also be used as stone-like finishes on a variety of other substrates.

Over the course of over three decades of successful application on historic restoration projects, **Custom SYSTEM 45** masonry repair mortars have been matched to thousands of different types and colors of natural stone, concrete and clay masonry. Ten distinct base formulas are used:

TYPE	SUBSTRATE
BL	BLUESTONE
BR	BRICK
CN	ARCHITECTURAL CONCRETE
GR	GRANITE
LC	LIMESTONE & CALCAREOUS CAST STONE
MR	MARBLE
SD	SILICEOUS SANDSTONE & BROWNSTONE
SL	SLATE
ST	PORTLAND CEMENT STUCCO
TC	TERRA COTTA & BRICK

For custom masonry repointing mortars, refer to the product data for **SPEC-JOINT 46**. For complete cement plaster replacement systems, refer to the product data sheet for **CEM-PLAST 54**. For natural cement systems, see **Rosendale Natural Cement Products**.

In each case a mechanically compatible formulation is prepared, based on suitable aggregates of similar composition, color and gradation to the material being repaired. Final color adjustment is achieved, where required, using low levels of highly stable inorganic pigments and fillers.

**Custom SYSTEM 45** has provided durable, inconspicuous repairs on a wide variety of structures, including churches, schools, monuments, post offices, courthouses, university buildings, hospitals, libraries, railroad stations, apartment buildings, hotels, office buildings and private residences.

<b>RL-SERIES RESTORATION LATEXES</b>	
<b>RL-1</b>	<b>STANDARD, TROWEL GRADE</b>
<b>RL-2</b>	<b>CASTING &amp; COATING GRADE</b>
<b>RL-3</b>	<b>MARINE &amp; IMMERSION GRADE</b>
<b>RL-4</b>	<b>HIGH PERMEABILITY GRADE</b>
<b>RL-5</b>	<b>HOT WEATHER GRADE</b>
<b>RL-6</b>	<b>COLD WEATHER GRADE</b>
<b>RL-7</b>	<b>SCULPTING GRADE</b>

## FEATURES:

**Custom SYSTEM 45** has been formulated to provide an optimum balance of the most important performance properties. These include:

- **High Adhesive Bond Strength**
- **High Dimensional Stability**
- **Substrate-Specific Coefficient of Thermal Expansion**
- **Low Modulus of Elasticity**
- **Compatible Liquid and Moisture Vapor Permeability**
- **Natural Appearance**
- **Excellent Workability**

All of these properties influence the long-term performance and compatibility of the repair with the substrate.

### High Tensile Bond Strength (Adhesion)

Tenacious adhesion to all types of properly prepared concrete and masonry surfaces is a primary performance requirement for any repair material. High tensile bond strength is of primary importance, because the other performance properties are irrelevant if the product is no longer bonded to the substrate.

**Custom SYSTEM 45** latex-modified cement-based mortars achieve higher direct tensile bond than the competitive unmodified mortars. Performance exceeds recommended minimum levels indicated in ICRI Guideline No. 320.2R, *Guide to Selecting and Specifying Concrete Repair Materials*.

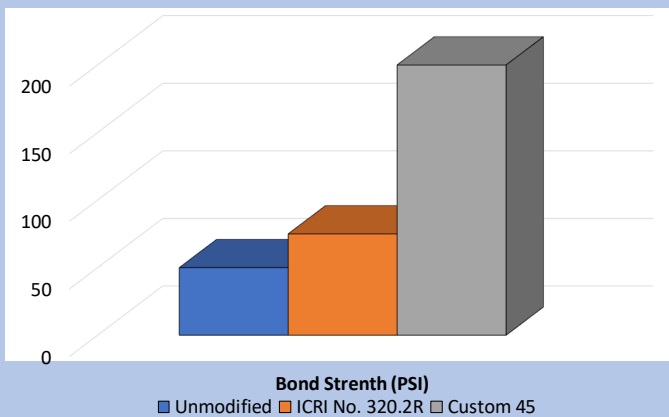
### Low Modulus of Elasticity ("Stiffness")

Of critical importance to the durability of masonry repair materials is the elimination of stress between the repair mortar and the host substrate. Materials which are low in modulus of elasticity (low in "stiffness") deform to relieve stress, as opposed to more rigid, higher modulus materials which may distress adjacent low strength substrates.

**Custom SYSTEM 45** latex-modified mortars can achieve compressive strengths similar to the substrate being repaired while maintaining lower modulus than the host material. This assures that the repair mortar always behaves as the softer material, relieving stress and preventing damage or premature failure.

**Appearance:** Excellent aesthetic results are achieved, because color and texture are closely matched to the existing masonry. Repairs can be virtually indistinguishable from original work, and both accelerated weathering (ASTM G154-16) and natural exposure testing assure long-term color retention. Formulations are UV-stable and nonyellowing.

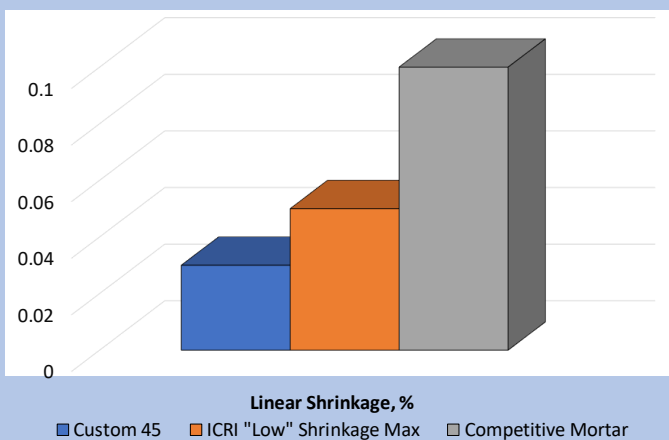
## Adhesion



### TYPICAL PERFORMANCE PROPERTIES

Adhesion	Direct Tensile Bond	205 psi
	ASTM C1042	1320 psi
Modulus of Elasticity	ASTM C580	<1 x 10 <sup>6</sup> psi
Moisture Vapor Permeance	ASTM E96	12-23 perms @ ½" depth
Freeze Thaw and Salt Scaling	ASTM C672 10 Years, Natural Exposure	No Scaling or Delamination after 50 cycles
Drying Shrinkage	ASTM C157	<0.05% (Low)

## Shrinkage, ASTM C531



### LINEAR COEFFICIENT OF THERMAL EXPANSION, IN/IN/°F x 10<sup>-6</sup>

Substrate	45 Grade	Substrate Coefficient	Custom 45 Coefficient
Limestone	LC	2.5-6.7	5.1
Sandstone	SD	4.5-6.7	6.0
Terra Cotta, Brick	TC	3	4.1
Marble	MR	3-5	4.7
Granite	GR	3-6	5.0
Concrete	CN	6-8	7.0

### COMPRESSIVE STRENGTH (psi), ASTM C109/C109M

45 Grade	Compressive Strength (psi), 28 Day Cure
LC	4300
TC	2900
SD	2700
GR	3000
CN	3700
MR	4300

**Dimensional Stability:** Practical field experience indicates that materials exhibiting high drying shrinkage are likely to crack and fail prematurely. *ICRI Guide No. 320.2R* encourages the use of materials with **low** shrinkage, which is defined as less than 0.05% drying shrinkage. **Custom SYSTEM 45** meets this requirement, without the use of expansive components or formation of ettringite to compensate for shrinkage. The result is low stress cure and crack free, durable repairs.

**Consistency:** **Custom SYSTEM 45** is more reliable and consistent in appearance and performance than competitive non-latex mortars or simple field-mixed mortars. Color, composition and quality are rigidly controlled in the manufacturing process, and critical ingredients are single-sourced to eliminate variations, even on projects extending over months or years and requiring many production batches. The two components are simply mixed together and applied, eliminating any influence by variations in local aggregate, cement or water compositions. Under most normal application conditions, proper curing and strength are achieved without special procedures or prolonged wet curing.

### Permeability: **Custom SYSTEM 45's**

latex-cement comatrix retains excellent **moisture vapor** permeability (>20 perms at ½" depth), avoiding moisture entrapment at the patch/substrate bond line. **Liquid moisture** permeability is comparable with substrate permeability, allowing repairs to meet the dual objectives of restoring building envelope integrity against moisture infiltration, while allowing internal moisture to escape harmlessly.

**Thermal Expansion:** Coefficient of thermal expansion for each grade of **Custom SYSTEM 45** is matched to expansion coefficients of the substrate, allowing long-term durability in exterior exposures which are subject to wide temperature variations.

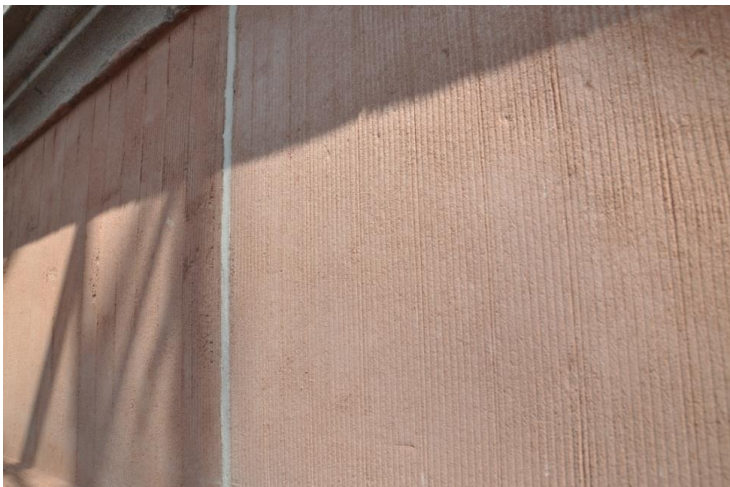
**Composition:** Part "A" (Restoration Latex **RL-1**) is a unique, proprietary self-crosslinking acrylic emulsion. Part "B" is a cement-based blend of select graded aggregates, additives, fillers and pigments, with performance and workability-enhancing admixtures. No chlorides, added gypsum or corrosive or deleterious additives are used.

**Workability:** Products are formulated for excellent workability under a wide range of repair situations. Product is **not** formulated for fast set or rapid hardening, permitting fine tooling, carving, shaving, grooving or sculpting in the period following initial set. Standard non-sag consistency allows unsupported build-up of up

to 2" on vertical surfaces without sagging, up to 1 inch on overhead applications. Optional **RL-2** superplasticized grade liquid allows material to be cast in forms without changing strength or color.



**Custom SYSTEM 45 sandstone grade during trowel application at 21 Astor Place, NYC.**



**Custom SYSTEM 45 carved like tooled stone at 21 Astor Place, NYC**

#### **Constructability: Custom SYSTEM 45**

is “user-friendly”. The product allows some adjustment in working consistency and supports a wide range of acceptable application and finishing methods. In most cases special curing is not required, assuring that satisfactory results are obtained under a wide variety of conditions.

**Worker Training:** Edison Coatings conducts “hands-on” training workshops on a regular basis. This **optional** course helps workers achieve optimum results with maximum efficiency. “On-Site” training is also available, to help entire crews achieve high-quality, cost effective repairs and to address job-specific challenges. Current workshop schedules can be found on our web site “Calendar” page and additional information on “in-house” and “on-site” programs can be found on the “Training” page at [www.edisoncoatings.com](http://www.edisoncoatings.com).

**Safety:** Products are non-corrosive, non-flammable, non-combustible and contain no toxic solvents, monomers or diluents. Low odor allows interior as well as exterior application. Powder components are formulated and graded to exclude toxic respirable crystalline silica.

## **THE COLOR & GRADE SELECTION PROCESS**

**Custom SYSTEM 45** is available in 10 standard grades and over 3000 colors. Test kits and custom color matching services are available at nominal costs. For best results, send cleaned samples of the substrate to be repaired to Edison Coatings, Inc. for free evaluation.

**The following are key elements in successful color selection:**

- 1. Choose representative samples for matching.** Choose color on the basis of the actual range of colors on the building. Samples should be cleaned in the same manner, using the same cleaning agents that will be used for general building cleaning. Indicate the portion of the sample to be matched by circling the appropriate area, or by placing an “X” in a corner of the side to be matched.
- 2. Use multiple colors.** Stone and masonry are often variable in color, and better overall match is often achieved through use of more than one color of **Custom SYSTEM 45**. Intermediate shades can be produced by blending light and dark shades of **Custom SYSTEM 45** in any proportion.
- 3. Install test patches.** The most accurate way to evaluate visual compatibility is through in situ test patching. Allow adequate cure time before final evaluation. Initial color should be *darker* than the substrate.

### **APPLICATION:**

**1. Surface Preparation:** Durable, effective repairs require clean, sound substrates. Remove all contaminants, coatings, efflorescence, unsound masonry and inappropriate previous repair mortars. If large or deep repairs will be otherwise unsupported, mechanical keying or anchoring is recommended.

**Minimum repair depth is ¼”. Maximum depth is dependent on application.**

The decision to anchor should be based on structural requirements, the condition of the substrate, patch dimensions and weight, and the extent to which patch integrity will otherwise rely on adhesion alone. Such decisions and details concerning spacing and configuration are frequently best made in consultation with a qualified professional. Good restoration practices should always be observed.

**2. Application: Custom SYSTEM 45** may be applied by trowel, spray, casting-in-place or other commonly used repair techniques. **Note: Sponge floating is not recommended, as it introduces extra water and affects color.** Standard latex component **RL-1** provides good hand workability under a variety of application methods and conditions. **RL-2** superplasticized liquid produces highly fluid consistencies, facilitating casting and coating without introducing extra liquid or changing color and strength. **RL-3** provides superior adhesion and durability for repairs subject to prolonged wet exposure or immersion. **RL-4** provides higher permeability for repairs subject to high humidity differentials or intermittent negative side moist exposures. **RL-5** is a hot weather grade, providing extended working life at temperatures above 85F. **RL-6** is a cold weather formulation, designed to accelerate initial set, to prevent disruption by freezing. **RL-7** is a sculpting grade, allowing thicker lifts and extended carving time. Custom combinations of special properties (e.g. **RL2/6** superplasticized/cold weather) are also available.



*Custom SYSTEM 45 using RL-2 form and pour application at 230 Park Ave, NYC. Anchor system installed into Terra Cotta.*



*Pouring Custom SYSTEM 45 into form.*



*Fitting the form in place.*



*Glazed with Elastowall 351 to match original Terra Cotta.*

**a. Priming:** For best adhesion, do not apply product to dry surfaces. Slurry coating is the preferred method of priming, using a thin brush coating of 1 part *Custom 45* liquid and 3 parts powder. For best results, apply patching mortar immediately after priming. Do not allow slurry coat to dry out before patching mortar placement.

**b. Mixing:** Best results are obtained when Part A and B are mixed together at consistent proportions. Determine the powder to liquid

proportion which works and handles best for your particular application and **Custom SYSTEM 45** formulation, and then measure the same proportions for each mix. Mix ratios are generally between 5:1 and 7:1 by weight, or between 3 qts. (3 liters) and 5 quarts (5 liters) per 45-pound (20 kg) pail. Good results can also be obtained by thorough hand mixing. Do not mix more material than can be applied in about 15 minutes. Product will adhere and “hang” most efficiently if not mixed too wet.

**c. Cold Weather:** Minimum temperature for optimum color control is **50°F (10°C)**. While good mechanical results are obtained at temperatures above 40°F (4°C), color development tends to be lighter at low temperatures. For optimum color control, temperature must be above minimum at time of application, and must be maintained until product has dried thoroughly. Drying time may vary from an hour or two (thin patches, warm and dry weather) to several days (deep patches, cool and damp conditions).

At temperatures below 50°F (10°C), use of **RL-6** winter grade latex is recommended to accelerate curing. Store **SYSTEM 45** components in a heated area until just before use. *Do not patch frozen surfaces.* Hot water rinsing of surfaces can help achieve minimum temperatures under marginal conditions. If auxiliary heating is used, do not direct hot exhaust gases at patches. Moderate temperatures and air flows work best, and heated air is preferable to burner exhausts, which are high in CO and CO<sub>2</sub>.

**d. Hot Weather:** Store materials in a cool place, out of direct sun. Dampen surfaces thoroughly with cold water prior to application to reduce suction and slow product drying. Do not thin excessively or retemper with additional liquid or water. To improve hot weather workability, shade work areas from direct sun, and use **Restoration Latex RL-5** to extend working time. Lightly mist surfaces or drape dampened burlap to allow a minimum of 2 hours’ moisture after application. Over-thinned or rapidly-dried surfaces may develop plastic cracking shortly after application. Remove and replace any such cracked patches.

**e. Interruption:** If work will be interrupted due to drop width or other limitations, always try to work to an inconspicuous “break”, such as a column line or ledge.

**f. Color Blending:** On masonry exhibiting unit-to-unit color variations, more than one custom color may be needed to achieve

inconspicuous repairs. Generally, varied blends of patch colors are less conspicuous than a single, uniform repair color. Alternatively, an intermediate shade should be selected, and color shading can later be achieved using **EXPO 43** cement-based coating or **EverKote 300** mineral stain, which may be applied to all or part of the units which are repaired. To blend fresh patch appearance with weathered adjacent original materials, use **LiquiDirt 94**.

**g. Finishing & Carving:** Product set is not accelerated. Build material steadily, using a light sweeping stroke, and allowing material to “fatten” for several minutes between applications. Finishing times may be varied to suit the mechanic, and while some prefer to tool and finish immediately, while product remains in a plastic state, others prefer to wait until initial set, typically an hour or so after application. Product is easily shaved in this stage of hardening but may be carved at any time after application. Some additional finishing is also possible the following day. **For very deep repairs**, consider forming and pouring full-depth in a single application using **Custom System 45** mixed with **RL-2 Restoration Latex**.

**h. Curing:** Product should be allowed to dry cure after a brief initial moist period. Do not steam clean or pressure wash patches which have not fully cured. Application in direct sun will produce temporarily robust colors, which will tone down to the “normal” color after a brief period of natural exposure. Color adjustment can also be achieved during cure by application of **SYSTEM 90-W-Color** or **EverKote 300**. **SYSTEM 90-W-Color** is also available in several translucent shades which simulate the patina of aging, to give repairs a more “weathered” appearance. For best long-term durability, **SYSTEM 90-W** can be applied to all masonry and patch surfaces.

**3. Storage & Handling:** Proper care should be taken when handling cement-based materials, to avoid skin and eye contact and avoid breathing dust. Some formulations contain free silica, and proper NIOSH-approved silica dust filters should be used. Products should be stored in a dry place, off the ground or floor, at moderate temperatures. **KEEP FROM FREEZING**. For complete safety and handling information, refer to Material Safety Data Sheets furnished with this product. Shelf life for properly stored material is minimum of 1 year from date of production.

## FOR COMMERCIAL & INDUSTRIAL USE



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