

MATERIAL SAFETY DATA SHEET

2804 WEST MARSHALL DRIVE, SUITE 102
 GRAND PRAIRIE, TX 75050 • (972) 602-1740 • FAX (972) 602-1780

POLYPLEX

Date Issued: **12/03/93** Date Changed: **12/04/97** Date Printed: **12/05/97**

Manufacturer: **Nippon Electric Glass America
 2604 W. Marshall, Suite 102
 Grand Prairie, TX 75050** Contact: **John Jones
 972-602-1740**

Emergency Contact: **Chemtrec (800) 424-9300**

Hazard Rating:

	H.M.I.S.	N.F.P.A.
HEALTH	1	1
FIRE	0	0
REACTIVITY	0	0
	P.P.E.	SPECIAL
OTHER	B	NONE

4 = Extreme
 3 = High
 2 = Moderate
 1 = Slight
 0 = Insignificant
 * Chronic Health Hazard

Identification: Common Name: LATEX
 Generic Name: POLYMER
 Chemical: ACRYLIC POLYMER
 Chemical Family: ACRYLIC

DOT Ship Name: **NON-REGULATED**

Warning Statement: **CAUTION
 MAY CAUSE IRRITATION TO EYES
 MAY CAUSE IRRITATION TO SKIN**

Section I - Ingredients

Components	%	Hazardous Ingredients	%	T.L.V. *
POLYMER	> 3%	N/A		
SURFACTANT	> 3%			
WATER	> 3%			

This product complies with all TSCA inventory

** Reporting required for S.A.R.A. (III) Sec. 313; (See Sec. VI of this MSDS)*

Post-It® Fax Note 7671 Date _____ # of pages _____

To: Daniel	From:
Co./Dept:	Co.:
Phone #:	Phone #:
Fax #:	Fax #:

Section II - Emergency and First Aid Procedures

Emergency : Call personal or company physician.

Eye Contact : Holding the lids apart, flush contaminated eye(s) with a gentle stream of water for 15 minutes. If irritation or redness develops and persists, seek immediate medical attention.

Skin Contact : Remove contaminated clothing and cleanse thoroughly with soap and water. Seek medical attention if irritation, swelling, blistering, or redness develops and persists.

Inhalation : First aid is not required, normally. However, seek medical advice if any unusual symptoms develop.

Ingestion : Seek medical advice if swallowed.

Note to Physician : None determined.

Section III - Physiological Effects and Health Information

Eye Effects : May cause irritation to eyes.

Skin Effects : May cause irritation to skin.

Systemic Effects : Excessive, or prolonged exposures to vapors may be irritating to nose, throat and respiratory tract producing symptoms of dizziness, headache or nausea.

Section IV - Special Protective Information

Respiratory Protection : (Specify Type) The use of respiratory equipment depends on vapor concentrations above the time-weighted TLV or PEL.

Ventilation : General mechanical ventilation may be sufficient to keep product vapor concentrations within specified time-weighted TLV ranges.

Eye Protection : Working conditions and safety regimentation dictates eye protection when working with mists, dust or liquids.

Protective Gloves : The use of gloves which are impermeable to the specific material handled is advised to prevent skin irritation and absorption.

Other Protective Equipment : WEAR SAFETY GLASSES AND IMPERVIOUS GLOVES.

Section V - Reactive Data

Stability : Stable
No known conditions to avoid.

Incompatibility : (Materials to Avoid) Avoid acids, bases & other reactive materials.

Hazardous Decomposition : Various combustion products, including carbon oxides, nitrogen oxides and sulfur oxides.

Hazardous Polymerization: Will not occur
No known conditions to avoid.

Section VI - Spill or Leak Procedures

Precautions in Case of Release or Spill: Spill and releases of this material are not reportable under S.A.R.A. Title III, Sec. 313. Prevent spilled liquid from entering sewer, storm drains, or other unauthorized treatment/drainage systems and natural waterways. Dike spill. Absorb with inert material and collect for disposal. Flush area with water. Prevent washings from entering waterways.

Waste Disposal: This material is NOT defined as hazardous by the Resource Conservation and Recovery Act. It is the product user's responsibility to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste. (40 CFR 261.20-40)
Dispose of this product in accordance with applicable local, state, and federal regulations.

Section VII - Storage and Special Precautions

Handling and Storing Precautions: Shocking the emulsion with large quantities of chemical or extreme shear agitation may cause coagulation. Keep product containers closed when not in use. Avoid extreme temperature variations and freezing.

Other: In general, the health and safety hazards expected from this product are slight.

Section VIII - Fire and Explosion Hazard Data

Flash Point Range: Non-Flammable

Extinguisher Media: For dried solids use water, foam, CO2 or dry chemical fire fighting equipment.

Unusual Fire and Explosion: Closed containers exposed to heat may rupture due to pressure buildup.

Hazardous Fire Fighting Procedures: Water may be useful in keeping containers cool.

Section IX - Physical Data

Approximate Boiling Temperature : 212
(F)

Weight per Gallon : 8.9

Percent Volatiles : 53
(+/- 2%)

pH : 9

Vapor Density : Not Determined

Evaporation Rate : Slower Than Butyl Acetate

Specific Gravity : Heavier than Water

Solubility in Water : DISPERSIBLE

Appearance and Odor : WHITE TO OFF-WHITE LIQUID, WITH A(N) ACRID ODOR.

Section X - Documentary Information

Issue Date : 12/03/93

Print Date : 12/05/87

Prepared By : Amy Conn

Manager : Gary E. Harris

Disclaimer : The above information is believed to be correct as of the date hereof. However, no warranty or merchantability, fitness for any use, or any other warranty is expressed or is to be implied regarding the accuracy of these data, the results to be obtained from the use of material, or the hazards connected with such use. Since the information contained herein may be applied under conditions beyond our control and with which we may be unfamiliar, and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume responsibility for the results of its use. This information is furnished on the condition that the person receiving it shall make their own determination as to the suitability of the material for their particular purpose and on the condition that they assume the risk of use thereof.

POLYPLEX

An All-Acrylic Polymer Curing Agent for GFRC

POLYPLEX is a specially formulated, all-acrylic polymer emulsion, which can be used in GFRC mixes to eliminate the necessity for seven-day wet cure.

ADVANTAGES

Until the introduction of acrylic polymer, GFRC products required a seven-day cure in over 95% humidity in order to ensure full curing of the Portland cement. (This usually meant building curing rooms where the product could be stored in the required wet environment).

- Where manufacturing was done in an enclosed building, the provision of a curing area resulted in the loss of valuable production space. Where manufacturing was essentially performed outside, the provision of a satisfactory curing area was difficult, if not impossible.
- **POLYPLEX** polymer eliminates the need for the wet curing period and the associated costs of curing areas and lost production space. These cost savings more than offset the added cost of incorporating **POLYPLEX** in the mix.
- **POLYPLEX** provides added workability to the GFRC mix, and particularly better adherence to vertical mold surfaces, eliminating sliding of the wet mix. It is suitable for use with both white and gray Portland cements.
- **POLYPLEX** does not yellow when weathered, and so it will not discolor panel finishes, as some acrylic polymers can do.

PRINCIPLES OF THE POLYPLEX POLYMER CURING EFFECT

Because it is thin, compared to conventional concrete (1/2" compared to 3" or thicker), GFRC without polymer can lose water by evaporation too quickly. To maintain sufficient water in the composite to ensure complete hydration of the cement these composites had to be stored in a wet environment.

POLYPLEX when added to GFRC mixes at the recommended levels, does not change the hydration process of Portland cement. Its function is to reduce permeability, first on the surface by forming a sealing film and then within the composite during the first few hours of curing. This reduced permeability in the composite significantly lessens the loss of water by evaporation, facilitating the full hydration and cure of the Portland cement. Excessive loss of water during curing, to such an extent that there is not sufficient water remaining to fully hydrate the Portland cement, will result in low cement and composite strengths. Further, there are no remedial procedures that will retrieve the composite strengths if the initial cure is not done correctly.

POLYPLEX only eliminates the need to keep GFRC products in a moist or wet environment after demolding. Portland cement still requires storage at or above 55°F; to develop full strength within 28 days. Any temperature drop below 55°F, although not stopping the cure, will slow the hydration reaction so that full cure and strength development will take longer than 28 days.

PHYSICAL PROPERTIES

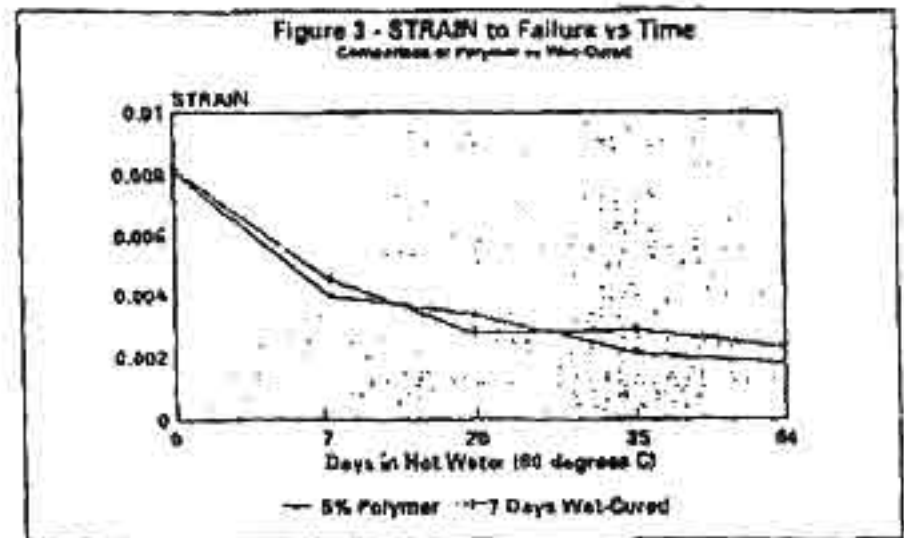
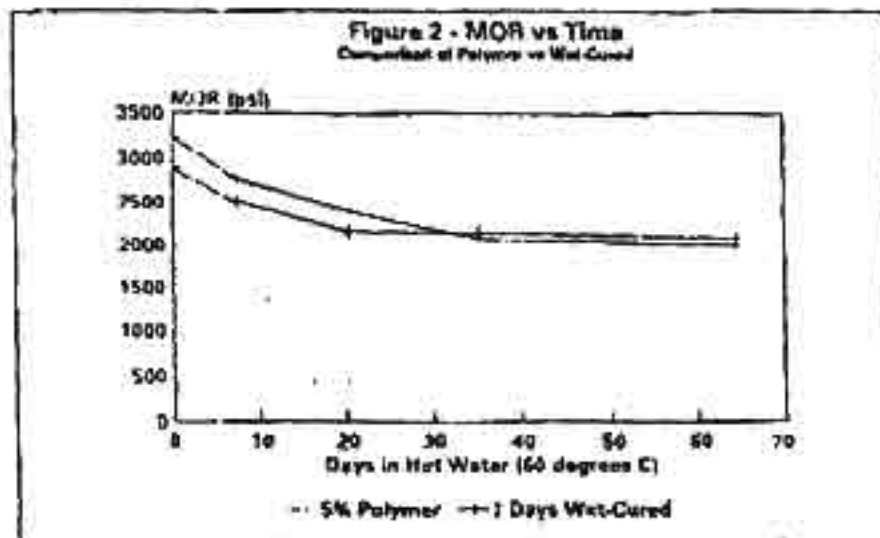
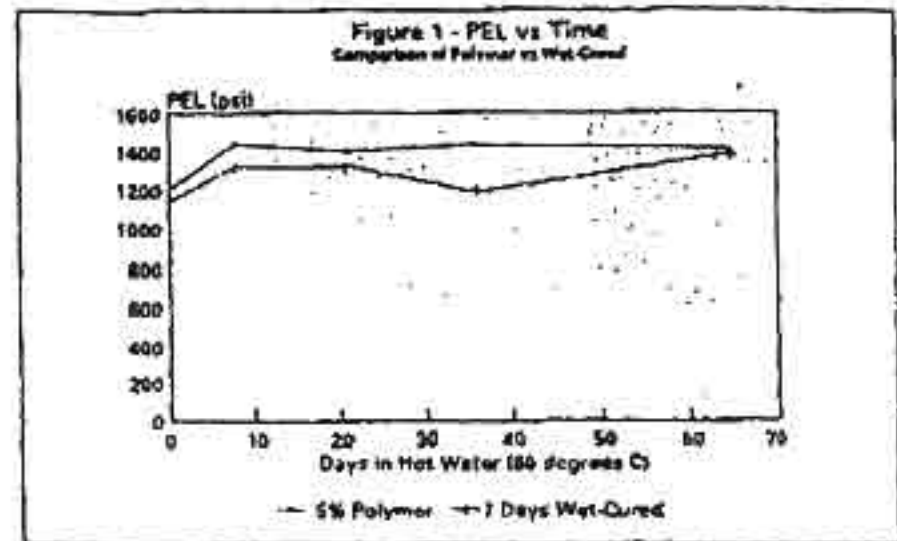
Table 1 shows a comparison between seven day and 28-day physical properties for GFRC containing 5% polymer solids and wet cured GFRC containing no polymer. The tests were done in accordance with ASTM C947-89.

TABLE 1

Test Result	Age (days)	5% Polymer	Wet Cured
LOP (psi)	7	1174	1031
	28	1213	1153
MOR (psi)	7	3279	2851
	28	3227	2897
Strain to Failure %	7	0.0967	0.0842
	28	0.0815	0.0826

The physical properties, after accelerated aging are shown in Figs. 1-3. The test specimens, both polymer-containing and non-polymer-containing GFRC, were aged in hot water at 60°C, and a series of tests were taken periodically up to 60 days (equivalent to about 50 years of natural weathering in a temperate climate).

All tests show that POLYPLEX, in the amount of 5% solids to the weight of dry cement, provides full curing of the Portland cement, at least equivalent to seven day wet curing without polymer. Further POLYPLEX has no detrimental effects on long term properties.



POLYPLEX SPECIFICATIONS

Type compound	Aqueous thermoplastic copolymer dispersion	Avg. polymer particle size	50-200µm
Type polymer	Acrylic based	Molecular weight	Approximately 400,000
% Solids	47% 1% by weight	Ultraviolet resistance	Good (500 hrs)
Free monomer content	Maximum 0.2% by weight in dispersion	Alkali resistance	Good
Appearance	Milky white, creamy, free from lumps	Viscosity	300 CPS
Odor	Meets OSHA and EPA requirements	Freeze-thaw stability	No gelation in a minimum of 5 cycles
pH	8-10	Specific gravity	1.05
Minimum film forming temp.	Approximately 50°F		

MIX FORMULATION

The recommended polymer content is 5% polymer solids to the weight of dry cement. For a mix based on one bag of cement (94 lbs.) the **POLYPLEX** content is calculated as follows:

$$94 \times 0.05 = 4.7 \text{ lbs.}$$

This is the weight of polymer solids needed. The **POLYPLEX** emulsion contains 47% polymer solids, so the amount of emulsion that will give 4.7 lbs. of solids is:

$$4.7/0.47 = 10 \text{ lbs.}$$

In calculating the mix water it must be remembered that the **POLYPLEX** emulsion contains 53% water which must be allowed for as follows: For a water/cement ratio of 0.33 the total water required is:

$$94 \times 0.33 = 31 \text{ lbs.}$$

10 lbs. of **POLYPLEX** emulsion contains
 $10 \times 0.53 = 5.3 \text{ lbs. of water}$

Therefore the extra mix water required is
 $31 - 5.3 = 25.7 \text{ lbs.}$

A typical mix formulation is as follows:

Cement	94 lbs.
Sand	94 lbs.
POLYPLEX	10 lbs.
Water	25.7 lbs.
Superplasticiser	as required to give desired fluidity.
5% NEG H103 roving	11.8 lbs.

N.B. Some additives, such as some superplasticisers, water reducers, set accelerators and retarders may not be compatible with acrylic polymers, particularly when used in combination. If flash setting or other slurry problems occur, it may be due to this incompatibility.

MIXING PROCEDURE

POLYPLEX can be incorporated into GFRC slurry mixes using most types of mixers, including high shear and paddle mixers. The important thing, however, is to avoid excessive mixing time, as this can cause break-down of the polymer and loss of its effectiveness. Mixing times should be kept to less than five minutes.

POLYPLEX contains a defoamer which prevents the polymer from foaming during mixing and so entraining air in the composite. This would reduce the composite density and adversely affect strengths. Densities of GFRC mixes containing **POLYPLEX** should be comparable to wet cured GFRC.

CONDITIONS OF USE

STORAGE AND HANDLING

POLYPLEX is delivered in 55-gallon drums (475 lbs.) It is supplied as an emulsion comprising 47% polymer solids and 53% water. Because of this it can freeze and, although it is freeze-thaw stable for 5-cycles, it should be stored in an area where it will be protected from freezing.

POLYPLEX has a shelf life of about 12 months, so it is important to rotate stock on a first-in first-out basis.

POLYPLEX does not have special EPA or OSHA handling regulations; material safety data sheets are available on request.

SPRAYING

GFRC slurries containing **POLYPLEX** should spray similarly to non-polymer slurries. However, it must be noted that **POLYPLEX** forms a film when it dries. Therefore it is important, immediately after spraying stops, to keep spray guns washed through with water, particularly the nozzles. It is important **not** to blow air through when not spraying, as this will cause the polymer to film-form. This could result in build-up in the nozzle and cause subsequent blockage.

CLEAN-UP

POLYPLEX, like other polymers, has good adhesive properties, which can create clean-up problems if good housekeeping is not practiced. Concrete build-up can be prevented if equipment is coated regularly with mold release. The mold release facilitates removal of concrete build-up on equipment at the end of production.

CONDITIONS OF USE, cont.

CURING PRACTICE

During the initial cure period of around 12 hours, the temperature should not be allowed to drop below 50°F, or exceed 120°F, or the film-forming action of the polymer will not take place, thereby making it ineffective as a curing aid.

Once the film has formed, it is largely unaffected by the environmental conditions and will continue to retain water in the composite through wide variations of temperature and humidity.

However, since the polymer does not take part in the hydration process of the Portland cement, the conditions of storage should be kept above 55°F so as not to inhibit cure of the cement.

OTHER USES

In architectural panels and other products with aggregate face-coat and mist-coat finishes, it is recommended that these also contain **POLYPLEX** at about the same level as the GFRC back-up mix. This will help in maintaining compatibility between the face or mist-coat and the GFRC back-up.

This will not affect sandblasting but, as **POLYPLEX** confers acid resistance, acid etching may be difficult, if not impossible.

Also, if a painted finish is to be used, adhesion tests should be run because the polymer film may adversely affect adhesion or penetration of the paint to the substrate.

POLYPLEX can be used as a bonding agent for patching or bonding-pad repairs. **POLYPLEX** can be added to the patch or bonding pad mix, or it can be brushed onto the surface to be repaired. **POLYPLEX** will improve adhesion of the patching material or the bonding-pad to the cured GFRC, but it is essential that the repair material be applied before the polymer begins to dry. Once dry, the polymer will have film formed and it will impair adhesion, rather than improve it.



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