POLYMER ENHANCING

ResNsand® Ultra

The Virtually Invisible Polymer/Resin Aggregate and Extender

Light ■ Clear ■ Durable

ResNsand Ultra used on the deck of the USS Ronald Reagan

Marshall Additive
TECHNOLOGIES
DIVISION OF THE R.J. MARSHALL COMPANY

ResNsand Ultra

CLEAR POLYMERIC ANTI-SKID / TEXTURED / ENHANCER

What is ResNsand Ultra?
ResNsand Ultra is a lightweight, optically clear Thermoset Polymer Resin, available in nine standard sizes ranging from 4-200 US Mesh. ResNsand Ultra is a polymer in that it is made up of several repetitive units (monomers). *It is a resin, in that each monomer has two reactive sites that react with standard resin hardeners, such as, polyamines, polyalcohols and polybasic acids. Thus when ResNsand Ultra is added to a resin and hardener, it forms a copolymer matrix with the parent polymer and hardener. The resulting new copolymer is stronger, more durable and has greater scratch and abrasion resistance than the parent polymer alone without ResNsand Ultra.

How tough is a ResNsand coating?
The increased strength of the ResNsand coating system is best illustrated when comparing TABER abrasions of clear coat epoxy (control) to a pigmented epoxy. The clear epoxy control showed 0.3 grams abraded after 1,000 cycles using a 500 gram weight versus 0.42 grams abraded for the pigmented epoxy. In general, the addition of a pigment, mineral, or inert non-mineral filler increases abrasion and decreases physical properties of the epoxy polymer. When ResNsand Ultra was added to the clear epoxy control abrasion was reduced to 0.21 grams, a 30% improvement in abrasion resistance. Abrasion was also reduced to 0.21 grams for the pigmented epoxy when ResNsand Ultra was added, a 50% improvement in abrasion resistance. See graph on opposite page.

Why use ResNsand Ultra?
- Weight: It can reduce the weight of a coating by 50% over a mineral aggregate.
- Clarity: In a clear coat, ResNsand Ultra will not distort or discolor any patterns or graphics.
- Toughness & Durability: ResNsand Ultra has demonstrated an increase in toughness and durability when used in clear coat epoxies, urethanes, acrylics and polyester gel coats.
- Chemical Resistance: It has excellent chemical resistance to mineral acids, alkalis, aggressive solvents, petroleum spirits, aliphatic and aromatic hydrocarbons and harsh detergents.

Which ResNsand Ultra is recommended?
The grade of ResNsand Ultra used largely depends on the application.
ULTRA 4 or 8 if end use is decorative such as countertop.
ULTRA 12, 16, or 20 if end use is for an anti-slip industrial floor designed for heavy duty vehicles such as lift trucks.
ULTRA 20 or 40 if end use is primarily foot traffic areas like hallways and commercial kitchens.
ULTRA -30 if end use is decorative or for foot traffic areas.
ULTRA 40 or 60 if end use will have barefoot traffic like pools, decks, piers and shower stalls.
ULTRA 100 or 200 if end use will come in contact with sensitive skin such as for use in a bath mat.

How much ResNsand Ultra is recommended?
How much to use depends on which particle size you select, thickness of film and type of resin being used. The best way to determine your needs is to make a trial run with no more than 100 grams of resin and hardener (if any). Add various weights of ResNsand Ultra (10% is the recommended starting point), mix well and brush onto a flat surface. Compare the results, which based on your judgment gives the desired anti-slip or textured profile.

How is ResNsand Ultra applied?
For large areas such as floors, ResNsand Ultra can either be broadcast or formulated into resin. It can also be applied as a premixed product or mixed on site.

ResNsand Ultra Uses:
Floors, decks, piers, pools, bath and shower stalls = anti-slip
Polyester gel coats (ULTRA 100 & 200) = abrasion resistance
Marine coatings (ULTRA 16, 20 & 40) = anti-slip and abrasion resistance
Surf boards, garage floors (ULTRA 40 & 60) = anti-slip
Solid Surface (all sizes) = decorative and abrasion resistance

* The ResNsand Ultra reaction with polyamines has been verified by mass spectrometry (MS), infrared (FTIR) and nuclear magnetic resonance (NMR) spectroscopy by: *The Department of Chemistry & Biochemistry, University of Toledo*

ResNsand Ultra

TECHNICAL DATA SHEET

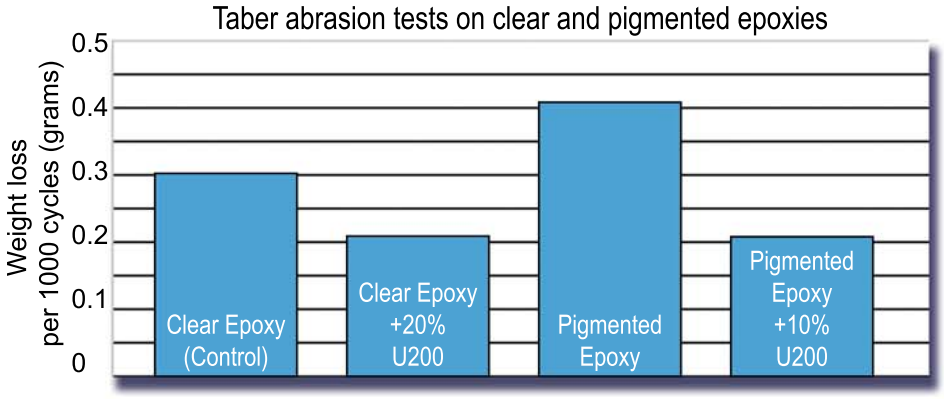
TYPICAL PHYSICAL PROPERTIES:	
Specific Gravity (H_20=1)	1.34
Density (lbs. per gal)	10.90
Color (in dispersion)	Clear
Color (in raw form)	White
Hardness (Rockwell)	M95-M110
Solubility	
- Ethanol, Acetone	Insoluble
- Non Polar Solvent	Insoluble
Melting Point	Decomposes ~400°F

TYPICAL CHEMICAL RESISTANCE:	
Alkali	excellent
Strong and weak acids	excellent
Alcohols	excellent
Ketones and esters*	good to excellent
Aliphatic hydrocarbons	excellent
Aromatic hydrocarbons	excellent
Detergents	excellent
Gasoline	excellent
Anti Freeze	excellent

*ResNsand will swell in ketone and ester solvents

TYPICAL SIZE DISTRIBUTION *(% Retained)*

Screen	U4	U8	U12	U16	U20	U40	U60	U100	U200	U-30
+1/2"	0	-	-	-	-	-	-	-	-	-
+4	2-4	0	0	-	-	-	-	-	-	-
+6	-	-	-	-	-	-	-	-	-	-
+8	70-90	0-5	-	0	-	-	-	-	-	-
+10	-	-	-	-	-	-	-	-	-	-
+12	0-20	0-95	0-10	0-3	0	-	-	-	-	-
+16	-	-	75-100	-	0-3	-	-	-	-	0
+20	-	0-20	-	-	0-15	0	-	-	-	-
+30	-	-	-	0-20	-	-	0	-	-	0-10
+35	-	-	-	-	-	-	-	-	-	-
+40	-	-	-	-	-	0-15	-	-	-	-
+60	-	-	-	-	0-20	75-100	0-10	0	-	-
+80	-	-	-	-	-	-	-	-	0	50-100
+100	-	-	-	-	-	-	-	0-15	-	-
+120	-	-	-	-	-	-	75-100	-	-	-
+200	-	-	-	-	-	-	-	-	0-25	-
Pan	0-8	0-1	0-25	0-5	0-5	0-25	0-25	85-100	75-100	0-50



GRADE	MESH SIZE	MICRONS
Ultra 4	4 - 8	2380 - 4760
Ultra 8	8 - 12	1680 - 2380
Ultra 12	12 - 16	1190 - 1680
Ultra 16	16 - 20	840 - 1190
Ultra 20	20 - 40	420 - 840
Ultra 40	40 - 60	250 - 420
Ultra 60	60 - 100	150 - 250
Ultra 100	100 - 200	75 - 150
Ultra 200	< 200	< 75
Ultra -30	< 30	< 595

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Just How Good Is ResNsand Ultra?
After many years of research, development and testing, a new coating evolved for the taxi and impact landing areas of aircraft carriers. The new coating, which contains ResNsand Ultra, is significantly lower in weight and is more durable than the conventional alumina anti-skid additive.

How Light Is It?
The unit weight of a drum reduced from 75 lbs to 40 lbs/ unit or almost 47% when ResNsand Ultra replaced a mineral anti-skid. As for the carrier deck, the weight reduction was close to 8,000 lbs.

How tough and durable is it?
American Safety Technologies (a division of ITW) received approval by the U.S. Department of Defense for the use of ResNsand Ultra on aircraft carrier decks. This special non-slip coating (formulated with epoxy resins and ResNsand Ultra) is used on hanger and flight decks, including the impact landing areas. To qualify for this honor, the ResNsand Ultra coating had to withstand 15,000 impact landings, whereby the incoming plane's tail-hook snags a hydraulic arresting wire, slams down and drags across the coating surface as the plane is brought to a stop. Not only did ResNsand Ultra pass this test with flying colors, but the resulting wear on the tail-hook and cable was significantly less with ResNsand Ultra than that caused by traditional coatings. Furthermore, Taber abrasion analysis shows that ResNsand Ultra improves abrasion resistance by more than 50% over conventional coatings containing alumina, a much harder substance. ResNsand Ultra is also resistant to fire and jet blast, most acids, alkalis, solvents, grease, oil, gasoline, jet fuels, hydraulic fluids, detergents, and alcohol.

As of this report, ResNsand Ultra epoxy coating has been applied to the decks of the following ships:

United States -	**France -**	**Japan -**
USS STENNIS	*CHARLES DE GAULLE*	*IZUMO*
USS RONALD REAGAN		
USS ABRAHAM LINCOLN		

Not just one example.
ResNsand Ultra has received similar reports from the manufacturers of flooring, shower and tub bases, bath mats, decks, piers and handicap ramps. ResNsand has also had favorable results with companies that have used it in epoxies, urethanes, polyester gel coats, UV curable, water-based acrylic and latex-based coatings.

American Safety epoxy coating:
United States Patent Application Publication, Robinson et al. Pub. No: US 2008/0167401 pub. date Jul 10 2008

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