TUFFLEX®, INC.
UNIQUE ELASTOMERIC SURFACING SOLUTIONS

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PRODUCT INFORMATION

TUFFLEX® Solvent-free "TUFF" and "SOFT"

PRODUCT DESCRIPTION:

BASIC: A significant advancement in urethane technology has resulted in a solvent-free resin binder that is. for the first time, mixed with water (water is the catalyst). It is also concentrated so that filling ingredients can be added in proportions that are variable to suit the end usage desired and lower the cost per unit.

UTILITY: TUFFLEX® Overlay Systems are designed for rapidly applied and rapidly cured installations over properly prepared substrates to create seamless, flexible, durable, slip resistant, and decorative surfaces which are reliably waterproof. The unique filling-ingredient variability and promptinternal-cure capability facilitate complete installations of any desired thickness under a wide range of marginal weather conditions. **TUFFLEX®** Overlay Systems are completely elastomeric. with no rigid organic or inorganic materials employed in their composition.

PRIMARY USAGE: TUFFLEX® Overlay Systems are designed to waterproof, protect. decorate, and provide traction on (1) exterior pedestrian traffic surfaces such as balconies. walkways, patios. stairways, sidewalks. etc.; (2) interior surfaces such as mechanical room floors: work areas, shower pans and stalls, display floors, etc.; (3) on boat and ship decks made of metal, wood and fiberglass; (4) vehicular traffic areas such as rooftop parking decks and ramps of concrete or asphalt, etc.; *(5)* exterior sundeck areas such as pool surrounds, ski lodge sun-decks, rooftop play areas, etc.; (6) equestrian and animal habitats such as stalls, wash racks, kennel runs, hot-walkers, etc.; (7) as well as on athletic surfaces. New applications are being researched and devised on a continuing basis. We invite inquiries about problem surfaces where **TUFFLEX®** Systems may provide an innovative solution.

COMPOSITION & MATERIALS: TUFFLEX® Overlay Systems are built around a unique water-catalyzed, single-component urethane pre-polymer which, being a concentrated material, is modified by variable proportions of water and filler material to produce a fluid "base membrane mixture." This is spread to achieve a self-leveling and prompt-curing waterproofing base membrane onto which selected rubber texture granules are broadcast. Then a final sealcoat of moisture-cured aliphatic or aromatic urethane colorcoat is applied.

TUFFLEX® RESIN BINDER CONCENTRATE: A fast curing water-catalyzed polyurethane elastomer. Cure may be further accelerated by the addition of a special chemical catalyst.

TUFFLEX® RUBBER GRANULES: Supplied by **TUFFLEX®, Inc. or** approved sources. Rubber granules are selected to add to the base membrane integrity and surface texture characteristics. Rubber granules range in size from 40 mesh through 3/16 inch diameter (sometimes stringy) and come in various degrees of hardness and flexibility. Clean tire-tread grindings, tennis-ball and handball bladder grindings. EPDM and SBR rubber grindings all contribute to different end uses.

TUFFLEX® PRIMERS: Appropriate **TUFFLEX®** Primer is used to assure a positive and durable bond to all properly prepared substrates. A solvent-free and odorless primer is available where preferred. Where there is an uncertainness of bonding to a substrate, test patches are recommended.

TUFFLEX® COLORCOATS: A variety of Aliphatic and Aromatic single-component, moisture-cured urethane rubber Colorcoats are available, depending on their end usage requirements. All are of high solids and flexible, with excellent resistance to hard usage abrasion. When rapid access is needed, colorcoat curing to a tack free condition can be expedited by an available Colorcoat Cure Accelerator.

CONTAINER SIZES: TUFFLEX® Resin Binder and Colorcoats are packaged in *5* gallon containers, with 55 gallon drums available on special order. Primers are available in 1 or 5 gallon containers. Catalysts and Cure Accelerators are package in 1 quart cans. Rubber granules are available in 50 pound bags.

BASIC OVERLAY SYSTEM; The basic **TUFFLEX®** Overlay System consists of **TUFFLEX®** Resin Binder Concentrate which is mixed at the job site with various proportions of water and filler material. This rapid setting liquid is spread at any desired thickness onto the prepared and primed surface. While the surface is still wet and receptive, an excess of rubber texture granules is broadcast onto and into the surface to create the desired slip-resistant surface texture. After the membrane cures enough to accept foot traffic, all un-bonded granules are removed and the surface is Colorcoated. For rapid access to the coating, expedite by using Colorcoat "Cure Accelerator"

FINISHES: The texture and appearance of **TUFFLEX®** Overlay Systems will vary, depending on the texture granules and Colorcoat used. Generally, the surface may have a slight gloss, which is moderated with age.

COLORS: Colorcoats are available in Light Tan, Dark Tan, Light Grey, Medium Grey, Dark Grey, Chocolate, and White. Special colors will be formulated subject to minimum quantity and tinting costs.

LIMITATIONS: All **TUFFLEX**® Systems must be installed on properly cleaned, prepared, graded, flashed, and primed dry substrates (see our printed Guide Specifications). All users must be familiar with and must abide by our published Material Safety Data Sheets. Polyurethanes and the solvents employed may cause health problems if used without adequate ventilation or fresh air respiration, so precautions must be taken to protect all occupants on the job site during installation.

4. APPLICATION STANDARDS: The physical characteristics of completed **TUFFLEX**® Systems vary according to the type and size of rubber aggregate employed in their formulation. Since only clean, high quality rubber is added. Actual usage shows that these aggregates do not reduce the strengths of the system, but enhance the characteristics required by the designed usage. Because so many vanations exist, the performance test results offered in the following tables are for our **TUFFLEX**® products only. Please see chart below).

PREPARATION OF SUBSTRATES & APPLICATION: Please refer to the individual specifications for each surface requirement.

5. AVAILABILITY AND COST: TUFFLEX® Systems are available through distributors and licensed contractors. Telephone (562) 404-0479 for the names of our agents or of the Contractors in your area. Cost of installation varies by specification, size of project, preparation, and other job site variables.

6. WARRANTY: TUFFLEX® **Inc..** in conjunction with Distributors and Licensed Contractors. may issue performance warranties on its Systems as dictated by job conditions **TUFFLEX**® warranties may be extended by the periodic refurbishment of the Colorcoat see "Warranty Explanation" policy).

7. TECHNICAL SERVICES: TUFFLEX®**, Inc.** has a network of Distributors and Licensed Contractors throughout the United States.

Telephone (562) 404-0479 for the name and address of the **TUFFLEX**® Representative in your area.

TECHNICAL DATA

PROPERTY	MEASURING and CONDITIONS	**TUFFLEX**® SOLVENT FREE RBC "TUFF"	"SOFT"
Weight	ASTM E-201	10.5#/gal	10.5#/gal
Solid Content	By Volume	91%	90%
Hardness	ASTM D-2240, Shore A	65	35
Elongation	ASTM D-412	650%	800%
Tensile Strength	ASTM D-412	1450	900
Adhesive Strength (peel on primed concrete)	ASTM D-903	175 pi	175 pli
Water Absorption	ATM D-471	.05% by weight	.05% by weight
Tear Resistance	ASTM D-1004	168 pli	90
Abrasion Resistance	ASTM D-421,15t 800mg Taber Abraser, H-18 wheel 1000 cycles	N/A	N/A
Weatherability change	ASTM D-822 Weatherometer 500 hrs.	Slight color change	Slight color
Temperature Service Range	Fed Std 141. Meth 6223	-65^{o} to 200^{o} F	065^{o} to 200^{o} F

*NOTE: **TUFFLEX**® "TUFF AND "SOFT" may be mixed to acheive different Shore A readings. A 50/50 mix is approx. Shore A 55

CHEMICAL RESISTANCE

4 day immersion at 77^{o} F of 40 mil **TUFFLEX**® Resin Binder Films and 20 mil **TUFFLEX**® Colorcoat films

	RESIN BINDER	COLORCOAT
Salt Water	No effect	No effect
Distilled Water	No effect	No effect
5% Detergent Solution	No effect	No effect
Chlorinated Pool Water	No effect	No effect
Antifreeze	No effect	No effect
Motor Oil	Stained	Slight stain
Hydraulic Brake Fluid	Slight bleaching	Slight bleaching
Gasoline	Slight Swelling (3%)	Slight stain

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How To

TUFFLEX® WORKSHEET

An introduction to the basic theories, calculations, and procedures of using **TUFFLEX®** Resin Binder Concentrate (RBC). Plus some informal hints to make the process a whole lot more fun!

TUFFLEX® is a breakthrough **"new technology"** urethane rubber with entirely new capabilities and versatilities that were never available with the old technology' materials.

With old technology" urethanes, you needed to spread the material in paint-like thin coats, then wait up to 24 hours for each coat to cure from moisture derived from the air before application of the other thin coats required to build up any meaningful membrane thickness. Solvent shrinkage, odors, mediocre physical properties and high labor costs resulting from multiple application steps are additional limitations.

In contrast, with our **"new technology"**, the addition of 25% of plain tap water catalyzes the **TUFFLEX®** Resin Binder Concentrate (RBC) - and also lowers the cost by 25%! - so that now any thickness of membrane can be applied in a single coat. **For the first time ever,** a coatings contractor can spread a solvent - free, odorless, extra tough and flexible urethane coating knowing that he has control of the pot-life of his mixture, the thickness of his membrane and the time of its cure.

Waterproofing membranes, "T" - expansion and seismic joints, flexible sloping under-layments, crack filling, caulking, to a movie studios use for casting special effects props. **TUFFLEX®** uses are only limited by your imagination.

Such a wide range of versatility could lead one to think that **TUFFLEX®** materials and systems are complicated and difficult to work with. Nothing could be further from the truth!

It is this tremendous versatility - coupled with user friendliness - that is at the very heart of **TUFFLEX®** technology

As with anything new, it only takes a bit of hands-on trial & error to relieve such apprehensions. A little experience and a little ingenuity can result in a combination that will help the contractor successfully increase his bottom line of job satisfaction and monetary gain.

HINT: Make copies of the following worksheet pages to use as on-th-job reminder sheets.

The primary and most unique material in the **TUFFLEX**® product line is the **TUFFLEX**® Resin Binder Concentrate (RBC). This comes in two forms:

Solvent Free TUFF" and Solvent Free "SOFT".

The Solvent Free "TUFF" has a Shore A hardness of about 60 and cures to an extremely flexible membrane for hard usage decks and roofing applications. The Solvent Free "SOFT" has a Shore A hardness of about 35 and is usually used as a cushion pad, in "T"-Joints, as a crack filler and as a caulking material. The "TUFF" material is usually applied as the wear-surface coating on top of the "SOFT". These two materials can be "Mixed & Matched" to reach any Shore A hardness in between. A 50/50 mix will result in a Shore A hardness of approximately 45.

The **four** most important and unique things about both 'TUFF" & "SOFT" are:

1 . They are **concentrated**, so various fillers can be added.
2. They are **catalyzed,** by adding 25% plain tap water.
3. The 25% water adds 25% to the yield, and **lowers** the cost by 25%!
4. They are solvent-free and odorless!

Far from being complications, these facts are the backbone of the **TUFFLEX**® **simplicity, versatility and economy.**

Water is the catalyst, and by adding the water, you also increase the yield by 25% and lower the end use cost by 25%. The advantage of a catalyzed material is that you can apply the **TUFFLEX**® "**thicker, quicker & better"** than old technology" elastomerics and save time **and** money.

It's that simple!

A bit later, we will review even more **TUFFLEX**® advantages, such as how to save additional labor and materials costs while solving some really unique problems.

Understanding and Calculating Yield

The basic catalyzing and **yield** formulation is the addition of up to 25% water to each unit of **TUFFLEX**® RBC. This **increases** the yield by 25% and consequently, **lowers** the cost by 25%.

One unit of **TUFFLEX**® **R**esin **B**inder **C**oncentrate **(RBC),** plus 25% water, yields 1.25 units of **B**ase **M**embrane **M**ixture **(BMM). RBC** + water = **BMM.**

For example, a 5 gallon pail of **TUFFLEX**® **RBC** x 1.25 yield = 6.25 gallons of **BMM.**

Total cost $___ divided by the 1.25 yield = $___ which is the actual cost per gallon
(Material cost + tax + shipping, etc.) of a mixed gallon unit of BMM.

TUFFLEX® overlay systems normally begin with surface preparation and priming, then the application of a base membrane of either 40-mils on smooth surfaces, such as concrete or metal ship decks, or 62.5-mils (1/16 inch) on plywood or other less-smooth surfaces. **TUFFLEX**® has also been used for 1/2 inch (500-mil) elephant pads!

There are 1,600 mil sq. ft. (msf) per gallon of liquid. If you divide 1600 by 40 mils thickness you get 40 sq. ft. of coverage. When 25% water is **added** to the **TUFFLEX**® **R**esin **B**inder **C**oncentrate **(RBC)** to act as the catalyst, the water also acts as a **filler material** increasing the yield of the material by 25% to 2,000 mil sq. ft. 1 gallon of RBC + 25% water = 1 1/4 gallons of ready-to-use **B**ase **M**embrane **M**ixture **(BMM).** An extra quart of material for free! Divide 2,000 mils by 40 mil thickness = 50 sq. ft. coverage per gallon of BMM, 10 sq. ft. increase in coverage for the "free" cost of the water!

It is efficient to mix half-pail quantities (2 1/2 gals. of RBC plus 2 1/2 quarts of catalyzing water) because pouring water into a full 5 gallon pail would cause it to overflow. Each 5 gallon pail of RBC plus the catalyzing 25% of free water yields 6 1/4 gallons of usable Base Membrane Mixture (BMM).

40 mil system calculations:
1 gallon of RBC + 1 quart (25%) water = 1 1/4 gallons of BMM (2000 msf). Divide by 40 mil thickness = 50 sq. ft. of coverage (per gallon of RBC+1 quart of water). 1/2 half pail mixing unit of RBC (plus its 2 1/2 quarts of water) will cover 125 sq. ft. and a full 5 gallon pail of RBC (plus its 5 quarts of water) will cover 250 sq. ft. at 40 mils thickness.

62.5 mil system calculations:
1 gallon of RBC + 1 quart (25%) water = **1** 1/4 gallons of BMM (2000 msf). Divide by 62.5 mil thickness = 32 sq. ft. of coverage (per gallon of RBC+1 quart of water). 1/2 pail mixing unit of RBC (plus its 2 1/2 quarts of water) will cover 80 sq. ft. and a full 5 gallon pail of RBC (plus its 5 quarts of water) will cover 160 sq. ft. at 62.5 mils thickness.

Calculating the RBC required for a 1.000 sq. ft. job.

40 mil thickness:

One 5 gallon pail of RBC + 25% water covers (5 gal. x 50 sq. ft. per gallon of BMM) 250 sq. ft. at 40 mils. 1,000 sq. ft. job divided by 250 = **4 pails of RBC needed for the** job. (After adding the 25% water, the resulting yield is 5 pails of ready-to-use BMM. One 5 gallon pail additional for the cost of the "free" water!)

62.5 mil thickness:

One 5 gallon pail of RBC + 25% water covers (5 gal. x 32 sq. ft. per gallon of BMM) 160 sq. ft. at 62.5 mils. 1,000 sq. ft. job divided by 160 = **6 1/4 pails of RBC needed for the job.** (After adding the 25% water, the resulting yield is 7.8 pails of ready-to-use BMM. About a pail and one half additional for the cost of the "free" water!)

As with any building material, a "**safety factor**" allowance should be figured in to compensate for uneven substrates, joint taping, patching and waste.

Another way of figuring material usage:

1 gallon RBC = 1600 mil square feet (msf)
1 quart water = 400 mil square feet
1 1/4 gallons = 2000 msf in 1 1/4 gallons of BMM

Divide by the desired thickness. Example:

1/4 inch = 250 mils, divided into 2000 mils (1 1/4 gal. BMM) = 8 sq. ft. at 1/4 inch thick.

Divide the cost per gallon of RBC by 2000 msf to get the per mil cost and then multiply by the mils thickness needed to figure the membrane cost per sq. ft..

"How to" and miscellaneous ramblings.

When the RBC is mixed with water, you have about 15 minutes +/- to apply the BMM and still have it flow freely and self level easily.

On large jobs that will require multiple mixing cycles, we normally mix in 1/2 pail units as the job progresses. The mixer person is the key and he must time the mixing to keep a wet edge and not get ahead or behind the applicators. (It's a lot easier than it sounds. It just takes communication, practice and experience.)

The rule of thumb when applying the BMM is "The quicker the better" In other words, don't hesitate. You can detail before and after the membrane is applied, but try not to "dawdle" while the material is setting up in the pail. The quicker it goes down, the better the material will lay out and smoothly self-level.

Hint: In hot weather you can add **cold water** to slow down the catalyzing rate and in cold weather, **hot water** to speed it up. As with everything else in life, experience and practice will make things easier as time progresses. Life is a learning curve!

Set up time.

When the water is added, the final set up time will still depend on the weather and temperature. Additional chemical catalyst (the red colored stuff!) is another tool to help meet your job needs. 1 vial of "**red**" is shipped with each pail of RBC and should be added when the pail is boxed and mixed to get the settled solids off the pail bottom and prior to the addition of water. This vial brings the pail up to the 'normal" amount of catalyst. (This amount is kept out during manufacturing for better storage life.) If this vial is forgotten, the material will just take a little longer to set up. (But don't ever forget the water!I!)

In cold weather, additional **“red”** chemical catalyst, may be added to speed up the cure time. One additional 1 oz. vial per 1/2 pail mixing unit will shorten the curing time (1 for “normal” and 2 additional = 3 total per 5 gallon pail of RBC). The additional cost is only 2 to 3 cents per sq. ft. and it really speeds things up! The working time does not measurably change, just the end cure time, which means that you can get back on the cured membrane earlier to finish the job quicker.

Curing time.

‘Normal” 70 degree day, the set up without additional chemical catalyst will be about 4 to 5 hours. With the addition of the “red” chemical catalyst, (3 vials max. per pail) the time can drop to about 2 to 3 hours, or even quicker in hot weather.

Adding filler material to the **TUFFLEX**® RBC.

TUFFLEX® can be thickened with rubber granules or sand in order to use it in some really unique and very cost effective applications.

The two rules of thumb are:

1. If you need the **TUFFLEX**® thick, **mix it thick.** If you need it thin, **mix it thin.** (Add more or less filler material.)

2. Don’t **ever** forget the water!!!!!!

Yes, it’s that simple. Mix thick or thin as needed and throw in 25% water. It’s almost contractor proof!

By using the **TUFFLEX**® mixtures as your caulking or sloping materials, you will not have the waiting time that you would if you used cementicious or non-**TUFFLEX**® caulking materials. These other materials must be allowed to dry out, out-gas and cure completely by being left open to the air. The **TUFFLEX**® mixtures are internally curing materials and may be covered with the next application step as soon as they cure firm enough so that they do not lift up when applied over. (We call this “materials receptive.”)

Cove up the walls, patch the cracks, tape the joints, slope to drain then cover those steps.with the membrane coat application. The materials will bond to each other and cure out as one flexible and monolithic unit. The entire deck can “rock & roll” as a unit. This really speeds up total completion time. Remember, time is money!

When rubber granules are added to the **TUFFLEX**® RBC it obviously creates a more flexible system than when sand has been added. But, both rubber and sand have their place on the job site.

Rubber is usually used when “caulking” or “spackling” mixtures are needed for filling cracks or coving up walls. Even without filler materials, **TUFFLEX**® figures out to less that $2.00 for a standard 11 oz. caulking tube (We can’t package in tubes because the water/catalyst has to be added. You can use bulk guns or disposable tubes after the material has been mixed.) With the fillers, the cost is even less. Try to find a tougher or better caulk at any price, let alone for under two bucks!

The **TUFFLEX**® Sand Slurry is made with the “TUFF” material because you can add quite a bit of sand and it will still remain a very tough and structurally solid material. A mixture of 1 to 1 will still be a very fluid and easy to work mixture for filling surface spalling and general patching. By adding 2 or 3 units of sand (With corresponding per unit cost savings.) you can mix a stiff enough batch to form a sloping angle. If the deck flexes, the Sand Slurry will not crack or de-laminate under the membrane like a cementicious or epoxy material would. This is why it works so well on plywood and twisting ship decks. Just part of the **TUFFLEX**® ‘Rock & Roll” theory!

Readily available 20 or 30 mesh silica sand is fine for the Sand Slurries, and either the texture rubber or the finer ground black tire rubber can be used for the caulking tasks. If a lot of rubber is needed, the black tire grindings are less expensive than the texture rubber.

TUFFLEX® “T” - Joint.

In the **TUFFLEX**® “T” - Joint system, the “SOFT” binder is used in the expansion joint and the “TUFF” material is applied as a membrane over the top to form a monolithic - Joint. The joint will still be visible as it expands and contracts, but the edge wear, high heel shoe penetration problems and edge leakage are eliminated.

Compatible solvents.

Use caution, since solvents are flammable.

Always check your local V.O.C. limiting requirements when selecting solvents for clean-up. Sometimes, the primers and color coats can be cut with solvent for economy and/or ease of application. Please check the specific **TUFFLEX**® Technical Data Sheet for further info.

Xylene, XyIol, Toulene, Toluol, M.E.K. and 1,1,1, -Trichloroethane are compatible for use with urethanes and epoxy primers. Never use a solvent that contains **alcohol,** which has a negative effect on urethanes.

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How To

TUFFLEX® ON-THE-JOB-REMINDER SHEET

BEFORE LEAVING THE SHOP FOR YOUR JOB:

You, and your crew, should be familiar with all **TUFFLEX**® instructional, advisory and cautionary information. Review and/or take with you copies of the **TUFFLEX**® Worksheet & Suggested Basic Equipment List. Make sure you have copies of the **TUFFLEX**® MSDS information on the job. Be familiar with the **TUFFLEX**® Specification that is to be applied.

PLYWOOD APPLICATION REMINDERS:

- Follow the surface preparation and application guidelines detailed in the **TUFFLEX**® Pedestrian Deck Overlay Specification on Plywood. Some highlights of this Specification -
- ¾" plywood is recommended over 16" o.c. joist spacing. The A - grade side should be up to minimize surface prep time and labor required on lesser grade plywood. Good jobs start out with good substrates.
- All plywood side and end joints should be backed by minimum 2" framing members.
- Joint spacing between plywood panels should be approximately 1/8-inch, or should be saw cut to about that spacing. This allows the plywood to naturally expand, contract and flex with the joints acting as small expansion joints. This prevents edge rubbing and failure
- Venting of sun-heated and expanding air in plywood joint spaces must be provided for.
- Annular ring shank nails or screws of a length consistent with the plywood thickness, should be spaced at a maximum of 6" O.C.. Sink the nails/screws into the deck and fill indent with thickened **TUFFLEX**® mixture prior to membrane application.
- If the plywood surface is contaminated or of suspect condition, use a test patch to check the surface. Do not coat over a surface that may later fail just to satisfy a customer. Don't own someone else's problem!

METAL FLASHING AND DECK EDGING:

- Galvanized metal must be roughed up and/or etched with muratic acid and neutralized with TSP. Apply the primer when dry. Surface preparation is important in all phases of coatings but is critical when going over flashing metal. If doubtful, use test patches to check the bond.
- Metal edging and wall flashing should be nailed with big-headed galvanized roofing nails, or equal, at a maximum of 3"o.c. near the edge closest to the plywood deck to minimize up-warning from the suns heat.

PLYWOOD JOINT TREATMENT:

- The 1/8" joint spacing, as recommended above, must be bridged with "TUFF-TAPE", a flexible polyester fabric. The joint space is best left empty and the tape and membrane bridging above.
- To bridge the joint, primer if called for, and a skim coat of **TUFFLEX**® B. M. M. is spread over the joint area. The TUFF-TAPE is laid into the material and pulled tight to the deck with a broad knife. Start at the center of the tape and work to the ends, making sure to keep the tape flat and tight to the deck. Use a bit more material or use the excess around the tape to 'set" the tape in the skim coat. The tighter you keep this application step, the less likely the joints will show on the surface after the membrane has been applied. Traffic hump" joints are a no-no. By keeping the TUFF-TAPE joint at the bottom of the membrane application, maximum flexibility is achieved during normal expansion and contraction of the deck. *Note: sometimes the joints still show because of this deck movement. At least the joints won't rub and fail.*

PRIMING:

- When priming is called for, apply the primer uniformly, but sparingly, with no puddles and allow to cure until slightly tacky. Hint: because the primer does not sink into the metal flashing like it will with plywood and concrete, it will take longer for it to become tacky. So do your edge metal priming first and allow it to set-up while working on other areas of the deck. Metal is harder to prime because the primer does not really penetrate well, so prepping the metal areas is very important. Most deck problems occur at the flashing details. Rough-sand flashing metal for optimum bond.

PREPPING AND DETAILING THE DECK:

- Level and fill all nail & screw depressions and detail smooth wood to metal transitions with Tuft-Tape and a thickened mixture of B.M.M.. If a limited amount has to be done, use the surface texture granules, if a lot has to be done, use the less expensive black tire grindings. Mix thick or thin as needed for patching or coving. (Refer to page 4 of the **TUFFLEX**® Worksheet.)
- Use the **TUFFLEX**® Sand Slurry to fill large voids, sloping to drain or ramping up several inches for wheelchair access to door sills. This makes a flexible sloping and filling material that will not crack with substrate movement. Shape with a wood float and finish with a steel trowel lubricated with approved solvent. (Refer to: "**TUFFLEX**® Sand Slurry Specification and Application Guide" for further information.

MIXING AND APPLICATION RATES AND TECHNIQUES:

- The best reference to review for mixing instructions and techniques is the "**TUFFLEX**® Worksheet". This publication will explain the theory and practice of **TUFFLEX**® RBC use. The application rates are stated in the **TUFFLEX**® Specification being used. The "Worksheet" shows how to figure material estimation and spread rates.

BROADCASTING TEXTURE GRANULES:

- The texture choice is up to the customers needs and wishes. The rule of thumb is that the more slip resistant a surface, the harder it is to clean. Ski resorts usually want very aggressive surfaces and home owners want surfaces that are easier to keep clean. On pitching fishing boat decks in the North Sea, they will call for very course aluminum oxide to be back rolled into the colorcoats for maximum slip resistance. Education of the customer makes for an educated choice by them.
- Many different surface treatment options are used on **TUFFLEX**® Membranes. A waterproof membrane under tile specification is available. 200,000 sq. ft. of **TUFFLEX**® Membrane was used to protect the concrete under the Aquarium of the Americas in New Orleans. Cementicious "Splatter Coats" and cementicious design pattern systems are sometimes used on top of the membranes.
  When the rubber granule surface is specified, wait about 15 to 30 minutes until the membrane starts to set-up and then broadcast to excess. Save the recovered granules for reuse. (A bag of rubber will broadcast about 250 sq. ft. to excess. A recovery of about 1/3 of the rubber is about normal.

TUFFLEX® COLORCOATS AND CURE ACCELERATOR:

- Colorcoats dry from the moisture they derive from the air. Never add water as with RBC,
- To assure color uniformity, thoroughly mix the solids up from the bottom and "box" together any pails with different batch numbers.
- Apply with a paint roller using 'cross-hatched" strokes to achieve a well bonded and even coat.
- Apply the colorcoat spread rate in accordance with the Specification in use.
- Up to one quart of **TUFFLEX**® Colorcoat Cure Accelerator will hasten the cure of one 5 gallon pail of colorcoat. Refer to the **TUFFLEX**® Technical Bulletin for Colorcoat Accelerator for further information.

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SUGGESTED BASIC EQUIPMENT LIST

PAPERWORK:

- Copy of job contract or work order.
- Copy of the **TUFFLEX®** Specification(s) to be used.
- Building Permit, if required.
- Copies of this list and any other notes to use as job site reminders.

SAFETY AND PROTECTIVE EQUIPMENT:

- Material Safety Data Sheets (MSDS) for making employees aware of safety and self-protection.
- Activated carbon filter masks or fresh air masks for work indoors and/or in poorly ventilated areas.
- Safety glasses or goggles for protection when mixing.
- Rubber gloves for use with solvents or by personnel allergic to the materials in use.

FOR MIXING:

- Heavy-duty Milwaukee 'Hole-Hawg" or equal. 300-r.p.m. is the fastest speed recommended, so that a minimum of air will be whipped into **TUFFLEX®** mixtures. Keep the blade down in the bottom of the pail and draw the material from the surface when mixing in order to avoid mixing in air. Do not "bounce" the mixer up & down in the material, as that will whip in air that may become trapped in the mixture when curing and cause blisters. Refer to the ADVISORIES: "Causes of Surface Blisters and How to Avoid Them".
- 5 gallon size mixing paddle.
- Heavy-duty electric cord with #12 minimum size wire.
- Two empty 5-gallon plastic pails for mixing the **TUFFLEX®** RBC in. For "boxing" the material in prior to mixing and to mix in and carry to the application area. Extra plastic pails for use with the primer and colorcoats. Several 1-gallon plastic buckets for measuring and for holding small quantities of patching material. (Plastic containers are reusable, as the cured material will peel out.)
- Plastic trash cans, 30 gal. ±. It is easier to dump the texture granules into the large plastic trashcans and work out of them than work out of the tippy bags. The recovered granules can be put back into the cans, lids snapped on, and transported to the next work site. Also good for holding the water for mixing.
- Drop cloths or thin plywood panels to mix on and protect the job site surface.

FOR SPREADING:

- Measuring tape and chalk line for setting up quantity control grids on surfaces to be coated. Especially useful when first learning to **TUFFLEX®** Membrane materials and their spread rates.
- Paint rollers with medium (1/8'to 3/8") nap and poles for spreading primer, base material and colorcoats. Use solvent resistant resin core roller covers. Use good quality frames and poles. Cheap ones bend!
- Concrete trowels in 4' X 14" to 4" X 20" sizes. Shorter trowels for use in congested areas. Round ended or notched trowels are optional depending on experience or needs.
- Heavy duty squeegees for larger jobs. Notched or straight depending on experience or needs.
- Various sized spackle or wall board knives for spreading materials in different sized areas and touch-up.
- Inexpensive paint brushes for touch-up. (Throw aways.)
- An inside-angle concrete step trowel for coving at vertical walls with thickened **TUFFLEX®** mixtures to form coving details.
- Kneepads. No "hand and knees" work should be done without kneepads!
- Lightweight cotton (breathable) gloves to keep hands cleaner. Use rubber gloves when using solvents.

MISCELLANEOUS:

- Lid lifters for easy removal of plastic pail lids. Eliminate cutting and saves lids for reuse.
- Solvent for tool and hand cleaning. Always check your local V.O.C. limiting requirements when selecting solvents. Compatible solvents: xylene, xylol, toluol, MEK and 1,1,1,- Trichloroethane. Never use solvents that contain alcohol, which has a negative effect on urethanes.
- Rags for clean up.
- Razor blade knives
- Duct tape for masking and taping oft area edges.
- 3” wide polyester fabric reinforcement “TUFF-TAPE” for plywood joint bridging. Provides stress-relief and helps visually hide the joints.
- Scissors for cutting fabric.
- Hacksaw for cutting metal step nosing, etc..
- Tin snips for cutting and trimming metal flashing and metal reinforcement mesh.
- Masking tape and masking paper for detailing. (A few minutes of masking is a lot less time than hours of clean-up!)
- Etching compound (muratic acid, etc.) for galvanized flashing metal and TSP for neutralizing.
- Chisels for opening and cleaning cracks.
- Wet-Dry shop-vac for cleaning out cracks, crevices and after cleaning the vac, picking up excess texture granules for reuse.
- Brooms, push and straight, for clean up. Also dust pans.
- 4’ carpenters level for checking decks drainage.
- Hammer, annular ring shank nails, screws, electric drill with screw bit, nail and/or staple guns depending on job size and needs.
- Drag chain for checking spalled concrete and exposing poor substrate that has to be removed. (2’ long heavy chain attached to a 2 - 3 foot long handle. High pitch sound means OK. Low pitch areas are probably delaminated and should be removed.)
- Electric or gas vacuum-blower. See Advisory titled “Removing Rubber Granule Lumps and Broadcasting Texture Granules”.

NOTES ON ADDITIONAL TOOLS TO USE:

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How To

SURFACE TEXTURES ON TUFFLEX MEMBRANES

TUFFLEX® Membranes are used in a wide variety of applications, ranging from our “normal” walking deck systems, which use various-size rubber granules for slip resistant surfaces, to 200,000 sq. ft. of bare membrane under the Aquarium of the Americas in New Orleans. That membrane was placed to waterproof and protect the concrete and re-bar of the old docks that the park and aquarium complex is built on.

TUFFLEX® Membranes provide waterproof surfaces outdoors, rustproof & flexible decking systems on storm-tossed ships and thick seamless Mono-Mat Systems that provide sanitary cushioned flooring for zoo and veterinary uses.

Surface treatments can run the gamut from smooth to very rough for maximum slip resistance. (On the pitching decks of North Sea fishing boats, in addition to an aggressive rubber granule texture on the membrane, coatings applicators also back-roll aluminum oxide into the colorcoats for a surface that you could not walk on with bare feet, but which provides a texture that meets their specific needs.)

No one surface texture can do it all. The customer has to be involved in the texture choices and options in order to make a informed decision. These decisions range from esthetics and cost concerns to slip-and-fall safety needs. Informed customers are good customers. They alone are responsible for making the final texture decision that they have to live with.

The general rule of thumb is that the more aggressive the surface texture, the harder it is to clean. For example, ski resorts need the traction of a heavy texture for safety reasons and only worry about cleanability as a distant secondary concern. (Squaw Valley ski resort turns fire hoses on their **TUFFLEX®** Decks and scrubs them down with stiff deck brushes!) In the interior uses at ski resorts, the need for traction is still there, so they use wet-dry industrial floor cleaning machines to scrub and vacuum the aggressive surface. Cleaning is sometimes just a function of changing the way it is done. Mops will catch and pull on any textured surface, so scrubbing with a stiff broom and using a simple wet-dry shop vac to suck up the dirty water can be substituted. (Using a fire hose does seem like more fun though!)

Many coatings contractors use cementicious “knock-down” splatter coats and decorative-pattern acrylic systems on top of **TUFFLEX®** Membranes when reliable waterproofing is needed underneath. Just follow the **TUFFLEX®** Specification sheet “Waterproofing Under Floor Tile System”, where a sand surface is applied on top of the membrane for bonding purposes to the thin set mastic and tile. Then just substitute the acrylic system in place of tile as the surface treatment.

One interesting texture option finding a very strong acceptance in the veterinary “Mono-Mat” market is using rubber texture granules mechanically sanding off their sharp tips. This leaves a “truncated cone” effect that provides a surface which is much easier to clean and maintain in animal habitats. It is actually “mop-able!”. It looks like a fine rubber knock-down finish and provides a nice random-design surface that will stand up to much harder usage than a smooth membrane with only a colorcoat finish. It is also easy on bare feet, such as for an above-grade swimming pool surround on a rooftop which must be waterproofed.

The trick to doing this system is simple. The membrane and rubber granule system is applied as usual. One colorcoat is applied and allowed to dry. Then the rubber granules can be sanded down with a belt sander with a very coarse grit sanding belt, or by hand in corners and around details. You cannot sand the rubber texture granules until they are “stiffened-up” with a colorcoat application. They are just too flexible to sand without the colorcoat. Then the second colorcoat is applied for the final surface coat. (Do not try this system without some practice! It is easy to over-sand and get an uneven look. Practice makes perfect!) Try it when you have some left over material, It’s really a very versatile surface option and one that you can add to your customer’s .

APPLICATION HINTS WHEN USING THE RUBBER GRANULE SURFACE:

The use of rubber granules was first tried by **TUFFLEX**® about 12 years ago. Early development work with **TUFFLEX**® Materials was at ski resorts at Lake Tahoe, CA. The regular sand textures would not hold up to ski boot wear & tear, whereas rubber texture was found to last longer because it will grip, flex and snap back when the hard ski boots strike the surface. Also the rubber texture is also much quieter to walk on. Noise reduction at ski resorts and on metal ship decks where this system has been installed is dramatic!

Rubber granules also speed up the application process because they can be broadcast onto the wet membrane and not tend to sink into it as sand will. Even if some rubber sinks in, it is rubber into rubber, and will not break down and cause failure as sand in the membrane will. Wait 15 to 30 minutes after the membrane has been applied when you can feel the material with your finger and see that it is beginning to set up - then throw the rubber on. Less will sink in and you will use less. (Experience is the best - and Only! - teacher when it comes to application technique.)

One 55 lb. bag of texture rubber will broadcast about 250 sq. ft. The idea is to apply an excessive amount of rubber to insure an even application to the surface. If you try to “chicken feed” the surface, it will end up looking uneven. It is best to broadcast to rejection and bury the deck. A little extra rubber used is a cheap quality control effort. About 1/3 of the rubber can be swept up and saved for re-use.