

UNISORB®

INSTALLATION TECHNOLOGIES



Grupo CAP

Instalaciones y Representaciones

WWW.GRUPDCAP.COM

+52 81 8647 0350

UNISORB® GROUTING PRODUCTS

APPLICATION & SPECIFICATION GUIDELINES

PRODUCTS

CEMENT-BASED GROUTS

- V-1® Non-Shrink
- WTF® Non-Shrink (Wind Turbine Formula)
- UNISORB® Concrete Repair Compound (UCRC)

EPOXY GROUTS

- Standard V-100®
- Ship-Safe Standard V-100®
- Deep Pour V-100®
- WTF-E V-100™ (Wind Turbine Formula)
- DCR V-100™ (Acid Resistant)
- CR Hi-Flow V-100™
- Ship-Safe CR Hi-Flow V-100™
- Joint Filler V-100®
- Hi-Temp V-100®
- Xtra-Temp V-100®
- Adhesive V-100®
- Low-Temp V-100®



ISO-9001 Certified

INTRODUCTION & TABLE OF CONTENTS

INTRODUCTION

This UNISORB® Grout publication presents detailed performance and product selection data covering the extensive line of Unisorb cement-based and epoxy grouting materials. Included are detailed mechanical data and independent laboratory reports presenting full performance profiles for individual products. It is our intent to provide you with a complete guide for the proper selection and application of these products.

UNISORB® grouting materials have been carefully developed to provide optimum performance, even in the toughest applications, along with unparalleled ease of preparation and placement.

The UNISORB® engineering staff and field representatives are readily available to provide design and on-site assistance with your projects to assure that maximum product performance is attained.

Contact UNISORB® Engineering and Sales at 888-4-UNISORB, 517-764-6060 or FAX 517-764-5607.

E-mail: unisorb@unisorb.com

Visit our web site at:

<http://www.unisorb.com>

TABLE OF CONTENTS

GENERAL INFORMATION

1. Application Chart
2. Product Overview
3. Cement-Based vs. Epoxy Grout
4. Commonly Asked Questions
5. Grout Comparison Charts
Grout With Aggregate
6. Grout Volumes for Anchor Holes
Standard Grout Packaging & Yield
- 7-10. Recommendations for Grouting Machinery

CEMENT-BASED GROUTS

- 11-13. V-1® Non-Shrink
- 14-15. WTF® Non-Shrink (Wind Turbine Formula)
16. UNISORB® Concrete Repair Compound (UCRC) UCRC Extended Set
17. Basic Application Techniques (Cement Based)

EPOXY GROUTS

- 18-19. Standard V-100®
20. Ship-Safe Standard V-100®
21. Deep Pour V-100®
22. WTF-E V-100™ (Wind Turbine Formula)
23. DCR V-100™ (Acid Resistant)
24. CR Hi-Flow V-100™
25. Ship-Safe CR Hi-Flow V-100™
26. Joint Filler V-100®
Hi-Temp V-100®
27. Xtra-Temp V-100®
28. Adhesive V-100®
Low-Temp V-100®
- 29-30. Basic Application Techniques (Epoxy)
- 31-32. Typical Unisorb Grouting Application Photos
33. Grout Forms & Forms Sealant
Other Unisorb Products

UNISORB® is a registered trade name of UNISORB® Installation Technologies. Other registered trade names and trademarks in this catalog include:

V-1®
V-100®

Consult Unisorb Factory for sealing, bonding, and curing compounds.

Consult Unisorb Factory for low or high temperature grout applications.

**888-4-UNISORB
517-764-6060**

Material Safety Data Sheets (MSDS) for all Unisorb's grouting products are available on line at www.unisorb.com.

APPLICATION CHART

Additional specialty grouting products available

Contact Unisorb Engineering

888-4 UNISORB
517-764-6060

	UNISORB GROUTING PRODUCTS														
	CEMENT-BASED			EPOXY											
	V-1 NON-SHRINK	WTF NON-SHRINK (Wind Turbine Formula)	UNISORB CONCRETE REPAIR COMPOUND (UCRC)	STANDARD V-100	SHIP-SAFE STANDARD V-100	DEEP POUR V-100	WTF-E V-100 (Wind Turbine Formula)	DCR V-100 (Acid Resistant)	CR HI-FLOW V-100	SHIP-SAFE CR HI-FLOW V-100	JOINT FILLER V-100	HI-TEMP V-100 (Up to 325°F)	XTRA-TEMP (Up to 425°F)	ADHESIVE V-100	LOW TEMP V-100
ACID ENVIRONMENTS								●				●	●		
HIGH TEMPERATURE ENVIRONMENTS	●	●	●									●	●		
LOW TEMPERATURE ENVIRONMENTS	●	●	●												●
CRANE RAIL SETTING	●	●				●	●	●	●	●					
EQUIPMENT ANCHORING	●	●		●	●	●	●	●	●	●		●	●		●
ANCHOR BOLT SETTING	●	●	●	●	●	●	●	●	●	●		●	●		●
LEVELING WEDGE SETTING	●	●	●	●	●		●	●	●	●		●	●		●
REPAIRING CONCRETE FLOORS/FOUNDATIONS			●												
WIND TURBINE TOWER BASE SETTING	●	●					●		●	●					
EXPANSION JOINT FILLING											●				
MACHINE BED GROUTING	●	●		●	●	●	●	●				●	●		●
SURFACE BONDING OF MACHINERY TO CONCRETE				●	●	●	●	●	●	●		●	●	●	●

Standard recommended applications shown above.
Consult Unisorb Engineering for optional applications.

PRODUCT OVERVIEW

CEMENT-BASED PRODUCTS	
V-1® NON-SHRINK	A highly flowable product which develops extremely high compressive strengths in a very short time. The product will not shrink, and is ideal for grouting precision machinery as well as anchor bolt setting and other machinery grouting applications.
WTF® NON-SHRINK (Wind Turbine Formula)	A cement based precision grout specifically formulated for Wind Turbine applications.
UNISORB® CONCRETE REPAIR COMPOUND (UCRC)	A flowable, fast setting product designed for setting anchor bolts, and filling holes and large cracks in concrete floors, roads, sidewalks, etc.
EPOXY PRODUCTS	
STANDARD V-100®	A superior quality product with excellent flowability, high resistance to impact, and extremely rapid cure time. It is an excellent choice where very high strength and low grout quantities are preferred.
SHIP-SAFE STANDARD V-100®	Reformulated version of Standard V-100 which may be shipped under non-hazardous classification, eliminating delays and haz-mat fees. Also complies with E/U non-hazardous shipping regulations.
DEEP POUR V-100®	A highly flowable product intended for use where pours 3" to 8" deep are required, providing excellent compressive strength and rapid cure time.
WTF-E V-100™ (Wind Turbine Formula)	Develops super high compressive strengths in a very short period of time. Contributes to shorter construction times. Especially useful for the grouting of Wind Turbine Generator bases and other high performance applications.
DCR V-100™ (Acid Resistant)	A product designed for rail installations which require extraordinarily high strengths combined with resistance to temperature, humidity, acid and chemical environments. This product will allow pours with 3" to 8" cross-sections.
CR HI-FLOW V-100™	A product designed for crane rail and other extraordinarily severe applications where ultra-high strength combined with resistance to temperature and humidity are important.
SHIP-SAFE CR HI-FLOW V-100™	Reformulated version of CR Hi-Flow which may be shipped under non-hazardous classification, eliminating delays and haz-mat fees. Also complies with E/U non-hazardous shipping regulations.
JOINT FILLER V-100®	A product developed for sealing the exposed edge of Inertia Block isolation material at the floor level. It cures to a flexible solid state, preventing transmission of vibrations while protecting the edge of the isolation pad.
HI-TEMP V-100®	A product designed for applications where high mechanical strength and high temperature resistance over regular epoxy grout is required. It has a maximum service temperature of 325° F.
XTRA-TEMP V-100®	A product developed for applications where high mechanical strength and very high temperature resistance are required. It has a maximum service temperature of 425° F.
ADHESIVE V-100®	A product developed to be used as a trowelable adhesive to place under steel plates, bonding them to concrete floors. This can be used in either temporary or permanent installations. This product bonds to most surfaces.
LOW-TEMP V-100®	A product developed for applications where high mechanical strength is required, and where low temperatures are encountered while mixing and pouring. It performs best at temperatures between 45°-65° F.

CEMENT-BASED VS. EPOXY GROUT

Often UNISORB® V-1® Non-Shrink cement-based grout or UNISORB® Standard V-100® epoxy grout will provide equally beneficial long range results in the same application. The following points describe the features of each of these products.

COST

When comparing equal volumes of V-1® and Standard V-100®, the epoxy cost is up to six times greater. It is readily apparent there need to be some good reasons to use the more expensive product. In many cases there is not a great difference in the applied cost. This is a result of physical properties associated with the Standard V-100® that permits use of smaller quantities, as well as other operational benefits that reduce installation costs, as contained in the following paragraphs.

MIXING

V-1® (as with most cement-based products) requires only the addition of water. Mixing is usually done mechanically in a mortar mixer, with clean up requiring only the use of water. Standard V-100® uses pre-measured components, and includes a paddle type stirrer to be used with a variable speed drill.

TIME CONSTRAINTS

When time is an issue consider the following. V-1® should have a 24-hour cure before work continues, with a three day cure before final alignment. The Standard V-100® is stronger than the concrete foundation in less than 8 hours and final alignment can usually be done within 24 hours. In addition, epoxy grouts are used on dry concrete which eliminates the need for pre-soaking.

WORKING TIME

Working time should be considered when selecting grout. V-1® allows 30-45 minutes in which to finish pouring grout, while Standard V-100® allows only 10-15 minutes. With Deep Pour V-100® you have 45-60 minutes.

CROSS-SECTIONAL AREA

Standard V-100® is more fluid than V-1® and can easily flow into thin cross-sections while maintaining full strength. V-1® can only be made more fluid by using additional water, which lowers the strength. Directions on containers should always be followed to achieve optimum results.

Cement-based products require water to undergo a chemical reaction called hydration, and start to lose water as soon as they are placed. Water loss can result through evaporation or absorption into the concrete foundation. Because of water loss, sufficient cross-sectional thickness of the cement-based grout must be maintained to be sure that there is a large enough volume of water to fully hydrate all of the cement. For this reason a 1" minimum grout pad thickness is recommended.

Because epoxy grout products do not undergo hydration, the Standard V-100® grout pad is often only 1/4" to 1/2" thick. In some cases the grout "pad" is just a puddle with a leveling device setting in it.

ANCHOR HOLE SIZE

The two factors listed above (fluidity and water content) also affect the size of the anchor hole. A much smaller hole is required when using Standard V-100® which impacts cost in two ways:

(1) Volume is much smaller when using epoxy grout. In a typical anchor installation a 3" diameter hole would be used with V-1® while a 1 1/2" diameter hole is recommended when using Standard V-100®. This reduces the volume by 75%, thus reducing the difference in material cost.

(2) Cost is also reduced in the process of placing smaller holes. In the example above, the 1 1/2" diameter hole could be made with a hammer drill (a tool most shops have) using shop employees. The 3" diameter hole would be made with a core drill. The core drill is usually rented or the whole project contracted to someone who specializes in this field.

CHEMICAL RESISTANCE

Both V-1® and Standard V-100® are resistant to chemicals normally found in the industrial environment. This includes oils, coolants, and other fluids. A good rule to follow with V-1® is that if the concrete floor can be exposed to the chemical, the grout can be also. This puts V-1® in a class above other products that require sealing to maintain their properties.

It is reasonable to expect V-1® grout to react as the concrete would to chemicals since after cure it is basically sand and cement. Actually, it is often more chemically resistant and holds up longer than the floor around it. This is because it is a more dense material than the concrete and the chemical attack cannot penetrate the surface. Therefore, while the concrete is being attacked from within, the grout is only being etched from the surface. Needless to say, if it is known that there may be some chemical attack and the floor is sealed to resist this attack, the grout should also be sealed. Standard V-100® also offers excellent resistance to chemical attack.

TEMPERATURE CONSIDERATIONS

The mixing, placing and curing of both V-1® and V-100® are affected by ambient temperatures. In warmer temperatures grouts cure faster, resulting in both shorter work and cure times. In cooler temperatures these times are extended. At temperature extremes special procedures should be used to assure proper grout placement.

After cure, V-1® is suitable for elevated temperatures as high as 1000° F, with little loss in compressive strength. Standard V-100® is capable of withstanding temperatures up to 150° F. Hi-Temp V-100® and Xtra Temp are formulated for maximum service temperatures from 325° F to 425° F.

COMMONLY ASKED QUESTIONS

1. How long after a foundation is poured can a grout be used?

V-1 *As soon as it is set enough to pre-soak, plus 24 hours.

V-100 *3 days (compression only), 7 days otherwise.

2. How long after grout is poured can a machine be aligned?

V-1 *3 days

V-100 *8-24 hours

3. How long does it take grout to reach its max. strength?

V-1 28 days

Standard V-100

7 days

Deep Pour V-100

7 days

4. Is grout pumpable?

V-1 Yes

Standard V-100

Yes

Deep Pour V-100

Yes, if proper equipment is used to allow for aggregate.

5. Can part of a bag/pail/kit be mixed?

V-1 Yes, if proper amount of water is used.

V-100 No

6. What is the strongest grout to use, V-1 or V-100 ?

V-100

7. Which grout is best to use for high temperature applications?

V-1 V-1 grout is usable up to 1000°F.

V-100 If epoxy grout is preferred use Hi-Temp V-100 or Xtra Temp V-100. (See pages 26 & 27.)

8. Should grout be poured on a wet or dry surface?

V-1 Wet

V-100 Dry

9. How can I keep grout from "seeping away" when I've had to core drill into the soil under the concrete floor?

V-1 Sprinkle dry V-1 grout powder into hole, approximately 1/4" deep, and level off, then pour grout.

V-100 Pour just enough V-100 grout to cover and seal the soil portion of the hole, and wait until it partially cures (about 1 hour). Then fill V-100 into hole with anchor bolt.

10. What is the shelf life for Unisorb grouts?

The shelf life should be considered one year for cementitious grouts and two years for epoxy grouts. This is the time frame where the strengths, flow and cure time are consistent for normal storage conditions. (See packaging for date of manufacture)

11. What about min./max. grout thickness?

The recommended thickness values presented throughout this catalog represent the proper thicknesses of our products for most applications. Please contact Unisorb Engineering if you believe that your application requires a cross-section that is outside of the thickness ranges shown herein.

12. What about placement time?

Placement time is the time you have to place the grout. For cementitious grouts this time begins when you start pouring water into the mixer with the grout powder, and ends when the grout begins to reach its initial set. For epoxy grouts it begins when you start pouring the hardener into the resin, and ends when the grout begins to

reach its initial set. The initial set is delayed somewhat when the freshly placed grout is followed by more grout in a continuous manner.

For advice on placement times for specific grouting projects please contact the Unisorb factory.

**Weather conditions, such as temperature, humidity, wind factor, rain or sunshine may affect figures given as follows:*

Warm, dry weather on a sunny day (if an outside application) will speed up curing and placement times on all grouts. Cold, wet weather will slow down curing and placement times on all grouts. If work is being done inside, and temperatures are in the 70°F to 80°F range, the median figures given should be quite accurate.

See individual grout product pages in this catalog for answers to most other grouting questions.

Consult Unisorb Factory for sealing, bonding, and curing compounds.

Consult Unisorb Factory for low or high temperature grout applications.

**888-4-UNISORB
517-764-6060**

GROUT COMPARISON CHARTS

GROUT WITH AGGREGATE

GROUT COMPARISON CHARTS

The following products are typically used for machinery installation and summarized below for easy comparison:

PHYSICAL PROPERTIES			
PHYSICAL PROPERTIES	V-1 NON-SHRINK	UNISORB CONCRETE REPAIR COMPOUND (UCRC)	WTF (Wind Turbine Formula)
Compressive Strength (psi)			
24 Hours	6,565	6,200	8,079
28 Days (Ultimate)	11,875	10,100	13,278
Tensile Strength (psi) (28 Days)	568	564	—
Flexural Strength (psi) (28 Days)	1,700	1,237	—
Typical Pour Depth	1" - 2"	1/16" - 2"	1" - 3"
Placement Time	45-60 minutes	10 minutes	20-30 minutes
Yield	.40 cu. ft./48#	.40 cu. ft./50#	.40 cu. ft./50#

PHYSICAL PROPERTIES	STANDARD V-100	DEEP POUR V-100	WTF-E V-100	DCR V-100	CR HI-FLOW V-100
Compressive Strength (psi)					
6 Hours	9,000	—	—	—	—
3 Days	15,250	11,600	14,020	—	—
7 Days (Ultimate)	16,800	14,000	15,470	17,000	17,000
Tensile Strength (psi)	4,800	1,536	2,350	3,000	5,500
Flexural Strength (psi)	6,800	4,600	4,800	6,000	8,100
Typical Pour Depth	1/4" - 1"	3" - 8"	3/4" - 8"	1 1/2" - 8"	1/4" - 2"
Placement Time	10-15 minutes	60 minutes	60 minutes	20-25 minutes	20-25 minutes
Yield	11# kit .10 cu. ft. 22# kit .21 cu. ft. 55# kit .53 cu. ft.	1 cu. ft./kit	1 cu. ft./kit	1 cu. ft./kit	22# kit .21 cu. ft. 52# kit .49 cu. ft.

*For standard packaging see page 6.

GROUT WITH AGGREGATE

CEMENT-BASED GROUT

Where grouting area and floor space are of sufficient size, up to 50% (by weight) of pea gravel aggregate may be used. Pea gravel should be standard size (3/8" dia.) and may be purchased from UNISORB. Prior to use, the pea gravel should be washed and dried. However, it is important to PRE-WET the pea gravel before it is added to the cement-based grout.

EXAMPLE: Truckload mixing of V-1 Non-Shrink grout with pea gravel using the following quantities:

- (51) 48# bags of V-1 Non-Shrink grout (2,448 lbs.)
- (24) 50# bags of WET pea gravel (1,200 lbs.)
- (50-55) Gallons of water

A bag of pea gravel weighs 50 lbs. In this example, a mixing ratio of approximately 50% pea gravel (by weight) was used to obtain one cu. yd. of grout (27 cu. ft.).

YIELD	
Grout Type	Yield With 50% (By Wgt.) Aggregate
V-1	.53 cu.ft./48# bag
UCRC	.53 cu.ft./50# bag
WTF	.53 cu.ft./50# bag

EPOXY GROUT

Unisorb recommends the use of Deep Pour V-100 epoxy grout for large or deep pours. This product includes the proper size and amount of aggregate. If Deep Pour V-100 is not readily available, or time constraints are an issue,

crushed granite or the equivalent may be used as an aggregate with Standard V-100 epoxy grout.

The crushed granite should be washed and dried before using, however it is important that it is NOT pre-wet. Fill the grout cavity with crushed granite and then fill the voids with Standard V-100 epoxy grout.

NOTE: The addition of aggregate filler may affect the final strength of cement-based and epoxy grouts by ±20%.

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

GROUT VOLUMES FOR ANCHOR HOLES SELECTED GROUT PACKAGING & YIELD

The grout volume chart below was prepared to help determine the amount of grout required for various size grout holes. The chart assumes the grout holes are cylindrical in shape.

To determine the amount of grout required refer to the following:

1. Determine the grout hole diameter and depth. Read the volume in the chart, i.e., a 3" diameter x 10" deep

hole equals 70.7 cu. in.

2. Multiply the 70.7 by the number of holes, i.e., if there are 30 grout holes, multiply 70.7 cu. in. x 30 to get 2,121 cu. in.
3. Divide this number (2,121 cu. in.) by the rated yield of the standard grout package. In the previous illustration to make a grout pour using 11# Kits of Standard V-100 epoxy grout you

would divide 2,121 cu. in. by 173 cu. in. per kit (12.3 kits). This can be rounded to 13-11# Kits of Standard V-100 epoxy grout.

4. Keep in mind that the above calculations are exact and offer no safety factor for more material usage than is planned, i.e., if the holes are slightly larger. You will need to allow for your own margin of safety.

VOLUME OF GROUT REQUIRED FOR ONE HOLE (Cubic Inches)

Hole Depth - Inches	Hole Diameter - Inches							
	1.5	2	2.5	3	3.5	4	5	6
4	7.1	12.6	19.6	28.3	38.5	50.3	78.5	113.1
5	8.8	15.7	24.5	35.3	48.1	62.8	98.2	141.4
6	10.6	18.8	29.5	42.4	57.7	75.4	117.8	169.6
7	12.4	22.0	34.4	49.5	67.3	88.0	137.4	197.9
8	14.1	25.1	39.3	56.5	77.0	100.5	157.1	226.2
9	15.9	28.3	44.2	63.6	86.6	113.1	176.7	254.5
10	17.7	31.4	49.1	70.7	96.2	125.7	196.3	282.7
12	21.2	37.7	58.9	84.8	115.5	150.8	235.6	339.3
14	24.7	44.0	68.7	99.0	134.7	175.9	274.9	395.8
16	28.3	50.3	78.5	113.1	153.9	201.1	314.2	452.4
18	31.8	56.5	88.4	127.2	173.2	226.2	353.4	508.9
20	35.3	62.8	98.2	141.4	192.4	251.3	392.7	565.5

SELECTED GROUT PACKAGING & YIELD

V-1 Non-Shrink	48# Bag	=	.40 cu. ft.	(691 cu. in.)
UNISORB Concrete Repair Compound (UCRC)	20# Pail	=	.16 cu. ft.	(276 cu. in.)
	50# Pail	=	.40 cu. ft.	(691 cu. in.)
	50# Bag	=	.40 cu. ft.	(691 cu. in.)
WTF (Wind Turbine Formula)	50# Bag	=	.40 cu. ft.	(691 cu. in.)
Standard V-100 Ship-Safe Standard V-100	11# Kit	=	.10 cu. ft.	(173 cu. in.)
	22# Kit	=	.21 cu. ft.	(363 cu. in.)
	55# Kit	=	.53 cu. ft.	(916 cu. in.)
Deep Pour V-100	Three Part Kit	=	1 cu. ft.	(1,728 cu. in.)
DCR V-100	63# Kit	=	.50 cu. ft.	(864 cu. in.)
	125# Kit	=	1.00 cu. ft.	(1,728 cu. in.)
Adhesive V-100	24.5# Kit	=	.26 cu. ft.	(450 cu. in.)
CR Hi-Flow V-100 Ship-Safe CR Hi-Flow V-100	22# Kit	=	.21 cu. ft.	(358 cu. in.)
	52# Kit	=	.49 cu. ft.	(846 cu. in.)
WTF-E V-100 (Wind Turbine Formula)	125# Kit	=	1.00 cu. ft.	(1,728 cu. in.)

RECOMMENDATIONS FOR GROUTING MACHINERY

By WAYNE H. WHITTAKER, V.P./G.M., Unisorb Installation Technologies, Jackson, MI

The grouting of machine base plates and bearing plates, and of anchoring/alignment equipment to a foundation are low-cost approaches that provide a high quality machine-to-foundation connection. A successful installation depends on: proper grout selection, based on application; foundation preparation; forming method employed; and careful attention to the actual application of the grouting material.

Grout Selection—Selecting grout for a particular application should include an evaluation of these factors:

1. **Cost**—Compare the cost of mixed grout, ready for placement. Yields can vary considerably from one manufacturer to another, and dry powder to price comparisons are misleading, as the amount of mixing water required will also vary.
2. **Strengths**—Applied loads should be evaluated carefully to ensure that the bearing capacity of the grout is not exceeded. Compressive strengths reported by manufacturers are based on tests run under lab conditions; actual field-cured values for cementitious grouts will be approximately 80 percent of the lab result.

3. **Ease of handling and placement**—The following factors are important:

- A. **Flowability**. The ease with which the material enters small cavities and travels under larger base plates is usually measured either by the ASTM-C230 test or Corps of Engineers Spec CRD-621 flow cone test. For the ASTM-C230 test, the results are expressed as a dimensionless number ranging from 100 to 150, with 150 the most flowable. The Corps of Engineers' results range from 30 seconds to 10 seconds, with 10 seconds the most flowable.
- B. **Tendency to separate** when mixed or handled excessively. In some materials that use metallic additives or have aggregates of widely varying sizes, the aggregates tend to separate if the material is overmixed or handled excessively.
- C. **Ability to be pumped** or vibrated, particularly on larger installations. Again, separation is the problem. The ability to be vibrated or pumped is a prime concern when grouting cavities are small, when placement is

difficult, or when grout must be flowed long distances.

- D. **Expansion or non-shrink** properties. The main objective is to select a material that will expand enough to assure full bearing contact with machine base and foundation (a few tenths to 1 percent or so is normal). When large grout-to-machine contact areas are encountered, a grout with a controlled internal pressure development should be selected to prevent the grout's expansion from disturbing alignment. The actual expansion of a grout is typically measured by either the ASTM C-1090-88 or ASTM-C827-87 early volume change method; the result is expressed as a percentage.
- E. **Maintenance requirements**. What will be required to keep the grout functional in the environment into which it will be placed is the main concern. For example, a grout that is to be used in an oily environment should be a relatively impermeable type. A grout with a porous structure will require a paint coat to prevent penetration by oils and other chemicals.

Other special considerations include ability to withstand thermal cycling and high temperatures, ability to resist acids, and susceptibility to spaulding under freeze-thaw cycling.

Materials in use today range from slightly modified sand and cement mixtures to chemically sophisticated epoxy materials with strengths five to six times that of standard concretes.

Cementitious Grouting Materials—The simplest grouting material consists of sand and cement mixed at approximately a 50-50 ratio. Simple sand and cement mixtures shrink on curing, usually from 2 to 3 percent, making their use in high load or precision applications questionable. Cementitious grouts in use today have been modified to expand rather than shrink on curing.

GROUTING ADVANTAGES

1. Foundation forming and finishing tolerances may be relaxed. Because grout provides the final link between the machine and the foundation, the foundation is usually finished 1½ to 3 in. below the desired machine base level. A thicker or thinner grout pad can be used, as the specific situation requires, to compensate for the variances encountered in actual foundation construction, eliminating the need for precision foundation work.
2. Grouting provides a rigid machine-to-foundation connection. As the grout is placed into the cavity, in the plastic or fluid state, it conforms precisely to the machine base and to the foundation, providing a 100 percent bearing contact between foundation and grout pad, and grout pad and machine base.
3. Anchoring/alignment equipment can be positioned within a precast or core-drilled grouting cavity at the time of machine installation. As the foundation is constructed, grouting cavities are created by precasting or core drilling (while the foundation is green) at the approximate location of each support or anchor point.

When the foundation has cured sufficiently to support machine loads, the machine is moved into position on the foundation and supported by temporary blocks. The anchoring/alignment equipment is then assembled to the machine base with the anchor bolt and base of the alignment device (if one is being used) projecting into the grouting cavity. Grout is then placed into the cavity and allowed to cure, completing the machine-to-foundation connection. This approach eliminates the requirement for time-consuming, precise presetting of anchor bolts or alignment equipment, significantly lowering the cost of more complex installations.

4. Existing foundations may be easily adapted to new equipment. Core drilling an existing foundation to accept new anchoring/alignment equipment, which is in turn grouted into permanent position, eliminates the need for removing and replacing an otherwise sound foundation if the equipment it supports is being relocated or replaced. When properly installed, these anchors exhibit holding power equal to or better than that of anchors set into the foundation as it was constructed.

(cont.)

RECOMMENDATIONS FOR GROUTING MACHINERY

(continued)

There are several basic expansion mechanisms in use today. One involves the addition of iron filings to the sand-cement mixture. The filings expand slightly when water is added to the mixture, causing the desired expansion.

Other systems include the use of carbon particles (evolved gas causes expansion) and the use of chemically compensated "Type K" cements (which promote growth within the cement paste).

Epoxy Grouting Materials—The epoxy grouts consist typically of a base resin and hardener that are mixed at the jobsite immediately before placement. (Some systems may also require the addition of a filler at this point.) An advantage of epoxy materials is the ability to withstand significantly higher shock loads than cementitious materials. Epoxies also can be used in much thinner cross sections than cementitious materials; this feature may be desirable in certain applications.

The epoxy grouts typically exhibit slight shrinkage on curing but usually the thinner section used (and extremely small amount of overall shrinkage encountered) minimizes the problem.

When the application is unusually severe from a shock loading standpoint or is to be used in a very thin section requiring high flowability, high strength, and rapid cure rate, an epoxy grout should usually be chosen rather than a cementitious one. Setting anchor bolts is an application particularly well suited to the epoxy material because a relatively small quantity is used and the short cure time is an advantage. Epoxy grouts are widely used for applications such as installing large engines, compressor units, crushers and shredders, and other equipment imparting large dynamic loads to their foundations.

Foundation Preparation—The concrete surfaces to which the grout will be applied must be carefully cleaned, leaving the surface free from all foreign material, grease, oil, etc. If an old foundation is being reused, be sure that the upper surfaces are sound. If unsound concrete is encountered, it will be necessary to chip back to sound concrete. The objective is to place grout against sound, clean concrete only.

DO'S AND DON'TS

For Cementitious Grouts

- Don't exceed recommended water levels in an attempt to achieve greater flowability. Using more water than specified by the manufacturer may result in segregation of the material or may interfere with the non-shrink mechanism.
- Don't overmix or undermix. Refer to the grout manufacturer's minimum and maximum mixing time recommendation. Overmixing may cause segregation in metallic-type materials and unnecessary air entrainment in other materials. Undermixing may not accomplish adequate blending of dry ingredients and may prevent proper wetting of materials which could result in the grout's "false setting" and other problems.
- Don't use curing compounds or bonding agents unless specifically approved by the grout manufacturer.
- Do wet the foundation thoroughly. Otherwise, water will be drawn from the newly placed grout too quickly, interfering with proper curing.
- Do use clean mixing water. Chemical contaminants may interfere with the proper expansion of the material.
- Do read the individual manufacturer's instructions, especially when placing grout at temperatures below 45° F (7° C) and above 90° F (32° C) as the requirement for special measures varies considerably.

For Epoxy Grouts

- Don't place epoxy grouts when water is present (once cured, water is no problem).
- Do be sure the foundation is clean and free from oil or grease.
- Do design for thin sections, avoiding large pours.
- Do familiarize jobsite personnel with the manufacturer's recommended handling and safety precautions.

Forming Recommendations — In preparing forms for retaining fluid grout, keep in mind that the most effective means of achieving a good machine base-to-grout contact is to place the material from one side only. The material should flow under the machine being grouted, and, while it is flowing, contact between the upper surface of the advancing grout and the machine base should be maintained. This approach will ensure that no air becomes trapped between the grout and machine base, Fig. 1.

It is important to maintain clearances between the machine base, foundation, and forms. Adequate clearance should be provided between the form and base plate on the pour side to permit material to be introduced rapidly enough to maintain grout base contact. Use of a sheet metal or wooden chute may prove helpful in introducing the mixed grout into the form. The forms should also be high enough to permit the fluid grout to be brought up the side of the machine base about 1/2 inch to make sure that full bearing contact is realized. Sufficient grout must be available so that the entire cavity is filled in a single, continuous pour.

The form should be carefully designed and constructed to prevent leakage because modern grouts are much more flowable than concrete. It is recommended that caulk or a construction adhesive be used to seal the individual form components to each other and to seal the completed form to the foundation. Epoxy grouts, which are extremely flowable, require extra attention to the sealing to prevent possible form leaks.

Application—It is desirable, in some cases, to grout anchoring/alignment equipment in place, pouring a bearing pad and setting an anchor bolt simultaneously, Fig. 2. The anchor bolt cavity must be completely filled with grout. A filled cavity can be attained by pouring the grout slowly at first to make sure no air is trapped. For unusually deep holes, it may be advisable to use an air bleed tube that is withdrawn when the cavity is full, Fig. 3.

An alternate approach is the funnel and hose method. A highly flowable grout is required for this approach, and the tip of the hose should be inserted into the anchor bolt cavity and withdrawn slowly as the grout level rises.

(cont.)

RECOMMENDATIONS FOR GROUTING MACHINERY

(continued)

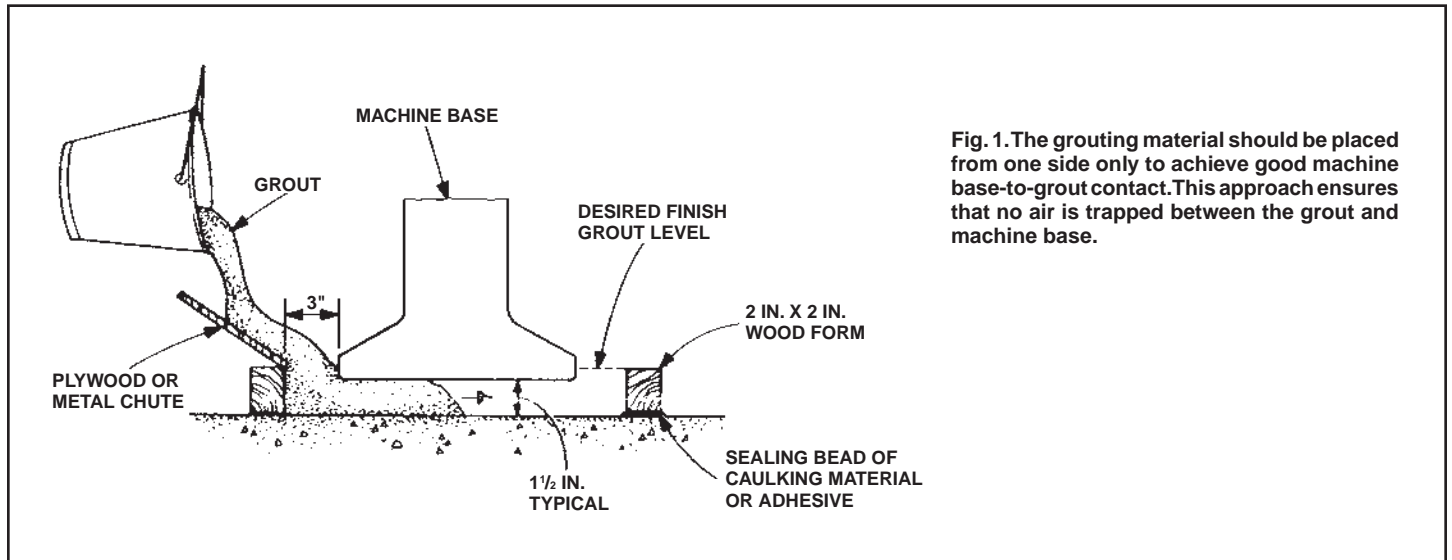


Fig. 1. The grouting material should be placed from one side only to achieve good machine base-to-grout contact. This approach ensures that no air is trapped between the grout and machine base.

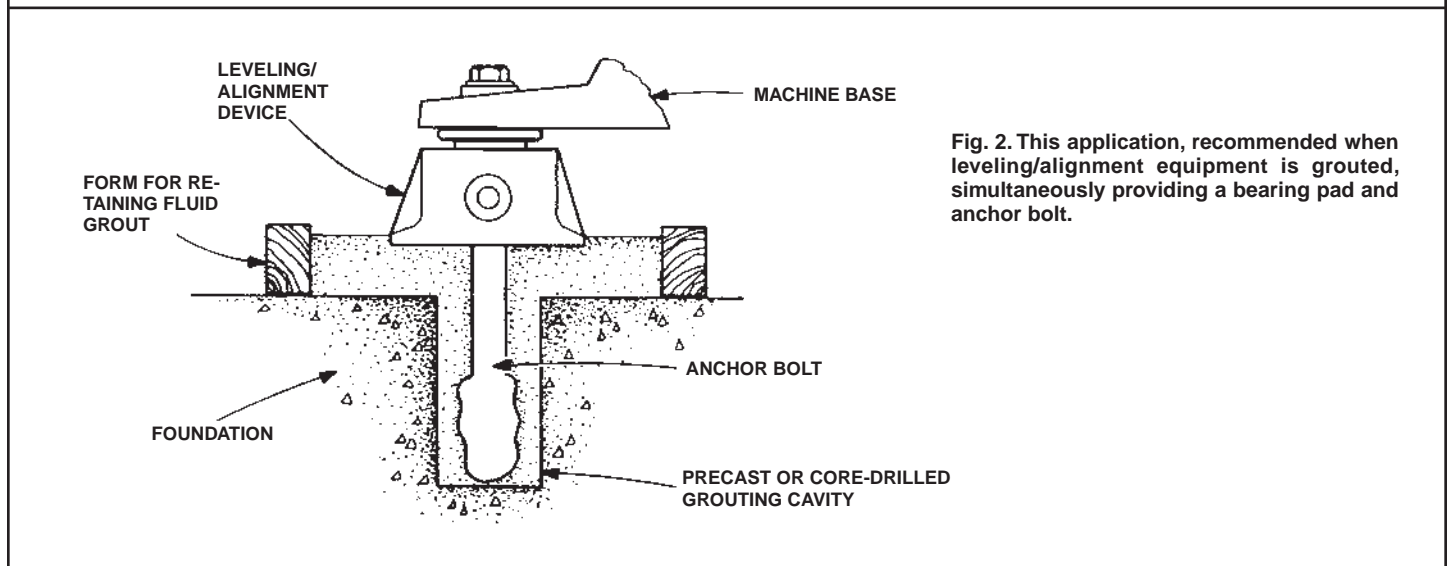


Fig. 2. This application, recommended when leveling/alignment equipment is grouted, simultaneously providing a bearing pad and anchor bolt.

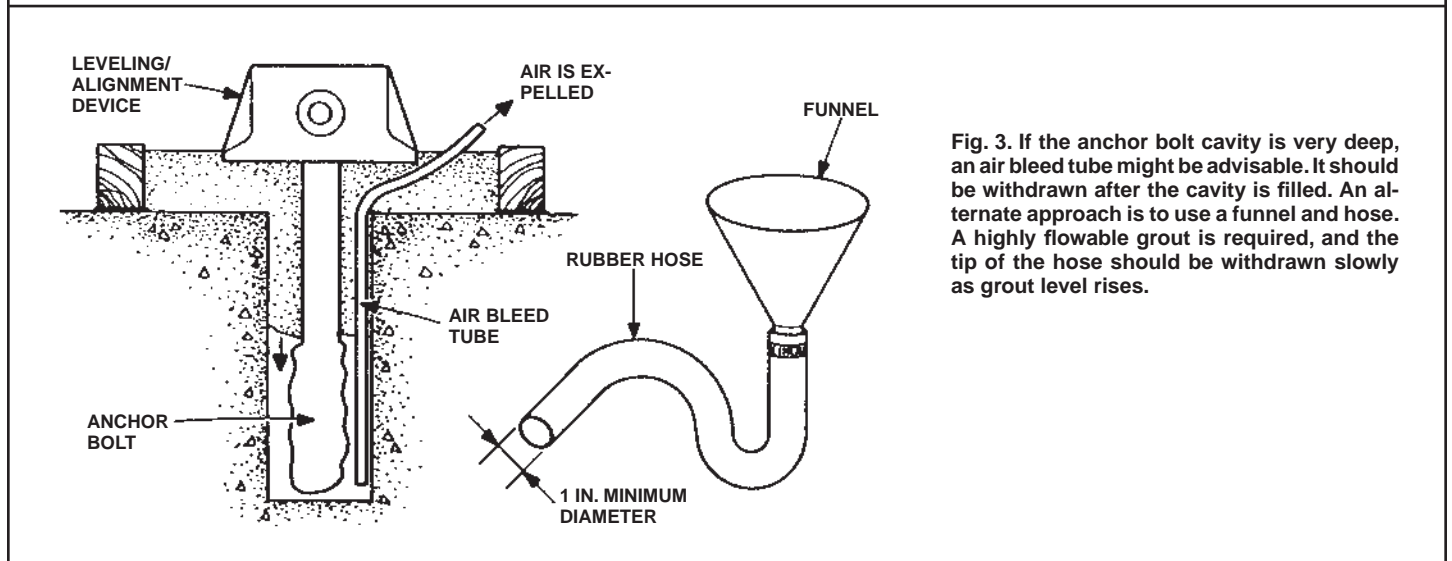


Fig. 3. If the anchor bolt cavity is very deep, an air bleed tube might be advisable. It should be withdrawn after the cavity is filled. An alternate approach is to use a funnel and hose. A highly flowable grout is required, and the tip of the hose should be withdrawn slowly as grout level rises.

RECOMMENDATIONS FOR GROUTING MACHINERY

(continued)

“The time spent in thoroughly planning the grouting installation will pay off in fewer problems in the machine's performance.”

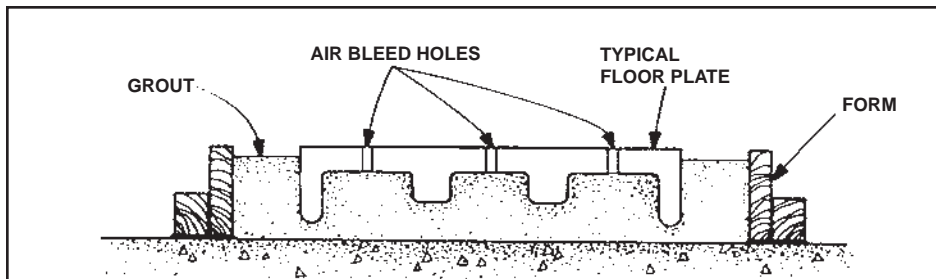


Fig. 4. Air bleed holes should be provided when blind cavities are grouted. The holes also provide visual assurance that all cavities are filled.

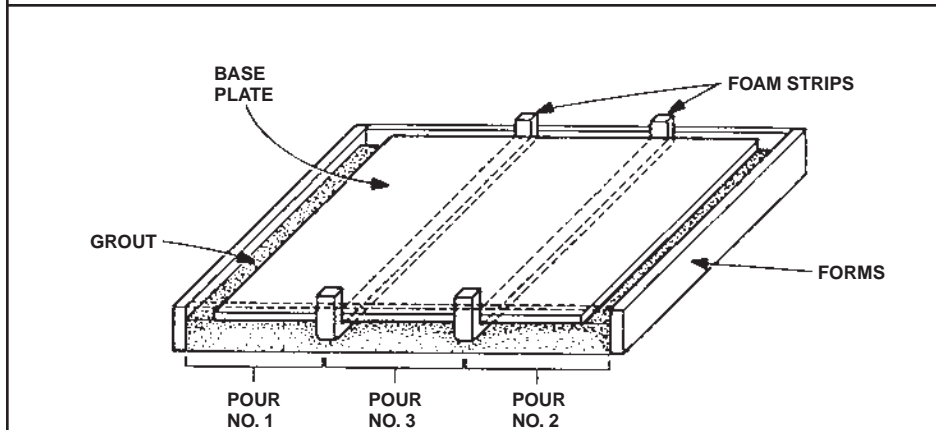


Fig. 5. When large areas are grouted, the pour should be divided into sections. Sections 1 and 2 should be poured and allowed to set before the center section is poured.

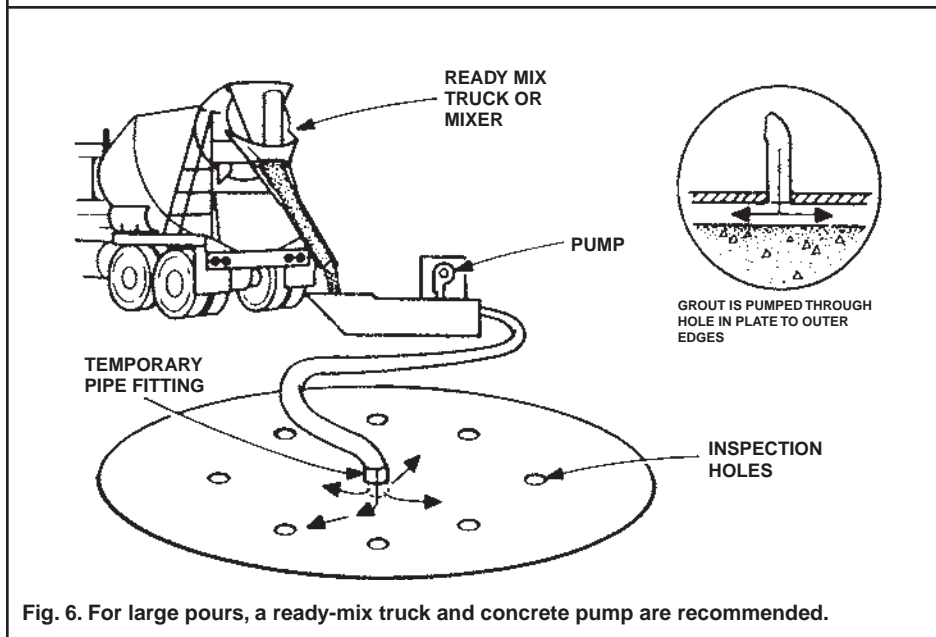


Fig. 6. For large pours, a ready-mix truck and concrete pump are recommended.

Air bleed holes should be provided when blind cavities are grouted, Fig. 4. The air bleed holes serve a second function of providing visual assurance that all cavities are filled.

When working with a larger pour, it may be advisable to break the pour into sections for more convenient handling by using polyethylene foam strips, Fig. 5. The outside cavities are filled first, and the grout is allowed to set before the foam strips are removed. The remaining center cavity is filled last.

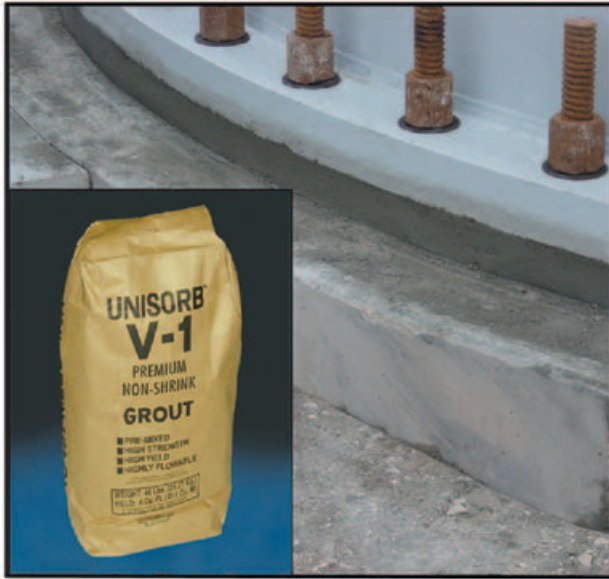
Many of the currently available grouting materials can be pumped with a standard concrete pump. This approach is frequently used when extremely large pours are required. The main problem is mixing the necessary amount of material quickly enough to permit a single continuous pour. A standard ready-mix truck and concrete pump work well, Fig. 6.

A first-quality grouting installation is the key to successful machine installation. The time spent in thoroughly planning the installation will pay off in fewer problems in the machine's performance.

Information in this article has been updated to meet product and application standards in use in 1998.

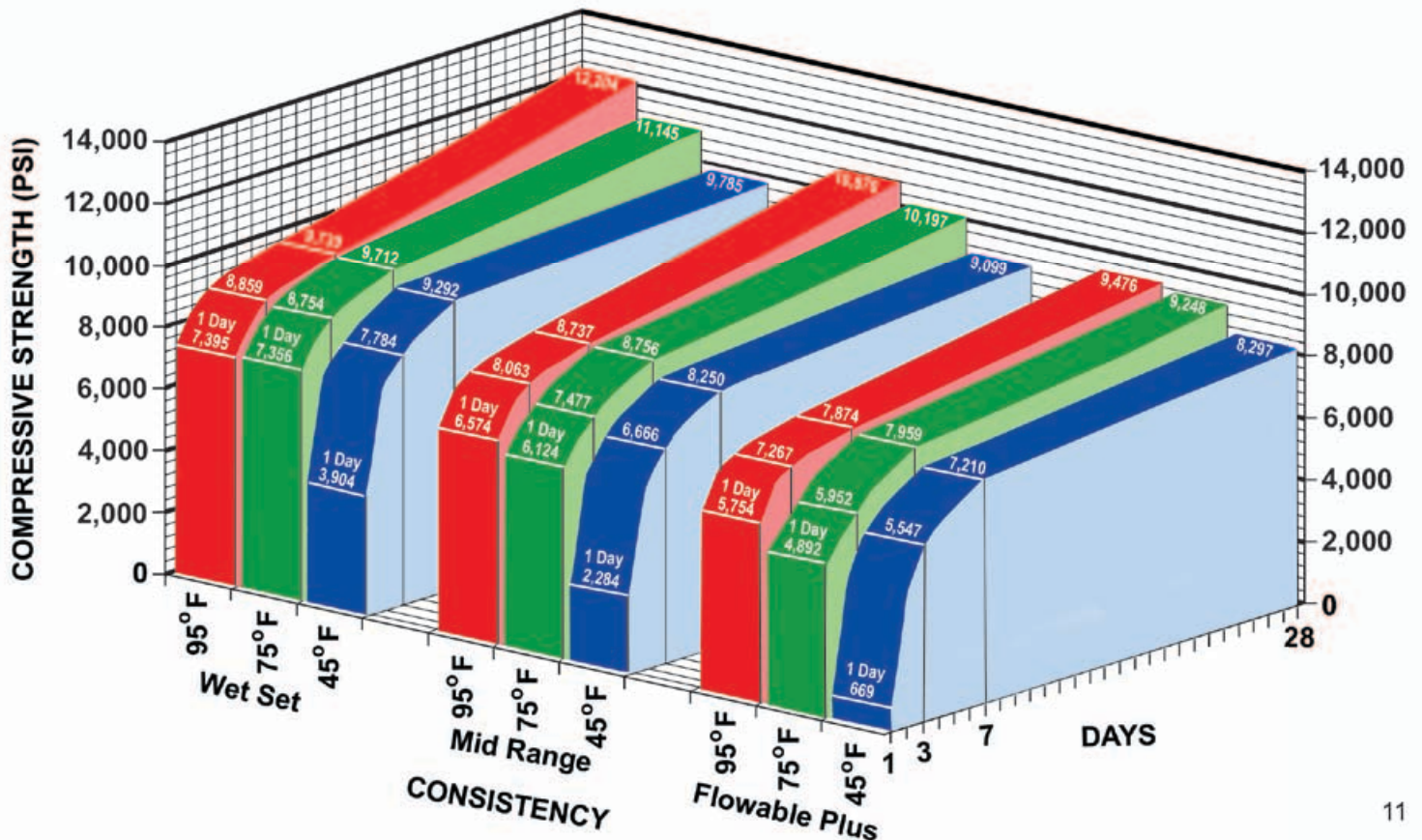
REPRINTED FROM
Plant Engineering

V-1® NON-SHRINK GROUT



- Exceeds ASTM C-1107 Requirements
- Up to 12,200 psi compressive strength
- Proven on thousands of wind turbine bases
- Controlled expansion
- Can be pumped and vibrated
- Easy mixing and clean up
- Qualifies for 3 LEED points
- Most experienced field support team in the industry

V-1 NON-SHRINK GROUT Typical Field Results



V-1® NON-SHRINK GROUT (Cont.)

A cement-based, non-shrink, premixed, highly flowable grout that develops extremely high compressive strengths in a very short period of time.

This product is particularly superior for applications where ease of placement and suitability for use under high unit loads are important. Other materials such as concrete or weaker grouts may develop structural flaws when subjected to concentrated loads.

Unisorb cementitious V-1 Non-Shrink Grout is uniquely suited for Wind Farm applications. It has outstanding wet-set properties and can also be mixed flowable when used with forms. Both methods will provide superior results. Contact Unisorb to learn more about the proper methods for your application, and available training options.

V-1 Non-Shrink Grout is ideally suited for the following purposes:

- Setting wind turbine towers
- Setting turbine base plates
- Grouting of precision machinery
- Setting precision leveling wedges
- Setting high strength anchor bolts
- Grouting of large base plates
- Grouting in machine bases

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

This product contains a special proprietary expansion mechanism which eliminates the natural volume loss present in other cement-based products. This expansion mechanism is totally unique in the grouting industry because it expands primarily during the initial set stages of the cure, thereby yielding a very stable end product. Controlled expansion precludes the possibility of shrinkage related voids so that full bearing contact is ensured. Many grout manufacturers today use a metallic expansion mechanism that may not be completely consumed during the cure stage. This can lead to reactivation of this material in a wet environment and create strong internal pressures that can promote premature failure. Since cured V-1 grout does not contain metallic expansion agents or allow excessive air entrapment, it does not require a post-cure coating to protect it from a wet environment.

V-1 grout is well suited for use in ambient temperatures and is routinely used in areas where temperatures reach 1,000°F. It also exhibits superior resistance to attack by strong acids and chemical bases.

V-1 grout is a very dense and stable material after proper cure. It provides long life expectancy and maintains the rigid machine-to-foundation connection required to meet the pre-

cise installation requirements of today's sophisticated equipment.

PERFORMANCE ADVANTAGES

V-1 grout is composed of several carefully blended sizes of the best quality pure silica sand, "high-early" portland cement and a proprietary controlled expansion mechanism. It is chloride-free and will not shrink below its original mixing volume after the recommended water ratio is added. This grout can be extended by adding up to 50% (by weight) pea gravel, substantially reducing material costs on larger pours. V-1 grout can be pumped or vibrated without risk of separation.

SPECIFICATION CONFORMANCE

V-1 grout exceeds all the requirements of ASTM C-1107, and qualifies for 3 LEED points.

TEMPERATURE CONSIDERATIONS

Use standard high temperature concreting techniques for temperatures over 90°F and low temperature techniques below 45°F.

PEA GRAVEL

When exceeding a thickness of 2" to 3", pea gravel should be added. Use 3/8" pea gravel, 1 part gravel to 2 parts grout by weight. (See page 5.)

PACKAGING/YIELD

48# Bag = .40 cu. ft. (691 cu. in.)

TYPICAL FIELD RESULTS

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

PHYSICAL PROPERTIES

Type of Grout Mixture	Wet Set			Mid Range			Flowable Plus		
Mix Ratio Water per 48 lb. bag	3.1 quarts			3.6 quarts			4.0 quarts		
Ambient temperature at mixing	45°F	75°F	95°F	45°F	75°F	95°F	45°F	75°F	95°F
Flow Consistency Flow Table (5 drops) ASTM C-1437	94	45	29	145	125	80	150+	150+	123
Compressive Strength (psi) per ASTM C-109									
Test Age									
1 Day	3,904	7,356	7,395	2,284	6,124	7,356	669	4,892	5,754
2 Days	7,786	8,271	8,376	5,759	6,942	7,672	4,292	5,613	6,898
3 Days	7,784	8,754	8,859	6,666	7,477	8,737	5,547	5,952	7,267
7 Days	9,292	9,712	9,739	8,250	8,756	8,737	7,210	7,959	7,874
28 Days	9,785	11,145	12,264	9,099	10,197	10,870	8,297	9,248	9,476
Vicat Needle Test per ASTM C-191									
Initial Set	5.00 hr.	3.10 hr.	0.67 hr.	6.67	5.00	1.50	8.23 hr.	6.76 hr.	2.00 hr.
Final Set	6.50 hr.	4.60 hr.	1.10 hr.	8.10	6.50	2.10	9.75 hr.	7.25 hr.	3.10 hr.

Typical Pour Depth 1 in. - 2 in. (unconfined), up to 3 in. under plate.

V-1® NON-SHRINK GROUT (Cont.)

ASTM C-1107 DATA

Shown below are selected physical properties of V-1 Non-Shrink Grout. Since the physical properties change with the amount of water used, the chart shows properties at four water levels. The four were chosen to show the properties for a plastic, flowable, and fluid consistency, and at maximum water.

Physical properties at maximum water are compared to the ASTM C-1107 requirements in the far right column. ASTM C-1107 includes testing and acceptance criteria for most physical properties of non-shrink ce-

ment based grouts. Unisorb V-1 Non-Shrink Grout meets or exceeds the requirements of ASTM C-1107 Grade C. Grade C is the designation for grouts that have a non-shrink mechanism active both in the fluid state and cured state. The fact that the expansion is +0.00 at max. water shows the precise nature of the proprietary expansion agent, overcoming post hardening shrinkage of the cement without excessive expansion.

The compressive strengths at 1, 3, 7, and 28 days are determined in accordance with the specification

outlined in ASTM C-109, "Standard Test Method for Compressive Strength of Hydraulic Cement Mortars". Additional cubes were tested at 16 hours to show early strength development. The results summarized in the chart below show that the 28 day strength requirement of ASTM C-1107, 5000 psi, is met in 3 days even at the high water level. These values are shown in graphic form in the chart on the previous page.

Unisorb V-1 Non-Shrink Grout is packaged in a moisture resistant bag.

PHYSICAL PROPERTIES						
Mix Ratio	Water per 48 lb. bag	3.67 qts.	3.84 qts.	4.00 qts.	4.32 qts.	ASTM C-1107 Requirements
Flow Consistency		Plastic	Flowable	Fluid	Fluid	
Flow Table (5 drops) ASTM C-230		109	135	150	----	Plastic 100-125
Flow Cone (5 min.) ASTM C-939		----	----	42 sec.	27 sec.	Flowable 125-145
Flow Cone (30 min.) ASTM C-939		----	----	----	28 sec.	Fluid 10-30 sec.
Flow Cone (60 min.) ASTM C-939		----	----	----	35 sec.	
Compressive Strength (PSI) per ASTM C-109						Minimum
<u>Test Age</u>						
16 Hours		4965	4275	3538	2075	----
1 Day		6565	5950	4905	4200	1000
3 Days		9085	8415	8290	7060	2500
7 Days		10040	9520	9585	8605	3500
28 Days		11875	11605	11125	10210	5000
Vicat Needle Test per ASTM C-191						
Initial Set		5 hrs. 3 min.	5 hrs. 22 min.	6 hrs. 17 min.	6 hrs. 30 min.	----
Final Set		5 hrs. 41 min.	6 hrs. 26 min.	7 hrs. 0 min.	7 hrs. 28 min.	----
Change in Height (%) at Early Ages ASTM C-827						
At Final Set		+0.55	+1.49	+1.43	+1.23	0.0-4.0
Change in Height (%) ASTM C-1090						
<u>Test Age</u>						
1 Day		+0.04	+0.01	+0.01	+0.00	0.0-0.3
3 Days		+0.04	+0.02	+0.01	+0.00	0.0-0.3
14 Days		+0.05	+0.03	+0.01	+0.00	0.0-0.3
28 Days		+0.05	+0.03	+0.01	+0.00	0.0-0.3
Flexural Strength		Tensile Strength		Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.		
7 Days	1670 psi	7 Days	535 psi			
28 Days	1700 psi	28 Days	568 psi			
High Temperature evaluation		Youngs Modulus of Elasticity				
Compressive Strength		6 x 10 ⁶ psi				
70°F	11000 psi	Expansion and Bleeding of Freshly				
800°F	11000 psi	Mixed Grouts @ Max. Water (ASTM C-940)				
900°F	9700 psi	Volume Expansion	+1.00%			
1000°F	8400 psi	Bleed	0.00%			

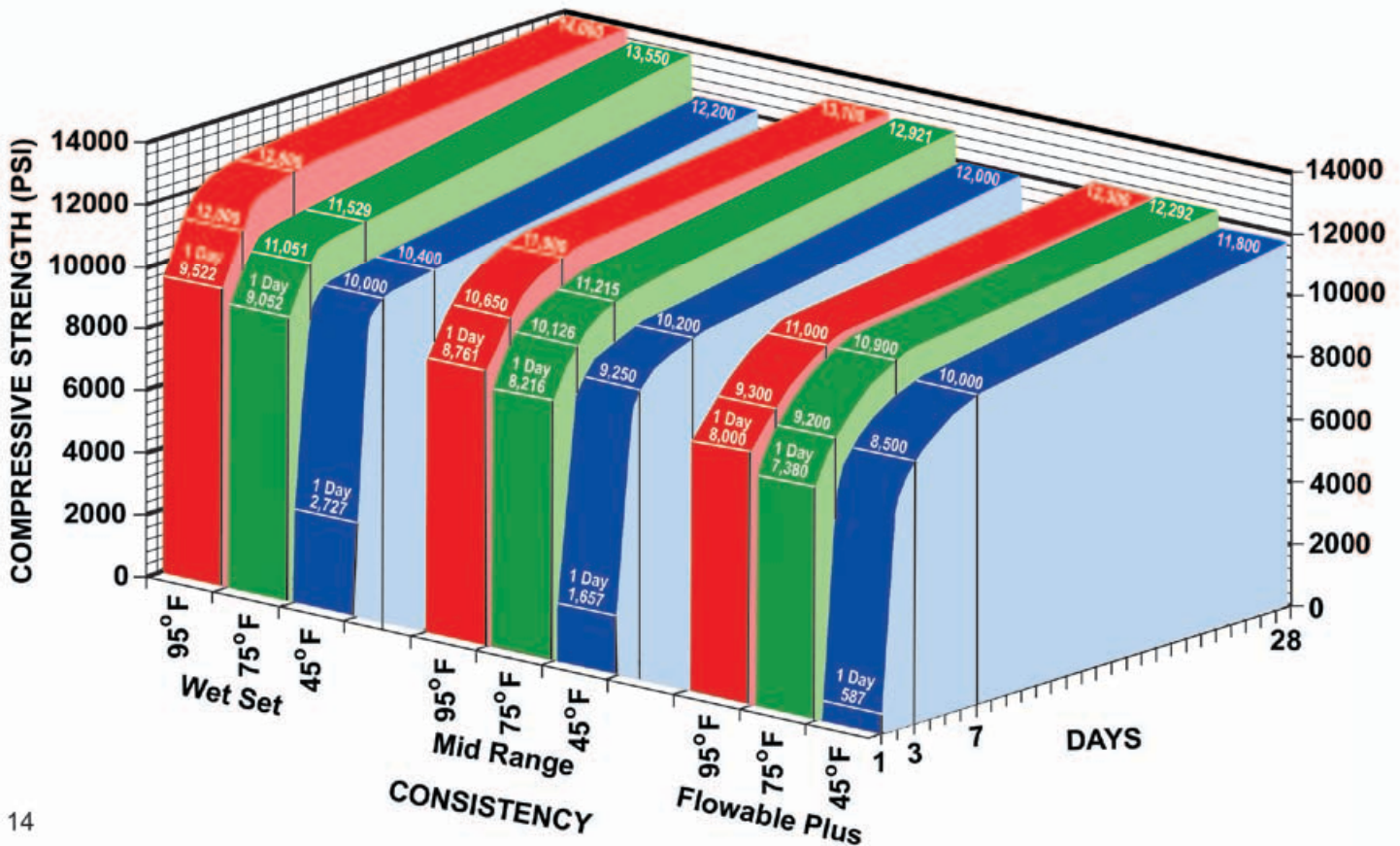
WTF® NON-SHRINK GROUT (Wind Turbine Formula)



- Up to 14,000 psi compressive strength
- Proven on hundreds of wind turbine bases
- Controlled expansion
- Can be pumped and vibrated
- Easy mixing and clean up
- Qualifies for 3 LEED points
- Exceeds ASTM C-1107 requirements
- Most experienced field support team in the industry

WTF NON-SHRINK GROUT

Typical Field Results



WTF® GROUT (Wind Turbine Formula) (Continued)

Unisorb WTF Non-Shrink Grout is a cement based precision grouting product, specifically formulated to develop ultra high strengths. Blended cements, graded sands, and a performance enhancing super plasticizer make a grout product that will be flowable with the addition of a minimum amount of water. The result is a cementitious grout that is surprisingly user friendly and will rapidly develop very high compressive strengths.

This product is particularly superior for applications where ease of placement and suitability for use under very high loads are required.

WTF was specifically designed for wet setting applications, yet when mixed at higher water levels it produces a very flowable mixture.

This product contains a special proprietary expansion mechanism which eliminates the natural volume loss characteristic of cement-based products. It also prevents unwanted continued expansion over time. This proprietary expansion mechanism is unique in the grouting industry because it expands primarily during the initial set stages of the cure, thereby producing a very stable end product. Controlled expansion prohibits the possibility of shrinkage related voids so that full bearing contact is ensured. Many grout manufacturers today use a metallic ex-

pansion mechanism that may not be completely consumed during the cure stage. This can lead to reactivation of this material in a wet environment and create strong internal pressures that can promote premature failure. Since cured WTF grout does not contain metallic expansion agents or allow excessive air entrapment, it does not require a post-cure coating to protect it from a wet environment.

WTF is well suited for outdoor applications, or indoor, including areas where temperatures reach up to 1,000 degrees F. It also exhibits superior resistance to attack by strong acids and chemical bases.

Unlike many cementitious grouts, WTF may be pumped and/or vibrated if needed to aid in placement on large pours.

WTF grout is a very dense and stable material after cure. It provides long life expectancy and maintains the rigid equipment-to-foundation connections which are necessary to meet demanding installation requirements.

PERFORMANCE ADVANTAGES

WTF grout is composed of several carefully blended sizes of the best quality pure silica sand, "high-

early" portland cement and a proprietary controlled expansion mechanism. It is chloride free and will not shrink below its original mixing volume after the recommended water ratio is added.

TEMPERATURE CONSIDERATIONS

Use standard high temperature concreting techniques for temperatures over 90°F and low temperature techniques below 45°F.

SPECIFICATION CONFORMANCE

WTF grout exceeds the Corp. of Engineers specifications for Non-Shrink Grout CRD C-621, all ASTM C-1107 requirements, and qualifies for 3 LEED points.

Always follow Unisorb mixing instructions.

PEA GRAVEL

When exceeding a thickness of 2" to 3", pea gravel should be added. Use 3/8" pea gravel, 1 part gravel to 2 parts grout by weight.

PACKAGING/YIELD

50# Bag = .40 cu. ft. (691 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

TYPICAL FIELD RESULTS

PHYSICAL PROPERTIES

Type of Grout Mixture	Wet Set			Mid Range			Flowable Plus		
Mix Ratio Water per 48 lb. bag	2.75 quarts			3.0 quarts			3.25 quarts		
Ambient temperature at mixing	45°F	75°F	95°F	45°F	75°F	95°F	45°F	75°F	95°F
Flow Consistency Flow Table (5 drops) ASTM C-1437	140	72	19	150+	86	70	150+	140	125
Compressive Strength (psi) per ASTM C-109									
Test Age									
1 Day	2,727	9,052	9,522	1,657	8,216	8,761	587	7,380	8,000
2 Days	9,300	10,242	10,758	8,400	9,371	9,732	7,500	8,500	8,706
3 Days	10,000	11,051	12,000	9,250	10,126	10,650	8,500	9,200	9,300
7 Days	10,400	11,529	12,800	10,200	11,215	11,900	10,000	10,900	11,000
28 Days	12,200	13,550	14,000	12,000	12,921	13,100	11,800	12,292	12,300
Vicat Needle Test per ASTM C-191									
Initial Set	14.00 hr.	9.25 hr.	2.00 hr.	15.40 hr.	9.80 hr.	2.50 hr.	16.50 hr.	10.20 hr.	3.50 hr.
Final Set	16.00 hr.	10.00 hr.	3.00 hr.	17.00 hr.	10.50 hr.	3.25 hr.	18.00 hr.	11.00 hr.	4.00 hr.
Typical Pour Depth	1 in. - 3 in.								

UNISORB® CONCRETE REPAIR COMPOUND (UCRC) UCRC EXTENDED SET



UNISORB® CONCRETE REPAIR COMPOUND (UCRC)

A cement-based, flowable, fast setting product designed for use in setting anchor bolts and filling holes and large cracks in concrete floors, roads, sidewalks, foundations, etc. It is well suited to high traffic wear areas. Edges of repairs can be feathered to blend into the surrounding area.

PERFORMANCE ADVANTAGES

UCRC employs special poly reinforcing fibers to achieve exceptional strength and durability. Unlike most cement-based products, UCRC is self-sealing and requires no sealant when used outdoors. This product requires no pre-wetting and can be opened to traffic in 20 minutes to one hour after pouring (depending on weight of traffic). It is also ideal for setting anchor bolts, particularly when short installation times are important, because of its fast setting time.

BASE PREPARATION

All contact surfaces must be cleaned of oil, grease, scale, etc. Unsound concrete should be chipped out leaving the surface level, but rough. The area to be repaired should be chipped to a minimum depth of 1/2".

APPLICATION TECHNIQUES

UCRC can be mixed in a wheelbar-

PHYSICAL PROPERTIES		
	UCRC	UCRC EXTENDED SET
Compressive Strength (CRD C-227/ASTM C-109)		
Water To 100#	6.5 qts.	6.5 qts.
1 hour	2,700 psi	1,500 psi
3 hours	4,000 psi	2,700 psi
1 day	6,200 psi	4,600 psi
7 days	8,400 psi	6,100 psi
28 days	10,100 psi	7,400 psi
Compressive Strength With 50% Pea Gravel Added (ASTM C-39)		
1 day	—	4,300 psi
7 days	—	5,400 psi
28 days	—	6,300 psi
Coefficient of Thermal Expansion (ASTM C-531) 7.46 x 10 ⁻⁶ in./in./°F		
Tensile Strength (ASTM C-190)		
7 days	544 psi	—
28 days	564 psi	—
Flexural Strength (ASTM C-348)		
7 days	1,185 psi	—
28 days	1,237 psi	—
Flow (ASTM C-929) 145 (25 drops, 5 min.)		
Vicat Needle Test @ 75° F (ASTM C-191)		
Initial Set	18 min.	33 min.
Final Set	20 min.	37 min.
Bond Strength (ASTM C-882)		
1 day	1,500 psi	1,700 psi
7 days	3,100 psi	2,200 psi
Typical Pour Depth 1/16 in. - 2 in.		

UCRC meets or exceeds the specifications for Scaling Resistance (ASTM C-928), Freeze-Thaw (ASTM C-666), and Rapid Hardening Materials for Concrete Repair (ASTM C-928).

row or cement mixer. Only the exact amount needed for a particular project should be mixed, due to its fast setting time. Exact ratios should be followed for mixture of product and water. Mix dry powder with water at the job site to form a trowelable mixture. Place in area to be repaired and trowel to desired finish. Allow to cure.

TEMPERATURE CONSIDERATIONS

Use standard high temperature concreting techniques for conditions over 90° F, and low temperature techniques for conditions below 45° F.

PEA GRAVEL

When exceeding a thickness of 2" to 3", pea gravel should be added. Use 3/8" pea gravel, 1 part gravel to 2 parts grout by weight.

PACKAGING/YIELD

50# Bag = .40 cu. ft. (691 cu. in.)
20# Pail = .16 cu. ft. (276 cu. in.)
50# Pail = .40 cu. ft. (691 cu. in.)

UCRC EXTENDED SET

UCRC is also available in an "Extended Set" formulation to allow longer work time. (See above chart.)

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

BASIC APPLICATION TECHNIQUES (CEMENT-BASED)

CONCRETE PREPARATION

Old Foundations

- Bond to good, sound, clean concrete.
- Clean to remove dust, dirt, oil and grease.
- Remove loose and crumbling concrete to sound concrete.
- Epoxy, urethane, and other floor sealers must be removed.
- Acid etching, degreaser or mechanical abrasion may be necessary.
- Cleaning agents utilized must be completely neutralized before grouting.
- Bonding agent may be used if desired.

New Foundations

- Avoid over-finishing. Highly finished surfaces often have a weak surface layer which must be mechanically removed to sound concrete.

FORMING

Anchor holes may be formed prior to concrete pour or may be core drilled. Corrugated steel tubing may be used and left in the concrete. Plastic and smooth side tubing should be removed. Do not wax forms and do not melt foam cores with turpentine or similar solvent. Avoid coating concrete with materials to which grout will not bond. Core drilled holes need to be cleaned with a wire brush to assure all concrete dust is removed.

Forms around the bases should extend around the complete perimeter, allowing 1"-2" space for air to escape. Allowing a 3"-4" space on the side to be poured will facilitate placement of grout. Forms on this side should be high enough to hold a quantity of grout while it is flowing under the base. Forms should be about 1" above the bottom of the base on all other sides. Amount of free grout not under the equipment should be held to a minimum. The use of a bonding agent is recommended where large areas of free grout are necessary.

Forming should allow for rapid and continuous placement of grout. All bases in contact with grout should be clean and free of scale, rust, oil and paint.

PRE-WETTING

Pre-soak area to be grouted with water for 24 hours prior to grouting.

MIXING AND PLACING

- Carefully follow instructions on product label.
- Grout may be mixed by hand or in a paddle-type mortar mixer.
- Do not mix more than can be placed. Never add more water to mixed grout.
- When grouting bases, mix grout rapidly and continuously as fast as it can be placed so that it continues to flow under the base.
- Pour from one side only so that air is forced out ahead of the grout.
- When grout has flowed completely under the base, it should be brought up the side of equipment approximately 1/4" to 1/2".
- Grout may be pumped, rodded or vibrated to facilitate placement.
- Finishing is not required, but edges may be cut back to give a desired slope if required for fluid run-off. This should be done after initial set, and just after removal of grout forms.

CURING

- Cover grout with wet burlap for 3 to 7 days after pouring grout.
- In most cases the grout can be considered cured in 24 hours, although it is still building strength.
- For best results anchor bolts are not tightened, nor machine alignments started until 3 days after grouting. If necessary, however, the alignment process can be started after 24 hours. (See temperature considerations below.)

TEMPERATURE CONSIDERATIONS

The higher the temperature, the faster the set. The lower the temperature, the slower the set. Normal winter and summer concreting procedures should be observed in temperatures below 45° F and above 90° F.

For additional information for cold and warm placement refer to ACI guidelines.

Special procedures for low temperature:

- Store bagged grout in a warm dry place (70° F) for 18 hours before use.
- Raise bed plate and foundation temperature with steam, infrared heaters, etc., before the grout is placed.
- Pre-heat the mixing water not to exceed 140° F.
- After grout is placed, cover the material to retain warmth.

Special procedures for high temperature:

- Provide shade for area to be grouted.
- Use cool or cold mixing water to lower the temperature of the grout mix to 60° F to 70° F.
- Poured grout should be protected from hot sun.

The above are basic techniques to follow when using most Unisorb cement-based grouting products. Refer to the specific product data sheets, catalog pages, and instructions printed on the container for information that will be relevant to the product being used.

Consult Unisorb Factory for sealing, bonding, and curing compounds.

Consult Unisorb Factory for low or high temperature grout applications.

888-4-UNISORB
517-764-6060

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

STANDARD V-100® EPOXY GROUT



STANDARD V-100®

A two-component, 100% solids, filled epoxy resin system of superior quality, offering excellent flowability, high resistance to impact and extremely rapid cure.

This grout is the product of choice where ease of placement, suitability for use under extremely high loads, and minimal cross section thicknesses are necessary. Other materials such as concrete or weaker grouts may develop structural flaws when subjected to high concentrated loads.

Standard V-100® is a perfect choice for:

- Grouting machine bases
- Setting anchor bolts
- Setting leveling wedges
- Setting sole plates
- Repairing deteriorated foundations

The rapid strength development of Standard V-100® permits loads to be applied much sooner after grouting than with other materials. Its excellent flowability permits use in extremely thin cross-sections.

IMPORTANT ADVANTAGES: PERMANENCE

Eliminates need for periodic

PHYSICAL PROPERTIES	
Color	Gray Green
Compressive Strength (ASTM D-695)	
6 hours	9,000 psi
3 days	15,250 psi
7 days	16,500 psi
Compression Modulus	
7 days	436,000 psi
Tensile Strength (ASTM D-638)	4,800 psi
Heat Deflection Temperature (ASTM D-648)	161°F
Maximum Service Temperature	200°F
Placement Time @ 77° F	10-15 minutes
Tensile Modulus	1.01 x 10 ⁶ psi
Flexural Strength (ASTM D-790)	6,800 psi
Mixed Viscosity (ASTM D-2196)	8,000 cps
Adhesion Slant Shear Test (ASTM C-882)	4,200 psi
Specific Gravity (ASTM D-792)	1.7
Hardness (Shore D) (ASTM D-2240)	90
Density (cured)	105 lbs./cu. ft.
Creep Test (ASTM C-1181)	
600 psi @ 150°F cured 24 hours @ 70°F 16 hours @ 150°F	1.95 x 10 ⁻² in./in.
Linear Shrinkage (ASTM D-2566)	0.00025 in./in. @ 77° F
Coefficient of Thermal Expansion (ASTM D-696)	2.0 x 10 ⁻⁵ in./in. @ 77° F

regrouting. Saves downtime, labor and lost production. Resistance to oils, greases, acids, alkalies and solvents is much greater than that of cement-based materials. Tensile and flexural strengths are at least 15 times that of concrete and compressive strength is about 5 times that of concrete.

PACKAGING

Standard V-100® is packaged in a kit with the base resin packed in an oversized container large enough to serve as a mixing vessel. The hardener portion of the kit is added to the base resin at the job site. A stirring paddle is included which will fit a standard 1/4" electric drill. After a mix time of 2-3 minutes

a 15 minute working time remains for placement of the material. For Gel Time vs. Temperature and Mixed Viscosity vs. Temperature see next page.

(cont.)

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

STANDARD V-100® EPOXY GROUT

(Continued)

EASY, FLOW-INTO-PLACE INSTALLATION

Flows into spaces under machines of 1/2" or less and fills completely before solidifying.

REGROUTS

No need to move equipment or break connections. Just raise equipment 1/2" to 3/4" and regROUT with Standard V-100®.

TYPICAL POUR DEPTH

Thickness of 1/4" up to 1" (unconfined), up to 1 1/2" under plate. (Multiple layers may be used for thicker pours.)

SMOOTHER MACHINE OPERATION

Standard V-100® survives impact and vibration as well as reinforced rubber materials and will not delaminate under the most severe shock loads.

FAST CURE

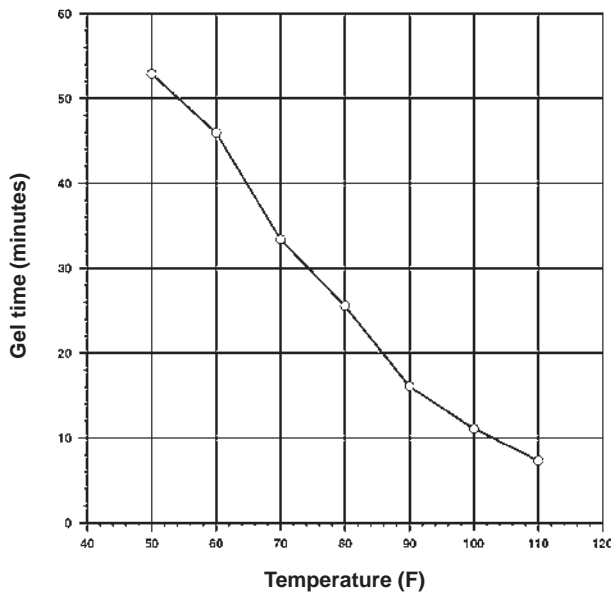
At 77° F, a 1/2" thickness will set up for use in 8 hours.

PACKAGING/YIELD

11# Kit = .10 cu. ft. (181.5 cu. in.)
22# Kit = .21 cu. ft. (363.0 cu. in.)
55# Kit = .53 cu. ft. (907.5 cu. in.)

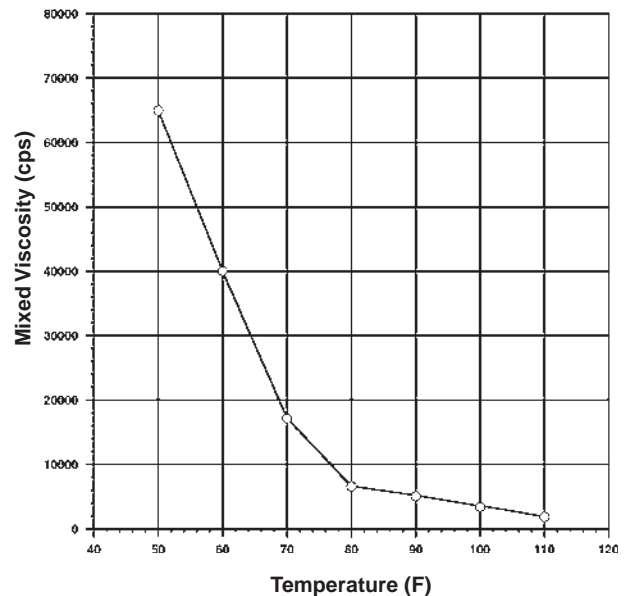
TEMPERATURE CONSIDERATIONS

**STANDARD V-100®
GEL TIME vs TEMPERATURE**



This graph shows gel time as a function of temperature. With the curve being basically linear, a good rule of thumb is 30 minutes (approx.) at room temp. (72° F) and varies about 1 minute per degree temperature change.

**STANDARD V-100®
MIXED VISCOSITY vs TEMPERATURE**



This graph shows viscosity is relatively constant above 80° F, but changes rather dramatically between 70° F and 50° F. This can be very noticeable when pouring on concrete which may be 10-20° F cooler than the ambient air temperature.

SHIP-SAFE STANDARD V-100® EPOXY GROUT



SHIP-SAFE STANDARD V-100 EPOXY GROUT

Reformulated version of Standard V-100 Epoxy Grout which may be shipped under non-hazardous classification, eliminating delays and haz-mat fees. Also complies with E/U non-hazardous shipping regulations.

As with all the V-100 family of grouts, Ship-Safe Standard V-100 offers excellent physical properties, mixing and placing characteristics.

A two component, 100% solids, flowable epoxy resin system for applications requiring high strength, high resistance to impact and chemical resistance. Other materials, such as concrete or weaker grouts may develop structural flaws when subjected to high concentrated loads.

Ship-Safe Standard V-100 is an excellent choice for:

- Grouting machine bases
- Setting anchor bolts
- Setting leveling wedges
- Setting sole plates
- Repairing deteriorated foundations

The rapid strength development of Ship-Safe V-100 permits loads to be applied sooner after grouting than with other materials.

IMPORTANT ADVANTAGES:

PERMANENCE

Eliminates the need for periodic re-grouting. Saves downtime, labor and lost production. Resistance to oils, greases, acids, alkalis and solvents is much greater than that of cement-based materials. Tensile strength is at least 10 times

that of concrete and the compressive strength is about 5 times that of concrete.

NEW SHIPS NON-HAZARDOUS

PACKAGING

Ship-Safe Standard V-100 is packaged in a kit with the base resin packed in an oversized container large enough to serve as a mixing vessel. The hardener portion of the kit is added to the base resin at the job site. A stirring paddle is included, which will fit a standard 1/4" electric drill. After a mix time of 2-3 minutes a 10-15 minute working time remains for placement of the material.

EASY, FLOW-INTO-PLACE INSTALLATION

Flows into spaces as small as 1/2" under machines and fills in completely before solidifying.

REGROUTS

No need to move equipment or break connections. Just raise equipment 1/2" to 3/4" and regROUT with Ship-Safe Standard V-100.

TYPICAL POUR DEPTH

Thickness 1/4" up to 1" (unconfined), up to 1 1/2" under plate. (Multiple layers may be used for thicker pours.)

SMOOTHER MACHINE OPERATION

Ship-Safe Standard V-100 survives impact and vibration as well as reinforced rub-

ber materials and will not delaminate under the most severe shock loads.

FAST CURE

At 77° F, a 1/2" thickness will set up for use in 8 hours.

CURE TIME:

The cure time (the time before the grout is strong enough for use) will also depend on the air temperature and the temperature of the floor and machinery being grouted. The average cure time from the last pour to machinery start-up will be 8 hours at 77° F. In cool weather, the grout will cure and develops strength more slowly than in hot weather. Remember that the temperature of the foundation concrete must be taken into account along with the air temperature when assessing the cure time needed.

PACKAGING/YIELD

11# Kit = .10 cu. ft. (181.5 cu. in.)
22# Kit = .21 cu. ft. (363 cu. in.)
55# Kit = .53 cu. ft. (907.5 cu. in.)

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

PHYSICAL PROPERTIES

Color	Gray Green
Compressive Strength (ASTM D-695)	
8 hours	4,000 psi
1 day	9,200 psi
3 days	13,000 psi
7 days	15,000 psi
Compression Modulus (7 days)	348,000 psi
Tensile Strength (ASTM D-638)	3,900 psi
Heat Deflection Temperature (ASTM D-648)	133° F
Maximum Service Temperature	175° F
Placement Time (@ 72° F)	10-15 min.
Tensile Modulus	362,000 psi
Mixed Viscosity	10,000 cps
Specific Gravity	1.7
Hardness (Shore D)	86
Density (cured)	105 lbs./cu. ft.
Creep Test (ASTM C-1181)	
600 psi @ 150° F cured 24 hours @ 70° F 16 hours @ 150° F	1.98 x 10 ⁻² in./in.
Coefficient of Thermal Expansion (ASTM D-696)	2.0 x 10 ⁻⁵ in./in./° F

DEEP POUR V-100® EPOXY GROUT



DEEP POUR V-100®

A three-component, 100% solids, epoxy resin system specifically designed for use where pour sections exceed 3" thereby permitting the use of a more highly filled material. Deep Pour V-100® offers excellent compressive strengths coupled with rapid cure times for applications where larger volumes are required.

Deep Pour V-100® is ideally suited for:

- Deep grouting of large machine bases
- Setting large anchor bolts
- Setting large leveling wedges
- Setting large sole plates
- Deep repairs in foundations

This grout is specifically formulated for pours as thick as 8" and develops the same high strength and chemical resistance as Standard V-100®. Ease of mixing and fast cure makes this epoxy grout ideal for minimizing down time in industries where equipment must continue running such as in steelmaking, manufacturing and power generation.

IMPORTANT ADVANTAGES: PERMANENCE

Eliminates need for periodic regrouting. Saves downtime, labor and lost production. Resistance to oils, greases,

PHYSICAL PROPERTIES	
Compressive Strength (ASTM D-695)	
1 day	11,000 psi
3 days	11,600 psi
7 days	14,000 psi
Tensile Strength (ASTM D-638)	1,536 psi
Tensile Modulus	72,000 psi
Mixed Viscosity (ASTM D-2393)	37,000 cps
Heat Deflection Temperature	136° F
Maximum Service Temperature (ASTM D-648)	250° F
Hardness (Shore D) (ASTM D-2240)	90
Placement Time @ 70° F	60 minutes
Flexural Strength (ASTM D-790)	4,600 psi
Flexural Modulus of Elasticity	2,154,000 psi
Coefficient of Thermal Expansion (ASTM D-696)	1.7 x 10 ⁻⁵ in./in./°C
Creep Test (ASTM C-1181)	
600 psi @ 150° F cured 24 hours @ 70° F 16 hours @ 150° F	7.09 x 10 ⁻³ in./in.
Linear Shrinkage (ASTM D-2566)	0.0003 in./in. @ 72° F
Typical Pour Depth	3 in. - 8 in.

acids, alkalis and solvents is much greater than that of cement-based materials. Tensile and flexural strengths are at least 11 times that of concrete and compressive strength is about 4 times that of concrete.

PACKAGING

The grout is packaged in convenient three-part kits consisting of a resin container, a hardener container and two bags of aggregate. A standard drum-type cement mixer or mortar mixer may be used.

EASY, FLOW-INTO-PLACE INSTALLATION

Flows into spaces under machines, fills completely before solidifying and is self leveling.

FAST CURE

At 70° F, an 8" thickness will be ready for use in 24 hours.

SMOOTHER MACHINE OPERATION

Deep Pour V-100® survives impact and vibration as well as reinforced rubber materials and will not delaminate under the most severe shock loads.

REGROUTS

No need to move equipment or break connections. Just raise equipment and regrout with Deep Pour V-100®.

PACKAGING/YIELD
3 Part Kit = 1.00 cu. ft. (1,728 cu. in.)

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

WTF-E V-100™ EPOXY GROUT



- Meets requirements for "High" effective bearing area per ASTM C-1339.
- 10,185 psi compressive strength in 8 hours
14,020 psi compressive strength in 24 hours
- No clean-up required (Mixed in disposable pails)
- Easy mixing - no special mixing equipment needed
Mix with drill and paddle or paddle type mortar mixer
- High flowability for easy pours
- Deep pours can be done in one step
- Contains no BGE or free silica
- Extra resistant to UV rays and water
- Most experienced field support team in the industry

WTF-E V-100 Epoxy Grout is a three-component, 100% solids epoxy resin system. It is specifically designed for applications requiring high mechanical strength due to high loads. WTF-E offers resistance to temperature, humidity, chemical environments and most acids.

WTF-E V-100 Epoxy Grout is formulated for medium thickness pours. It is recommended for applications varying from 3/4" to 8" cross sections. The flow characteristics of WTF-E allow easy placement. Its tremendous compressive strength and high effective bearing area characteristics make it especially

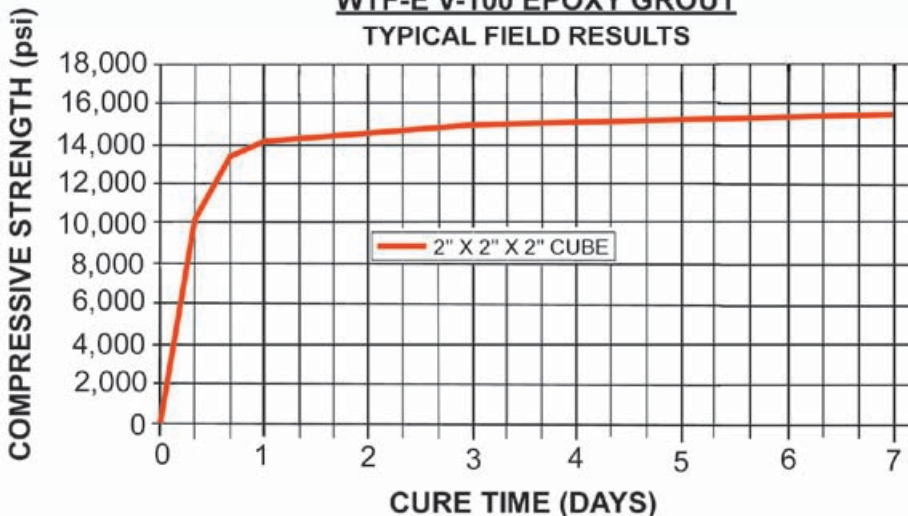
well suited for severe applications such as wind turbine bases, forge hammers, punch presses, power generation equipment and rail installations of all kinds.

PACKAGING/YIELD
3 Part Kit = 1.00 cu. ft. (1,728 cu. in.)

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

WTF-E V-100 EPOXY GROUT
TYPICAL FIELD RESULTS



PHYSICAL PROPERTIES

Cure @72°F

Compressive Strength (ASTM C-579)	8 hours	10,185 psi
	16 hours	13,510 psi
	24 hours	14,020 psi
	72 hours	14,760 psi
	168 hours	15,470 psi
Tensile Strength (ASTM C-307)		2,350 psi
Flexural Strength (ASTM C-580)		4,800 psi
Heat Deflection Temperature (ASTM D-648)		170°F
Maximum Service Temperature		225°F
Hardness (Shore D) (ASTM D-2240)		94
Mixed Viscosity (ASTM D-2196) (77°F)		27,000 cps
Gel Time		50-60 min.
Placement Time		60 min.
Typical Pour Depth		3/4 in. - 8 in.
Linear Shrinkage (ASTM C-531)		0.000040 in./in.
Coefficient of Thermal Expansion (ASTM C-531)		0.000006 in./in./°F
Flowability and Bearing Area (ASTM C-1339)	1st Contact - 45 sec. Full Contact - 63 sec.	Bearing Area Range - High (85-100%)
Creep Test (ASTM C-1181) 600 psi @ 150° F Cured 24 hours		0.00045 in./in.

DCR V-100™ EPOXY GROUT



- 15,200 psi compressive strength in 6 hours
16,700 psi compressive strength in 24 hours
- High flowability for easy pours
- Suitable for either indoor or outdoor use
- Resistant to UV rays and water
- Acid and chemical resistant
- Deep pours can be done in one step
- Mix with drill and paddle or paddle type mortar mixer
- Easy clean up with water and detergent
- Most experienced field support team in the industry

Unisorb DCR V-100 Epoxy Grout is a three-component, 100% solids epoxy resin system. It is specifically designed for applications requiring high mechanical strength due to high loads. DCR offers resistance to temperature, humidity, chemical environments and most acids.

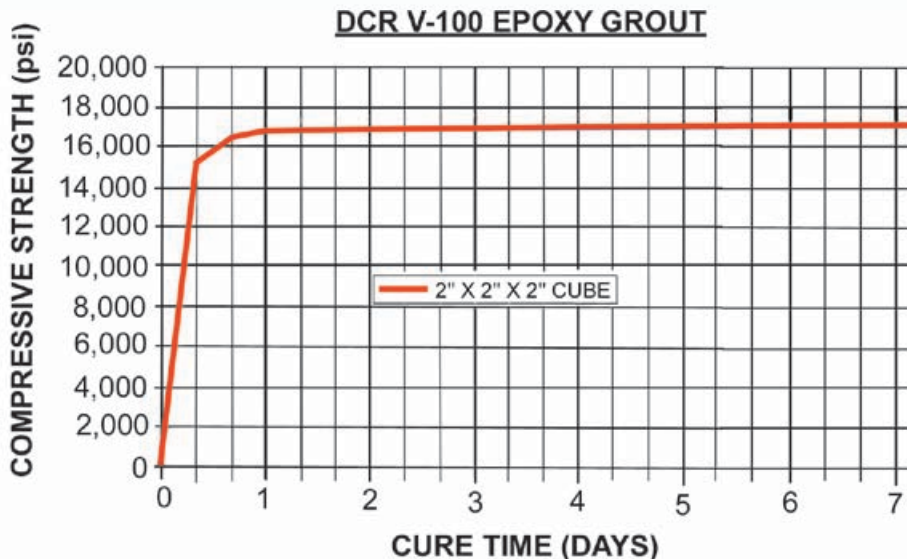
DCR V-100 Epoxy Grout is formulated for medium thickness pours. It is recommended for applications varying from 1 1/2" to 8" cross sections. Flow characteristics of DCR allow easy placement. Its tremendous compressive strength characteristics makes it especially suited

for severe applications such as forge hammers, punch presses, stamping press bolster rails, rail installations of all kinds, and power generation equipment.

PACKAGING/YIELD

63# Kit = .50 cu. ft. (864 cu. in.)
125# Kit = 1.00 cu. ft. (1,728 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.



PHYSICAL PROPERTIES

Cure @72°F

Compressive Strength (ASTM D-695) (72°F)	17,000 psi
Tensile Strength (ASTM D-638)	3,000 psi
Flexural Strength (ASTM D-790)	6,000 psi
Heat Deflection Temperature (ASTM D-648)	227°F
Maximum Service Temperature	325°F
Hardness (Shore D) (ASTM D-2240)	90
Mixed Viscosity (ASTM D-2196) (77°F)	20,000 cps
Gel Time	50-60 min.
Placement Time	20-25 min.
Typical Pour Depth	1 1/2 in. - 8 in.

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

CR HI-FLOW V-100™ EPOXY GROUT



- **15,000 psi compressive strength in 8 hours**
17,700 psi compressive strength in 24 hours
- **No clean up required (mixed in disposable pails)**
- **Easy mixing - two part kit - no added aggregate**
- **No special mixing equipment needed - just a power drill**
- **Minimal PPE required (no aggregate or dust)**
- **Extra resistant to UV rays and water**
- **Cross sections as low as 1/4" can be achieved**
- **Contains no BGE or free silica**
- **Most experienced field support team in the industry**

A two-component, 100% solids, epoxy resin system specifically developed for wind turbine bases, crane rails, and other extraordinarily severe applications where exposure to extreme loads, elevated temperatures and high humidity shortens the service life of other grouting materials. CR Hi-Flow V-100 Epoxy Grout is formulated to be very flowable for ease in placement under longer rails or machine bases. Typical pour cross-sections range from 1/4" to 2" with the material shipped in an easily mixed two part kit.

After curing, CR Hi-Flow V-100 Epoxy Grout is impervious to water and and saltwater, and can be used in

total submersion without affect on its operational functions. It is resistant to most fuels, oils, chemical and water absorption, making it ideal for heavy industrial use outdoors. It offers the same features as our other epoxy grouts, i.e. high strength, ease of mixing, self-leveling and fast cure.

PACKAGING/YIELD

22# Kit = .21 cu. ft. (358 cu. in.)
52# Kit = .49 cu. ft. (846 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

TYPICAL FIELD RESULTS

PHYSICAL PROPERTIES

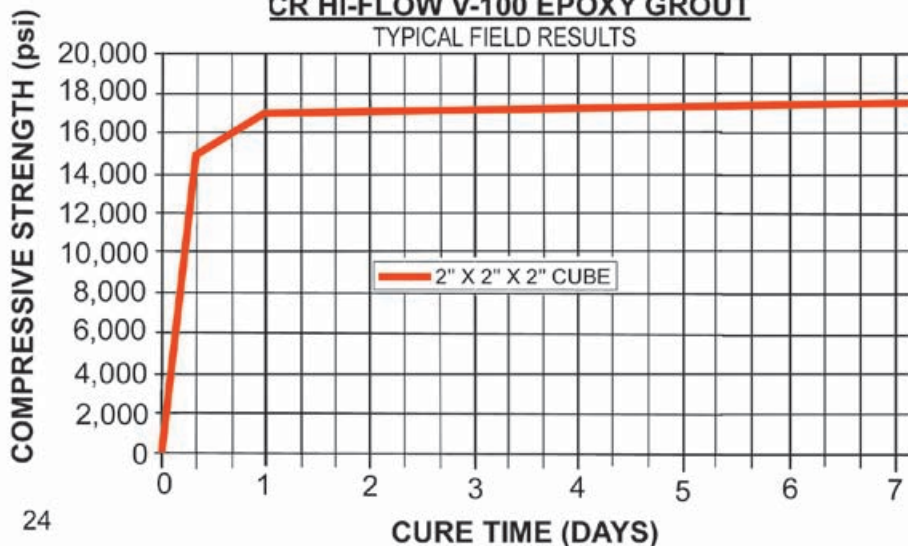
Cure @72°F

Compressive Strength (ASTM C-579) (72°F)	17,700 psi
Tensile Strength (ASTM C-307)	5,500 psi
Flexural Strength (ASTM C-580)	8,100 psi
Modulus of Elasticity (ASTM C-580)	1,000,000 psi
Heat Deflection Temperature (ASTM D-648)	200°F
Maximum Service Temperature	275°F
Hardness (Shore D) (ASTM D-2240)	95
Mixed Viscosity (ASTM D-2393)	7,500 cps
Gel Time	30-35 min.
Placement Time	15-20 min.
Typical Pour Depth (Multiple layers may be used for thicker pours.)	1/4 in. - 2 in.

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

CR HI-FLOW V-100 EPOXY GROUT

TYPICAL FIELD RESULTS



SHIP-SAFE CR HI-FLOW V-100™ EPOXY GROUT



NEW
SHIPS NON-
HAZARDOUS

- Contains no DOT or EU regulated materials (ships non-hazardous)
- 14,600 psi compressive strength in 8 hours
17,000 psi compressive strength in 24 hours
- No clean up required (mixed in disposable pails)
- Easy mixing - two part kit - no added aggregate
- No special mixing equipment needed - just a power drill
- Minimal PPE required (no aggregate or dust)
- Extra resistant to UV rays and water
- Cross sections as low as 1/4" can be achieved
- Contains no BGE or free silica
- Most experienced field support team in the industry

Specially formulated to address environmental shipping concerns, a two-component, 100% solids, epoxy resin system specifically developed for wind turbine bases, crane rails, and other extraordinarily severe applications where exposure to extreme loads, elevated temperatures and high humidity shortens the life of other grouting materials. Ship-Safe CR Hi-Flow V-100 Epoxy Grout is formulated to be very flowable for ease in placement under longer rails or machine bases. Typical pour

cross-sections range from 1/4" to 2" with the material shipped in an easily mixed two part kit.

After curing, Ship-Safe CR Hi-Flow V-100 Grout is impervious to water and saltwater and can be used in total submersion without affect on its operational functions. It is resistant to most fuels, oils, chemical and water absorption, making it ideal for heavy industrial use outdoors. It offers the same features as our other epoxy grouts, i.e. high strength, ease of mixing, self-leveling and fast cure.

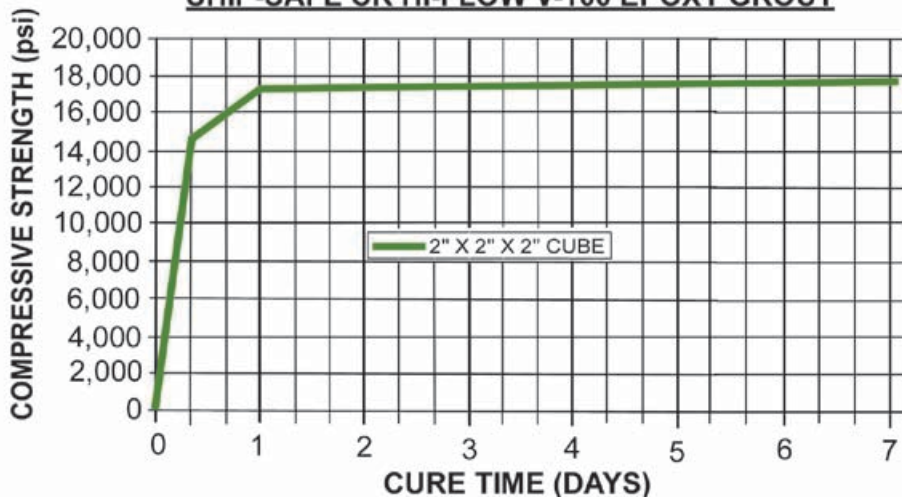
PACKAGING/YIELD

22# Kit = .21 cu. ft. (358 cu. in.)
52# Kit = .49 cu. ft. (846 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

Physical properties shown are the result of laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

SHIP-SAFE CR HI-FLOW V-100 EPOXY GROUT



PHYSICAL PROPERTIES

Cure @72°F

Compressive Strength (ASTM C-579) (72°F)	17,700 psi
Tensile Strength (ASTM C-307)	2,280 psi
Flexural Strength (ASTM C-580)	7,892 psi
Modulus of Elasticity (ASTM C-580)	973,000 psi
Heat Deflection Temperature (ASTM D-648)	187°F
Maximum Service Temperature	260°F
Hardness (Shore D) (ASTM D-2240)	93
Mixed Viscosity (ASTM D-2393)	8,000 cps
Gel Time	30-35 min.
Placement Time	15-20 min.
Linear Shrinkage (ASTM C-531)	0.0007 in./in.
Thermal Expansion (ASTM C-531)	0.0003 in./in.
Creep Test (ASTM C-531)	0.00049 in./in.
Typical Pour Depth (Multiple layers may be used for thicker pours.)	1/4 in. - 2 in.

JOINT FILLER V-100® HI-TEMP V-100® EPOXY GROUT



JOINT FILLER V-100®

A two-component, 100% solids, filled epoxy system designed to seal the exposed edge of Inertia Block isolation material while providing an excellent appearance to the installation. It cures overnight at room temperature to a gray, cement colored flexible mastic.

Joint Filler V-100® is conveniently packaged in a 2 gallon kit, and its 1:1 mixing ratio allows the mixing of the amount necessary for the application. Do not mix more than can be placed in 15 min.

This material is resistant to and prevents the entry of water, lubricants, coolants and other fluids into the joint. It is also tough and puncture resistant, effectively keeping chips and other

debris from entering the isolation joint. When cured, the material remains pliable enough to prevent the unwanted transmission of vibrations between the Inertia Block and the shop floor.

PHYSICAL PROPERTIES

Tensile Strength (ASTM D-412)	430 psi
Hardness (Shore A)	60
Placement Time @ 77° F (1 lb. mass)	60 min.
(Full Kit)	15-20 min.
Cure Time	24 hours
Mixed Viscosity	2,200 cps

PACKAGING/YIELD

2 Gal. Kit = .25 cu. ft. (432 cu. in.)
(1/2" x 1/2" groove up to 144 linear ft.)



HI-TEMP V-100®

A two-component, 100% solids, epoxy resin system specifically designed where higher mechanical strength and high temperature stability over regular epoxy grouts is required.

Hi-Temp V-100® is resistant to most fuels, oils, water, and attack by acids and caustic solutions, making it ideal for marine or power plant applications.

PACKAGING

This epoxy grout product is conveniently packaged in kits with a mixing

paddle and pre-measured containers of resin and hardener. To use, pour the hardener into the resin and mix 3 to 4 minutes until a uniform color appears.

PLACEMENT TIME & CURE TIME

The placement time (the time you have to pour before it sets) of Hi-Temp V-100® Epoxy Grout will vary with ambient temperatures. The average placement time at 77° F will be 30-40 minutes. In cooler weather you will have more time to pour material, and in hotter weather you will have less time. Cure time (the time before the grout is strong enough for use) will also depend on the air temperature and the temperature of the floor and machinery being grouted. The average cure time from the last pour to machinery start up will be 24 hours at 70° F. In cool weather the grout will cure and develop strength more slowly than in hot weather. Temperature of the foundation concrete should be taken into consideration along with the air temperature when calculating the cure time needed.

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

PHYSICAL PROPERTIES

Compressive Strength (ASTM D-695)	19,000 psi
Tensile Strength (ASTM D-638)	4,500 psi
Flexural Strength (ASTM D-790)	9,200 psi
Mixed Viscosity (ASTM D-2393)	13,000 cps
Heat Deflection Temperature (ASTM D-648)	266° F
Maximum Service Temperature	325° F
Hardness (Shore D)	90
Gel Time @ 72° F	40-50 mins.
Creep Test (ASTM C-1181) 600 psi @ 150° F	
cured 24 hours	1.62 x 10 ⁻³ in./in.
Typical Pour Depth	1/4 in. - 1/2 in.
(Multiple layers may be used for thicker pours.)	

PACKAGING/YIELD

21# Kit = .20 cu. ft. (345 cu. in.)
47# Kit = .45 cu. ft. (776 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

XTRA-TEMP V-100® EPOXY GROUT



XTRA-TEMP V-100®

A two-component, 100% solids, epoxy resin system specifically designed for applications where mechanical strength and very high temperature stability are required. This grout is resistant to most fuels, oils, water, and attack by acids or caustic solutions.

This product is conveniently packaged in kits containing pre-measured amounts of resin, hardener and a mixing paddle. It is also available in bulk, with the base resin packaged in 55 gallon drums and the hardener packaged in 5 gallon pails.

The placement time (the time you have to pour before it sets) will vary with ambient temperatures. The placement time at 77° F will be 50-60 minutes. In cool weather you will have more time to pour material and in hot weather you will have less time.

Cure time (the time it takes before the grout develops its ultimate physical properties) is also dependent on ambient temperatures and service temperature. With the recommended cure temperature the machinery start up may be in 24 hours. The grout may also be cured for 7 days at ambient temperatures with the service temperature providing the heat for the final cure.

PHYSICAL PROPERTIES	
Compressive Strength (ASTM D-695)	20,000 psi
Tensile Strength (ASTM D-648)	5,500 psi
Flexural Strength (ASTM D-790)	7,900 psi
Mixed Viscosity (ASTM D-2393)	7,000 cps
Heat Deflection Temperature (ASTM D-648)	320° F
Maximum Service Temperature	425° F
Hardness (Shore D) (ASTM D-2240)	90
Creep Test (ASTM C-1181) 600 psi @ 150° F cured 24 hours	1.01 x 10 ⁻³ in./in.
Typical Pour Depth (Multiple layers may be used for thicker pours)	1/4 in. - 1/2 in.

CURE CYCLE
(To Develop Ultimate Properties)
Heat for 8 hrs. @ 75° F
Heat for 4 hrs. @ 200° F
Heat for 4 hrs. @ 400° F

APPLICATION CHARACTERISTICS			
Characteristic	Part A	Part B	Part A/B
Color	Tan	Blue	Green
Density lbs./gal.	14.5	7.8	13.8
(Kg./l)	(1.737)	(0.935)	(1.654)
Mixing Ratio Parts by:			
Weight	15	1	—
Volume	8	1	—
Placement Time @ 77° F	50 minutes in a 5 lb. mass		
Peak Exothermic Temperature	170° F in a 5 lb. mass		

PACKAGING/YIELD
20# Kit = .19 cu. ft. (330 cu. in.)
44# Kit = .43 cu. ft. (735 cu. in.)

Physical properties shown are the result of independent laboratory testing performed per industry recognized test procedures. Laboratory properties aid in determining suitability of the product for the intended application. Field test results may vary due to procedures or ambient conditions such as temperature and humidity. Laboratory reports are available on request.

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

ADHESIVE V-100® EPOXY GROUT LOW-TEMP V-100® EPOXY GROUT



- Industrial filling or patching
- Vertical and overhead surfaces

PACKAGING

Adhesive V-100® is packaged in a convenient kit consisting of one gallon of resin and one gallon of hardener. To use, simply mix a portion of the resin and the hardener at a 1:1 ratio-by-volume in a separate container. Be sure to use separate trowels for the resin and hardener. Mix thoroughly and apply. Do not mix both containers together unless you are using all of the adhesive in one application within the allowed work life. Containers with unmixed material can be resealed for future use. Mixed adhesive cannot be resealed for future use.

PLACEMENT TIME

The placement time of this adhesive material (the time you have before it sets) will vary according to the air temperature. Average placement time at 70°F is approximately 45 minutes for one (1) pint of mixed material. In cooler weather you have more time to work with the material. In hot weather you have less time.

CURE TIME

The average cure time at 70°F will be 4-5 hours. Air temperature above and

below 70°F, as well as the temperature of the surfaces on which the adhesive is being applied, will affect cure time. Prewarming the parts or surfaces will accelerate the cure time, but do not heat the surfaces above 100°F.

PHYSICAL PROPERTIES

Compressive Strength (ASTM D-695)	14,000 psi
Tensile Strength (ASTM D-638)	5,200 psi
Flexural Strength (ASTM D-790)	11,000 psi
Tensile Shear Strength (ASTM D-1002)	2,400 psi
Heat Deflection Temperature (ASTM D-648)	147°F
Hardness (Shore D)	90
Gel Time (ASTM D-2471)	
14 fl oz	1 hour @ 77°F
1/16" film	2 hours @ 77°F
Recommended Thickness	1/32 in. to 1/4 in.

PACKAGING/YIELD

24.5# Kit = .26 cu. ft. (450 cu. in.)

Consult the specific Material Safety Data Sheets (MSDS) for all safety data.

ADHESIVE V-100®

A two-component, 100% solids, epoxy resin system. This versatile, easy-to-handle adhesive has a paste-like consistency, short cure time and bonds to most surfaces.

Adhesive V-100® is ideal for:

- Bonding steel plates to concrete
- Bonding of wood
- Bonding of plastic
- Bonding of ceramic tiles
- Bonding of fiberglass

LOW-TEMP V-100®

A two-component (resin and hardener), 100% solids, solvent free, epoxy resin system designed to be poured when air temperatures are between 25°F and 65°F. This makes this an ideal grout for use in cold climates where outdoor pours are required. Optimum pouring range is 45°-55° F which allows for best worklife and installation. Low-Temp V-100® must be stored at, or warmed to, 45°-65° F. Do not use Low-Temp V-100® at temperatures above 65° F; the worklife is too short and cracking may result.

To use, pour the hardener into the resin and mix until a uniform color ap-

pears, usually 2-3 minutes. Pour this material immediately after mixing; work life is much shorter than with standard epoxy. For questions on specific applications please contact Unisorb Engineering.

PHYSICAL PROPERTIES

Compressive Strength (ASTM D-695)	9,500 psi @ 40° F 18,700 psi @ 72° F
Tensile Strength (ASTM D-638)	6,100 psi
Flexural Strength (ASTM D-790)	10,500 psi
Heat Deflection Temperature (ASTM D-648)	153° F
Maximum Service Temperature	200° F

PHYSICAL PROPERTIES (CON'T)

Linear Shrinkage (ASTM D-2566)	0.00021 in./in. @ 40° F
Hardness (Shore D) (ASTM D-2240)	95
Mixed Viscosity (ASTM D-2393)	20,000 cps @ 40° F
Gel Time	120 min. @ 40° F
Work Time	30 min. @ 40° F
Creep Test (ASTM C-1181) 600 psi @ 150° F cured 24 hours	1.76 x 10 ⁻² in./in.
Typical Pour Depth	1/2 in. - 2 in.

PACKAGING/YIELD

23# Kit = .22 cu. ft. (380 cu. in.)
50# Kit = .47 cu. ft. (812 cu. in.)

BASIC APPLICATION TECHNIQUES (EPOXY)

These are the basic application techniques to follow when using most UNISORB® Epoxy grouting products. Refer to the specific Product Data sheet and instructions on the label for information relevant to the product being used.

CONCRETE SURFACE PREPARATION

Remove all oil, grease and contamination from concrete. Remove loose and weak concrete from the foundation surfaces by chipping down to sound aggregate. Light sandblasting or acid etching may be sufficient but must be completely neutralized before grouting. The concrete must be dry and have no water in anchor bolt holes.

METAL SURFACE PREPARATION

Base plates or sole plates to be grouted should be sanded or blasted to a bare metal condition. If it is impossible to grout within 8 hours of sandblasting, the surface should be primed with a high-quality epoxy primer.

FORMING

If not already recessed, dam the grout area and carefully seal the forms. A heavy body caulking compound such as RTV Silicone should be used to provide a watertight condition, and for easy removal after the grout has set up. Install the dam high enough to allow the grout to build at least a 2" head. The

forms should be placed between 2-6" away from the perimeter of the machine base to allow for the air to escape and to provide for a grout shoulder around the base plate.

PREPARATION OF EPOXY GROUT

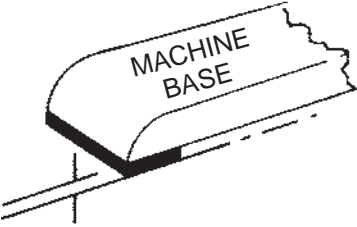
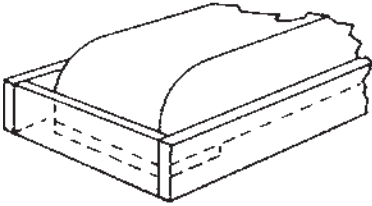

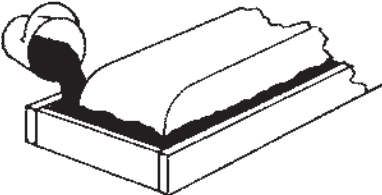
Store the material between 70-80°F. Do not mix until ready to pour. For pot life information consult the specific Product Data sheet. Generally, two people working with the grout (one mixing and one pouring) is the best procedure.

TWO PART EPOXY

When ready to mix the grout, first thoroughly pre-mix the resin. While stirring the resin, slowly add the hardener. To prevent splashing, pour in a steady stream approximately 6" high. Mixing time should be about 2-4 minutes, depending on kit size. Be sure to mix completely around the pail perimeter, moving the stirrer up and down and at a slight angle until a uniform color appears with no streaks. A jiffy mixer, or similar stirrer in a variable speed drill works best for most epoxy grouting materials. Stirrer blades must be long enough to touch the bottom of the pail.

THREE PART EPOXY

The three part formula contains a resin, a hardener and a grout filler. When ready to mix the grout, pour the resin in a drum of at least 10 gallon capacity. Using a jiffy mixer or a variable speed drill, thoroughly mix the hardener into the resin. Slowly add the two bags of aggregate filler so that all surfaces become wet as it is mixed. Continue to mix until there are no dry streaks. A mortar mixer may be used, but do not use a rotating drum-type. Do not add water.

APPLICATION TECHNIQUES FOR EPOXY GROUTING	
<p>1</p>  <p>LEVEL MACHINE WITH 1/4" - 3/4" CLEARANCE</p>	<p>2</p>  <p>DAM PERIMETER LEAVING ADEQUATE VENTING</p>
<p>3</p>  <p>MIX GROUT (2-3 MINUTES)</p>	<p>4</p>  <p>POUR UNDER MACHINE AND LET HARDEN</p>

(cont.)

BASIC APPLICATION TECHNIQUES (EPOXY)

(Continued)

POURING

Always pour from one spot to prevent air pockets under the machine. When the grout has penetrated to the other side of the base, move the pouring spout along the same side of the base to where the grout is at least 1/2" up the side of the base. When the grout has filled to the bottom and adjacent sides of the base, it is acceptable to fill in by pouring around the base perimeter. The epoxy will self-level, but may need to be helped to flow under the base, especially in colder weather. Always sweep from one side of the base to the other to eliminate entrapped air.

PLACEMENT TIME

The placement time (the time you have before initial set) depends on the air temperature, the ambient temperature of the foundation and machinery, and the temperature of the grout. The average placement time at 77°F can vary from 15 minutes to 1 hour, depending on the specific epoxy grout product. In cool weather you will have more time to place grout, and less time in warm weather.

TEMPERATURE CONSIDERATIONS (Two part)

The temperature of the kit components (resin and hardener) at the time of mixing and placement has a significant effect on both the ease of mixing and placement of the mixed grout. For optimum results (in ease of mixing and placement, as well as in the final strengths attained) it is very important that both components are at a temperature between 75°F and 90°F at the time of mixing and placement. Storage of both components at a temperature within this range for a minimum of 18 hours before mixing is recommended.

TEMPERATURE CONSIDERATIONS (Three part)

The temperature of the kit components (resin, hardener and aggregate) at the time of mixing and placement has a significant effect on both the ease of mixing and placement of the mixed grout. For optimum results (in ease of mixing and placement, as well as in the final strengths attained) it is very important that all

three components are at a temperature between 75°F and 90°F at the time of mixing and placement. Storage of all three components at a temperature within this range for a minimum of 18 hours before mixing is recommended.

CURE TIME

The cure time (the time until the grout is strong enough for use) is also temperature dependent. In hot weather the grout will cure and develop its strength more quickly. In cool weather the grout will cure and develop its strength more slowly. Special precautions must be taken during cold weather (below 50°F) to assure that the grout will cure properly. Consult the factory for details.

REMOVING FORMS

If the temperature has been maintained at 70°F during the entire procedure, it is possible to remove the forms within 24 hours. After removing the form anchoring devices, a sharp rap should be enough to separate the forms from the base grout. Bolts can then be checked for tightness and the equipment placed in operation.

CLEAN UP

Because of the presence of the filler, the uncured Deep Pour V-100 may be cleaned with a water rinse. For all other uncured V-100 Epoxy Grouts use isopropyl alcohol, xylol, ketones, or methylene chloride. Be sure to follow safety instructions on labels when using these solvents.

PRECAUTIONS

Always wear appropriate Personal Protective Equipment. MSDS are available on our web site at www.unisorb.com. Avoid inhaling fumes and keep the work area well ventilated. Wash skin and clothes with soap and water immediately (before the grout cures).

Consult the specific Material Safety Data Sheet (MSDS) for all safety data.

The above are basic techniques to follow when using most Unisorb epoxy grouting products. Refer to the specific product data sheets, catalog pages, and instructions printed on the container for information that will be relevant to the product being used.

Consult Unisorb Factory for sealing, bonding, and curing compounds.

Consult Unisorb Factory for low or high temperature grout applications.

888-4-UNISORB
517-764-6060

TYPICAL UNISORB GROUTING APPLICATION PHOTOS



V-1 Grout mixed in a wheelborrow with a hoe.



V-1 Grout mixed in a pail with a power drill and paddle.



V-1 Grout mixed in a power grout mixer.



V-100 Epoxy Grout mixed in a paddle type power mixer with a two-bucket divider.



Standard V-100 Epoxy Grout mixed in a pail with a power drill and paddle.



V-1 Grout mixed in a cement truck.

TYPICAL UNISORB GROUTING APPLICATION PHOTOS



Multiple sole plate forms for V-100 Epoxy Grout pour.



Pouring Deep Pour V-100 Grout under a sole plate.



Placing V-1 Grout for large equipment ring.



Finished V-1 Grout installation on large equipment ring.



Pouring V-1 Grout for a power generation Fixator application.



Pumping V-1 Grout on a large turbine generator project.

GROUT FORMS AND SEALANT



UNISORB Grout Forms are designed to reduce the time required to pour grouting materials for machinery mounting bases and other equipment. The easy-to-use plastic Grout Forms eliminate on site forms construction while providing for uniformity in size, shape and thickness of poured grout bases. Forms are easy to remove after the grout has set by simply cutting the plastic form with a utility knife and removing it.

Square Grout Forms are available in 9" and 11" sizes. A 12" x 15" rectangular form is also available. The 9" forms are available in heights up to 8" and are designed for use with UNISORB Model RK-I Fixators. The 11" forms are made in heights up to 10" and are designed for use with UNISORB Model RK-II and RK-III Fixators. The 12" x 15" forms are available in heights up to 11" and are designed for use with UNISORB Model RK-IV and RK-V Fixators.

Supplied with the Grout Forms is a high-tack butyl rubber sealant in roll form which is applied to the base of the Grout Forms. When the Grout Forms are pressed into position on a clean, dry foundation the sealant prevents the grout from leaking from under the form. The sealant requires no cure time and grout can be placed immediately after forms are in position. Application temperatures for the sealant is from 20° F to 120° F. Excess sealant can be removed from grout with mineral spirits.

Grout Forms assure excellent results when used with all UNISORB Grouts.

OTHER UNISORB PRODUCTS

- CAPSULE ANCHOR SYSTEMS
- DIE TURNOVER PADS
- QUANTUM IM MOUNTS (Injection Molding Machine)
- FOUNDATION ISOLATION SOLUTIONS
- JAKEBOLT HEAVY DUTY ANCHOR BOLTS
- LEVEL-RITE MACHINERY MOUNTS
- QUANTUM PRESS MOUNTS
- LEV-L-INE MACHINERY MOUNTS
- VIBRALASTIC MOUNTS
- NOVIBRA MOUNTS
- FIXATOR ANCHORING/ALIGNMENT SYSTEMS
- TRI-WEDGE MACHINERY MOUNTS
- IMW MOUNTS
- VECTOR ANCHOR BOLTS
- VIBRATION ISOLATION PADS
- VIBRATION SURVEY SERVICES

Contact UNISORB home office to inquire about these fine machinery installation products.

MACHINE INSTALLATION EXPERTISE SINCE 1935

Since 1935, UNISORB has been serving the machinery installation needs of all segments of the manufacturing industry. As part of our commitment to provide the best installation products and services, UNISORB maintains the only industry staff of engineers devoted exclusively to the design and implementation of complete machinery installation systems. From concept to final installation, UNISORB ensures optimum performance of mounted equipment.



Depend on UNISORB's years of experience for:

- *Machinery Mounts*
- *Vibration Isolation Systems*
- *Anchoring/Alignment Systems*
- *Vibration Analysis Services*
- *Professional Engineering Services*
- *Isolated Foundation Design*
- *Advanced Grouting Technologies*

UNISORB®

INSTALLATION TECHNOLOGIES

www.unisorb.com

BOX 1000, JACKSON, MI 49204-1000

888-4-UNISORB • FAX 517-764-5607

ISO-9001 Certified