CG-050

OPERATION AND MAINTENANCE MANUAL

WITH

PARTS LIST

SERIAL # _____

WARRANTY STATEMENT

ChemGrout, Inc. warrants that equipment shall be free from defects in material, workmanship or components.

The period of this warranty shall be limited to 90 days from the date of purchase, and the extent of ChemGrout's liability shall be limited to replacement of components that have been proven faulty. No claims in excess of component replacement value will be recognized.

Specifically excluded from this warranty is normal wear resulting from the mixing and pumping of abrasive slurries, or damage to the equipment as a result of improper use.

SAFETY

Various guards, shields, grates and screens are provided over moving parts, such as: sheaves, couplings, augers, paddles, belts, etc. to guard against injury to operators while the equipment is in operation, and must not be removed or modified in any way.

WARNING STICKERS ARE PROVIDED TO REMIND OPERATORS OF THE POTENTIAL HAZARDS.

Operators are advised to utilize appropriate personal safety equipment including, but not limited to, safety glasses or goggles, dust masks or respirators, gloves and / or rain gear and hard hats when operating this equipment.

LIABILITY

It is understood and agreed that ChemGrout is relieved of any and all liability that may arise from personal injury or damage to property as a direct or proximate result of the removal of protective guards, shields, etc., the ignoring of warning signs and the lack of common sense procedures.

SAFETY DATA

PLEASE READ AND HEED THE FOLLOWING IMPORTANT SAFETY NOTICES BEFORE PLACING MACHINE IN SERVICE.

*** * * * NOTICE * * * ***

PROPER PERSONAL PROTECTIVE EQUIPMENT, INCLUDING, BUT NOT LIMITED TO: GOGGLES, DUST MASKS OR RESPIRATORS, GLOVES, HARD HAT, BOOTS AND RAINGEAR MUST BE WORN WHEN OPERATING THIS EQUIPMENT.

*** * * * NOTICE * * * ***

FOLLOW MATERIAL MANUFACTURER'S INSTRUCTIONS FOR PROPER MATERIAL USE AND RECOMMENDATIONS FOR SAFETY EQUIPMENT AND PROCEDURES.

*** * * * WARNING * * * ***

NEVER PUT HANDS OR TOOLS IN MIXERS OR PUMP UNLESS PRIMARY POWER SOURCE IS SHUT OFF AND DISCONNECTED AND KINETIC ENERGY DISSIPATED. ON ELECTRICALLY POWERED EQUIPMENT, USE PROPER LOCK OUT/TAG OUT PROCEDURES. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN SERIOUS PERSONAL INJURY AND/OR DAMAGE TO THE MACHINE.

*** * * * WARNING * * * ***

NEVER ATTEMPT TO DISCONNECT OR OPEN THE COUPLING ON ANY PART OF THE PUMP DISCHARGE SYSTEM WHILE PUMP IS IN OPERATION, OR IF THE DISCHARGE SYSTEM IS UNDER PRESSURE FOR ANY REASON.

*** * * * WARNING * * * ***

NEVER OPERATE MACHINE WITHOUT THE VARIOUS GUARDS, SHIELDS AND OTHER SAFETY EQUIPMENT WITH WHICH THE MACHINE WAS ORIGINALLY EQUIPPED IN PLACE AND FUNCTIONAL.

*** * * * WARNING * * * ***

ALL ELECTRICAL CONNECTIONS MUST BE MADE BY A QUALIFIED ELECTRICIAN.

*** * * * WARNING * * * ***

HYDRAULIC COMPONENTS, INCLUDING, BUT NOT LIMITED TO VALVES, FITTINGS, HOSES, MOTORS, RESERVOIR AND FILTERS MAY BE HOT. TO PREVENT INJURY, TOUCH ONLY THE HANDLES PROVIDED. LET THE HYDRAULIC COMPONENTS COOL BEFORE SERVICING THE EQUIPMENT.

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SECTION 1

OPERATING INSTRUCTIONS

CG-050 GROUT PUMP

Maintenance

Daily - Add oil 10W, or 20W at (14), Drain filter (15).

Operation

Connect air line to (17) and grout line to (1). Pour 1 gallon water in hopper (5). Start pump at (16) and pump out water. (See note below) Disconnect and manually drain hose. Lift rear of pump and drain out water. Reconnect grout hose.

NOTE:
It may be necessary to elevate discharge end of hose during this procedure to prevent water draining from pump through ball valves.

Cleanup

Pour water into (5) and pump until discharge is clear. Stop pump, disconnect all couplings (3), disassemble pump, wash all parts clean. Reassemble pump, making sure to install valve balls in correct position as shown on pump parts diagram.

Important Notices

Some pre-blended grouts are NOT pumpable. The sand particles must be graded with various sizes (see the sand gradation curve in this manual). Sand that is all one size will pack the hose and not pump. The grout mix must also not be mixed too wet so that the sand falls out of suspension. Check the ChemGrout web site to see if your material is listed as pumpable. The link is: http://www.chemgrout.com/pumptestmfg.html. If the material is not listed we recommend a test batch prior to production to verify pumpability.

NOTE:
Reference numbers in parentheses refer to component parts diagram.

SECTION 2

SERVICE GUIDE

SERVICE GUIDE

PROBLEM	PROBABLE CAUSE	SOLUTION
Pumps water O.K., will not pump grout.	Grout mix too "thick", does not enter pump chamber	Add water to grout mix, but be careful not to dilute mix so much cause aggregate to segregate.
	Aggregate too large, prevents ball from seating.	Change to smaller aggregate, or screen out larger particles.
	Aggregate segregations in Discharge hose.	Drain residual water from Discharge hose prior to pumping grout.
		Aggregate improperly graded; change aggregate.
	Grout material has excessive coefficient of internal friction.	Some premixed grout materials are not pumpable. See section on grout mix recommendations.
Pump stalls on discharge stroke.	Pump discharge or hose plugged with grout.	Disconnect discharge hose, check pump, clean out hose.
	Discharge valve (6) improperly installed.	Remove clamp (3), disassemble discharge end of pump and check valve (6) for proper installation. Ball retainer should point downstream.
Pump runs but does not discharge.	Grout not entering pump Chamber.	Grout too thick or obstructed hopper.
	Inlet (hopper) valve installed incorrectly.	Check inlet valve (6) for proper installation; ball retainer should point downstream and valve should be installed on discharge side of Tee (7)

SERVICE GUIDE cont'd

PROBLEM	PROBABLE CAUSE	SOLUTION
Piston "stutters" or does not reverse direction.	Sluggish or Inoperative pilot valve.	Determine which pilot valve (11) by observation; remove valve, wash in fuel oil and return to service or replace with new valve.
Pump strokes unevenly or too slowly.	Misadjusted shuttle valve.	Readjust shuttle valve adjusting screws (13); turn out to increase speed and in to decrease speed.
Pump does not run.	Insufficient air supply.	Check air at source. Requires10 CFM at 100 PSI.
	Pump fluid end plugged.	Open clamps (3), disassemble pump and check sleeve (8) for obstruction.
	Air cylinder pilot valves Inoperative.	Open air cylinder enclosure, remove both VR-370 pilot valves (11), wash in fuel oil, push plunger 3-4 times and return to service.
Low discharge	Low air pressure.	Check air supply pressure; pressure. Should be 100 PSI.
Excessive piston wear	Dirty or scored sleeve.	Clean residual material from sleeve (8), or replace sleeve, if scored.
Grout or fluid leakage around piston.	Excessive clearance between piston and sleeve.	Replace piston cups (10).

TIMING SEQUENCE DIAGRAM
CHEMGROUT AIR POWERED PISTON AND PLUNGER PUMPS

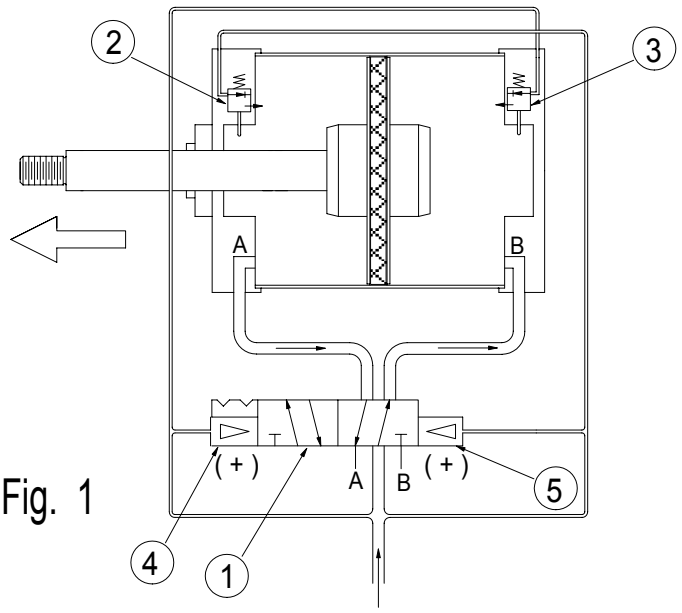


Fig. 1

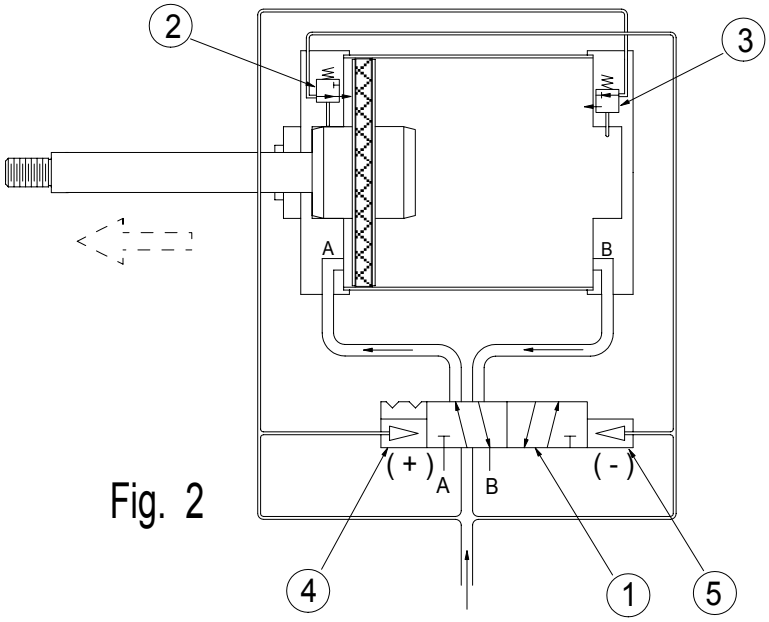


Fig. 2

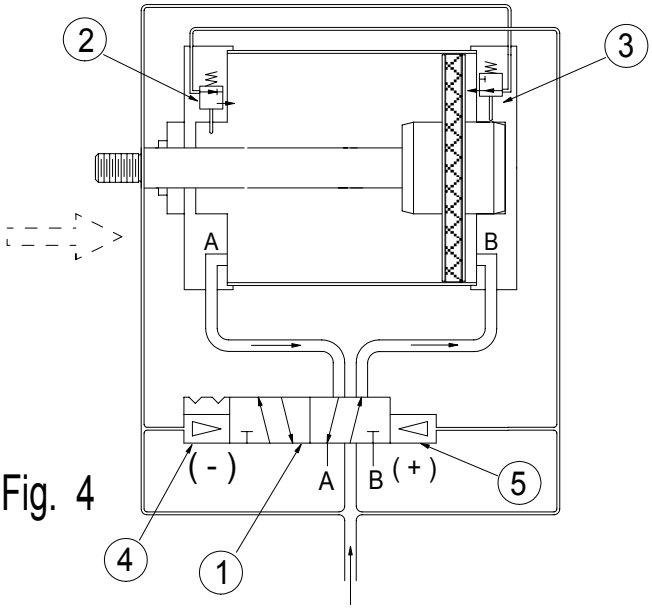


Fig. 4

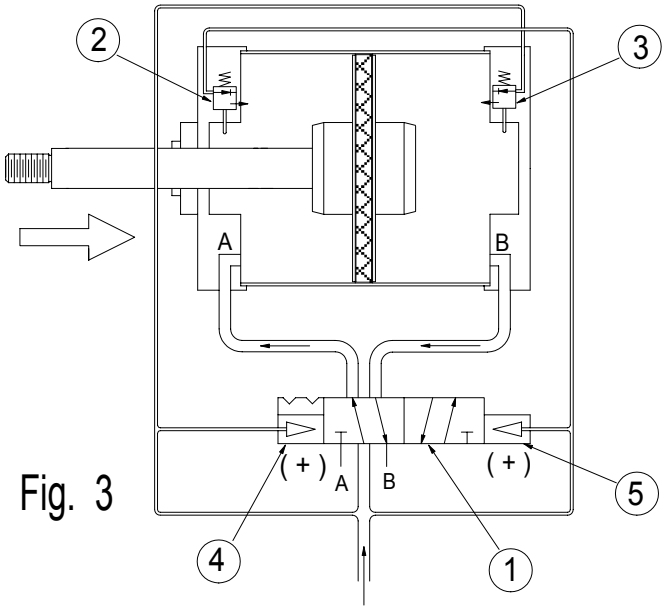


Fig. 3

EXPLANATION OF AIR CYLINDER TIMING SEQUENCE DIAGRAM

VALID FOR CG-050, CG-030 AND ALL AIR DRIVEN HIGH PRESSURE PUMPS

FIGURE 1

In this picture, air is entering the cylinder through Port B, driving the piston forward, while exhaust air is exiting from Port A through the timing valve (1). While in motion, the air pressure at pilot ports (4) and (5) is equal to line air pressure.

FIGURE 2

In Figure 2, the piston has traveled to its fully extended length and engaged poppet valve (2), allowing the escape of a small amount of air from the pilot system. Release of this air has reduced the air pressure at timing valve pilot port (5), resulting in a pressure imbalance, causing the timing valve spool to shift, directing drive air through Port A, reversing direction of piston travel.

FIGURE 3

As the piston rod retracts, air pressure in the pilot system is again equal to line pressure, and exhaust air is expelled from the rear of the cylinder through Port B while drive air is entering the cylinder through Port A.

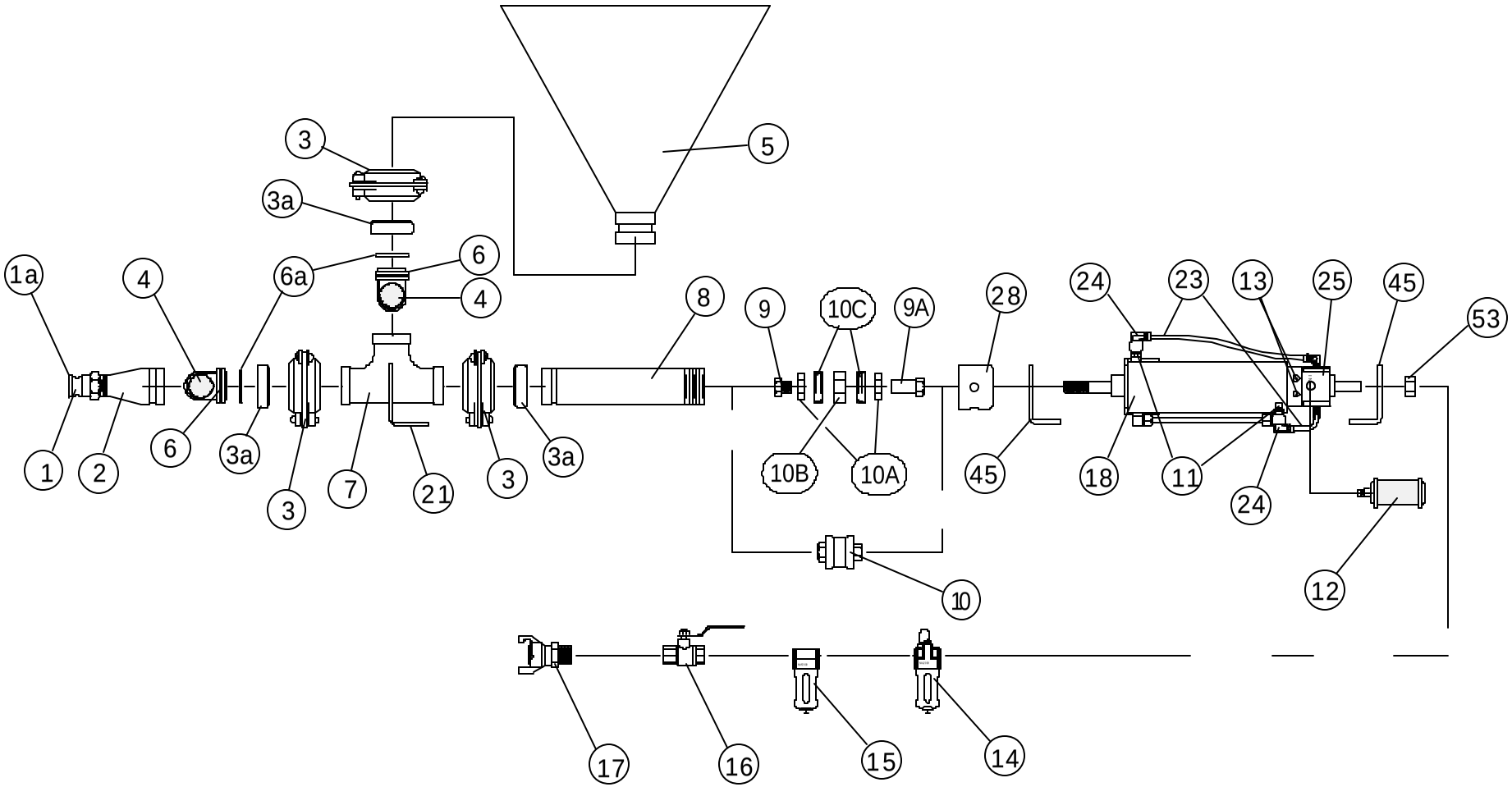
FIGURE 4

The piston has reached its maximum retraction travel and engaged poppet valve (3), resulting in a reduction of air pressure at pilot port (4). This causes the timing valve spool to shift, directing drive air to the cylinder through Port B. The piston is now moving forward again as exhaust air exits the cylinder through Port A.

SECTION 3

DIAGRAM & REPAIR PARTS LIST

CG-050


1a
4
6a
3
3a
6
4
5
8
9
10C
9A
28
24
23
13
25
45
53
1
2
6
3a
3
7
21
3
3a
10B
10A
45
18
11
24
12
10
17
16
15
14

CG-050

REPAIR PARTS LIST

NO.	PART NO.	DESCRIPTION
1	33EV1ABR	1" Part A Evertite
1A	33EV1GASKET	1" Evertite Gasket ***(not shown)***
2	21050REDUCER	Reducer
3	542VICT#78	Coupling ***(includes gasket)***
3A	542VICTGASK	Coupling Gasket
4	21050BALL	Ball
5	21550PHOPP	Hopper ***(80 deg.)***
6	21050BALLSEAT	Ball Seat
6A	21050RING	Ball Seat O-Ring
7	21050TEE	Tee
8	21050SLEEVE	Sleeve
9	243/4-10X3/4BOLT	Bolt
9A	243/4X10CPLGNUT	Machine Rod Coupling
10	07050PIST	CG050 Piston Assy ***(includes 10A, B & C)***
10A	21050PISTBP	Backer Plate
10B	21050PISTSP	Spacer Plate
10C	21050PISTCUP	CG050 Piston Cup ***(2 req'd per unit)***
11	06VR370	VR-370 Valve
12	06M02	Muffler
13	(NONE)	Part No Longer Used
14	06050LUB	Lubricator
15	06050FILTER	Filter
16	841/2BBALL	Air Valve
17	33AM2	Air Coupling
18	06050AIRCYL	Air Cylinder
19	21050ALCOV	Aluminum Box Cover ***(not shown)***
20	06AV316PGVCR	Air Cylinder Seal Kit ***(not shown)***
21	21050TSUP	Tee Support
23	07050AIR	1/4" Hose Set ***(4" & 11")***
24	06AV276VR	90 deg. Brass EL on VR-370
25	06AV303VCR	Shuttle Valve Assembly
28	21050ALCAP	Sleeve Coupling
45	21050CYLBRK	Cylinder Bracket
50	21050BASE	Aluminum Base ***(not shown)***
53	24A314	Rear Mount Nut

**** Complete sets of warning labels are available upon request**

SECTION 4

GROUT SUGGESTIONS

MIXING AND PUMPING SUGGESTIONS

NOTE:
The suggestions offered herein are intended as an aid to help the operator identify some of the factors that need to be taken into consideration when mixing and pumping cementitious grouts. Because a wide variety of materials are available for many different applications, it is incumbent upon the operator to become familiar with the specific characteristics of the material he intends to use.

MATERIALS
Among the commercially manufactured materials available in today's market are materials for structural repairs, floor toppings, high strength non-shrink grouts, manhole and sewer lining mortars and other specialty materials. Each of these materials has unique characteristics, which must be well understood to insure a successful application.

FLOW
In general, most materials need to be of a flowable or pourable consistency for successful pumping. This means that if the material can be poured out of a pail or bucket, it can likely be pumped. The exception to this requirement is repair mortars, which tend to be mixed in a thicker consistency and require special pumping techniques. Materials that contain aggregates pump best and perform best when the consistency is kept to the lower range of pourable; that is, not too wet.

SETTING TIME
Some materials contain accelerating admixtures to reduce the setting time. This is particularly true of repair mortars and other spray applied materials so that strength gain can be fairly rapid. It is important to keep moving when using these types of materials. Once the material is mixed, it must be pumped immediately and kept in motion and subsequent batches must be mixed and pumped as rapidly as possible. Any delays in the application process could result in plugged hoses and equipment. Temperature also has an effect upon these materials to the extent that exposure of the hose to the sun on a hot day will accelerate the set time even more; therefore this should be avoided. It may even be necessary in some cases to cool the material, the mix water, or even the hose itself.

PUMPING DISTANCE
Pumping distances should always be kept to a minimum, and hoses should run as straight as possible no matter what material is being used. Sometimes circumstances require longer than usual hose lengths; when this occurs, every effort should be made to use every advantage possible to insure a successful application. Some materials simply cannot be pumped for long distances, so it's best to know the proposed material characteristics before attempting a production procedure.

GENERAL PROCEDURES

Before attempting to mix and pump production materials, it is prudent to rinse the mixer and charge the pump hopper with sufficient water to thoroughly flush the pump and all grout lines. This is to purge the grouting system of any residual materials or scale that may exist. Once that is completed, remove the grout hose from the pump and drain out all water by elevating one end, or by progressively elevating the entire hose, starting at one end and proceeding to the other.

Next, mix a slurry composed of portland cement in approximate proportions of 6-1/2 to 7-1/2 gallons of water to one bag (94 lbs.) of cement, and pump this through the grouting system. This is to remove any residual water from the hose, lubricating it for the production material to follow. Now the production grout may be mixed and pumped immediately behind the slurry mix, which is thus evacuated from the hose, and may be retrieved in a bucket. Do not attempt to pump production material through a dry hose.

Finally, one last word about procedures. Occasionally, no mater how conscientious an operator may be, a hose will get plugged. Once this happens, the only sure way to remove the plug is to empty it of material. Beating on it with a hammer or running over it with a vehicle will not usually be successful. A prudent operator will be prepared for such eventuality by having readily available a sufficient length of small diameter stiff tubing, hose or plastic pipe to which he can rapidly connect a water source and flush the grout from the hose.

ADDITIONAL SUGGESTIONS

"HOMEMADE" GROUT

Sometimes commercially prepared grouts are not readily available, and in these cases it may be necessary to formulate and produce the material on site. This can be done quite successfully, but certain basic principles must be observed.

The resultant material should exhibit the following characteristics:

A stable suspension of solids that does not separate while at rest.
Color must be predominantly that of the cement used.
Fluid enough to pour from a container but not too wet. (Thick batter consistency or thicker)

CEMENT

There are several types of Portland cements manufactured to satisfy a variety of specific requirements, such as high early strength, sulfate resistance and other needs. The most common of these is Type I Portland, and is that which is most frequently used in the production of cementitious grout.

WATER

In most instances, the water to be used for the production of grout should be clean and free of sulfates or other dissolved chemicals. If available, potable water is ideal. Since the water to cement ratio is the most important factor in the quality of the material in its final state, the water content should be kept to the minimum that will produce materials with the characteristics listed above.

ADMIXTURES

Admixtures are available to modify and enhance the grout mixture. These include plasticizers, water reducing agents, expansive agents, anti-washout ingredients, set time modifiers and others. Each of these admixtures are designed to impart specific properties to the grout. If used at all, they should be used only with a full understanding of their effects, and only according to the manufacturers' recommendations.

FLYASH

In some parts of the country, flyash (a byproduct of coal burning power stations) is available. This material has often been used to enhance the properties of cementitious grouts or, in some cases to reduce the cement fraction. Use of this material should be approached with CAUTION, since ash from some sources have, in recent years, been observed to cause FLASH SET in grout mixes. If the use of this product is anticipated, trial mixes should be made to prove their applicability.

SAND

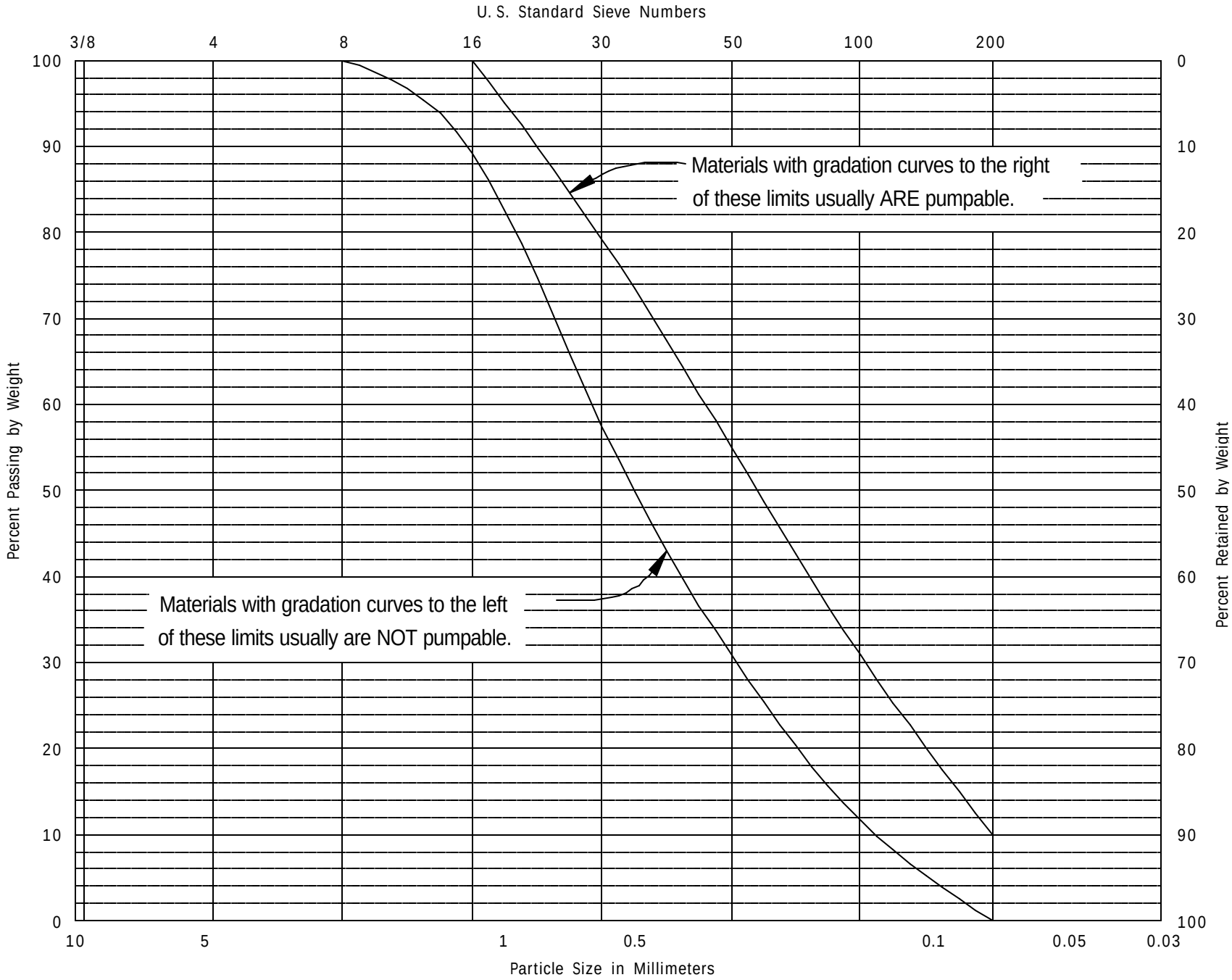
Sand is often used in grout formulations either to increase the volume of the material, thus reducing the cost, or to act as an aggregate in the case of high-strength structural grouts. If the use of sand is anticipated, several factors must be considered such as the shape, size and gradation of the sand to be used. In general, the sand should be clean, well graded and of rounded, natural shape. Angular particles such as those found in manufactured sands should be avoided.

Of all of the considerations when anticipating the use of sand in a grout mixture intended to be pumped, one of the most important is gradation. Gradation of a sand sample is determined by a sieve analysis, which reveals the percentages of each individual particle size of which the sand is composed. Laboratory tests and field experience shows that some sand gradations will pump better than others, and some will pump only with difficulty, if at all. Sample sieve analysis data is offered herein as a guide to choosing sand that has a good chance of producing a strong, pumpable grout mix.

Another factor to take into consideration when choosing a sanded grout over a slurry grout is the volume, or amount of sand that can be used in the mix. This will vary as a function of the gradation, but in general will usually be in the proportion of 1-1/2 to 2 times the cement content by VOLUME. In rare cases, it may be possible to exceed this proportion, but caution should be exercised.

Grouting Sand Gradation Specifications

Sieve Size	% Passing
#8	100
#16	90-100
#30	55-80
#50	30-55
#100	10-30
#200	0-10


U. S. Standard Sieve Numbers
3/8
4
8
16
30
50
100
200
100
90
80
70
60
50
40
30
20
10
0
Percent Passing by Weight
Percent Retained by Weight
Materials with gradation curves to the right
of these limits usually ARE pumpable.
Materials with gradation curves to the left
of these limits usually are NOT pumpable.
10
5
1
0.5
0.1
0.05
0.03
Particle Size in Millimeters

SECTION 5

ACCESSORIES

OPTIONAL ACCESSORIES

Part No.	Description
03050REMOTE	REMOTE CONTROL
03050CONVKIT	CONVERTS 050 INTO 550P
32GRT1X12.5	GROUT HOSE 1" X 12.5'
32GRT1X25	GROUT HOSE 1" X 25'
32GRT1X50	GROUT HOSE 1" X 50'
33EV1ABR	MALE HOSE END (1" PART A)
33EV1DBR	FEMALE HOSE END (1" PART A)
03SPRAYER	SPRAY WAND