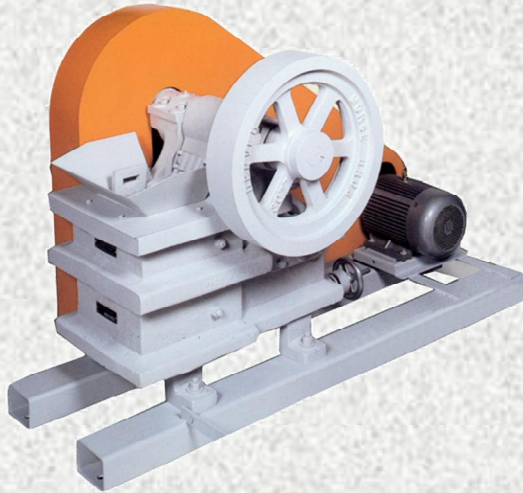


SAMPLE PREPARATION EQUIPMENT



October, 2014

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Sample Preparation and Sampling Methods Are More Important Than The Actual Assay.

Perhaps many would argue with the above statement, but many more, such as the Father of Modern Sampling, Pierre Gy, and a host of metallurgical engineers and mine operators have presented plenty of conclusive evidence as to why the above statement is valid. There are hundreds of case study papers published that document the importance of sampling, and the process of preparing the sample, which will result in the few grams to be assayed.

When a few grams of material are going to represent many thousands of tons of ore, and the valuable mineral(s) they hold, it is easy to understand the importance of using scientific methods that are as accurate as conditions allow, to obtain the few grams for the actual assay ore. Many large companies have opted for the robotic, computer controlled assay lab, where human intervention is minimized as a solution. However these complex and expensive labs have their own built in errors, such as the ability to clean out disk pulverizers between samples, often leaving caked remnants of previous ores for the next batch, resulting in some degree of cross contamination.

It is very possible for a manual, human operated assay lab to be more accurate than these robotic labs, because humans can recognize potential problems and react to them, whether they are “programmed” to look for them or not.

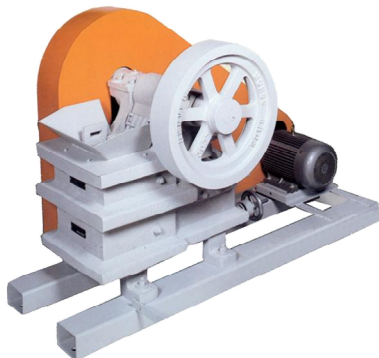
It is critical that methods used to reduce the ore to those few grams be as accurate as possible, and equipment is available that will assist in doing this, in many cases. For instance, cone and quartering is the “old” method for splitting a large sample. Cone and quartering induces a margin of error of 19.2%. ¹ Starting off with a 19.2% error is not the best game plan for more accurate assays.

The Rotary Sample splitter has a margin of error of 0.1% ¹, and is capable of splitting large bulk samples of –1/4” ore. Sepor can make these machines as large as necessary to accommodate assay labs, and we have done so on many occasions. This simple changing of the equipment/methods used in splitting large samples for the lab can eliminate 19% error in the assay actually being representative. Further, since a riffle splitter is usually involved in reducing the final cut from the bulk sample to the one actually assayed, there is a more precise riffle splitter that should be used. A precision riffle splitter has a margin of error of 2.7% vs. a typical Jones riffle splitter’s error margin of 3.7%¹. So, by utilizing these two methods in the sample preparation procedure would eliminate 20% of the margin of error, and combined with the assay lab’s experienced personal knowledge, mean that a human operated assay lab could be more accurate than a robotic assay lab. It is the combination of human experience and the ability to intervene when something is noticeably errant, and utilizing the most appropriate and accurate equipment that will make the difference in a most positive way.

¹ - AA Khan—Critical Evaluation of Powder Sampling Procedures



JAW CRUSHERS



At left, Metso's Morse Brothers 5 x 6 Lab Jaw Crusher. The M/B series includes the 8 x 8, which will reduce -6" material to -1/4", the 5 x 6, which will reduce -4" material to -1/4", the 4 x 6, which will reduce -3" material to -1/4" and the 2 1/4 x 3 1/2, which will reduce -1 1/2" material to -1/4". If large particle sized samples make their way to a lab, the 8 x 8 is a popular machine to reduce them to -1/4". The 8 x 8 and the 5 x 6 have found many uses on pilot plants, also, as their rugged construction make them suitable for 16 plus hours a day utilization.



At left is the Badger 5 x 7, which will reduce -4" material to -1/8", many times eliminating the requirement for a crusher such as a cone or roll crusher, to reduce ore to -1/8" prior to fine grinding. While the Badger is a good lab crusher, it is not rugged enough for pilot plant use, in many instances.



At left, is the Chipmunk lab jaw crusher. It comes in two versions, the smaller VD version, which is 2 1/4 x 3, and will reduce -1.5" ore to -1/8". The other Chipmunk is the slightly larger WD, which is 2 3/4 x 4 and will reduce -2" ore to -1/8". These are suitable for labs that do not have much ore larger than 1 1/2".



The Mini Jaw Crusher, at left, has a 2 x 2 jaw opening and is suitable for reducing -1" ore to -10 mesh. As its name might indicate, it is for small quantities, and has a maximum capacity of 20 pounds per hour. It, however can come with either steel, ceramic or tungsten carbide jaw and cheek plates, for maximum reduction of contamination of samples, when necessary.

CATALOG NUMBER	MODEL	JAW OPENING (In.)	MOTOR (HP)	CAPACITY (Lbs./Hr.)	DIM. LxWxH (In)	SHIP Wt. (Lbs)
010A-021	MINI	2 x 2	0.5	20	10x10x20	45
010A-002	VD	2.25 x 3	2	400	32x19x23	390
010A-003	VD	2.25 x 4	3	800	36x22x29	650
010A-004	WD	2.38 x 4	3	800	36x22x29	660
010A-030	BADGER	5 x 7	5	1000-1500	24x32x20	700
010A-019	M/B	2.5 x 3.5	1	500	24x16x18	400
010A-020	M/B	4 x 6	3	400-1200	42x24x24	650
010A-015	M/B	5 x 6	5	1000-2500	54x30x38	1650
010A-016	M/B	8 x 8	10	1500-4000	73x39x48	4650



Secondary Crushers, Roll Crushers, Cone Crushers



These Marcy Dual Rolls Crushers are available in two sizes. The 6.5 x 6 is ideally suited for a lab where space is a concern. The larger 9 x 12 can also be used in pilot plant operation, as well as laboratories. They are fabricated steel with tilting hopper for easy clean-up with safety cut-off when hopper is lifted. Mounted on steel base. Simple roll adjustment. Designed for intermediate crushing of friable materials to -10 mesh. Especially recommended for lab use and where initial cost is a primary concern. Dual roll crushers generally have a maximum crushing ratio of 4:1. If a 0.75" particle is fed to it, the maximum reduction would be to 0.188".



The 10 x 6 roll crushers is suited for lab or pilot plant use. It is constructed with a one piece heavy welded steel frame and utilizes rubber bumpers to absorb shock from the rolls, instead of springs. Like all roll crushers, the roll spacing and product size is set by turning a hand wheel, which exerts force against the moveable saddle, in which the rolls are mounted. Thereby increasing or decreasing the space between the rolls.

CATALOG NUMBER	SIZE (ROLL DIA X LENGTH) (In.)	CAPACITY (Lbs./Hr.)	DIMENSIONS L x W x H (In.)	SHIP WEIGHT (Lbs.)
010C-005	6.5 X 6	3000	30 x 40 x 60	650
010C-007	9 X 12	8000	48 x 60 x 80	1600
010C-001	12 X 12	7500	60 x 48 x 40	3500
010C-003	8 X 5	500	22 x 29 x 22	900
010C-009	10 X 6	4000	39 x 32 x 38	1700

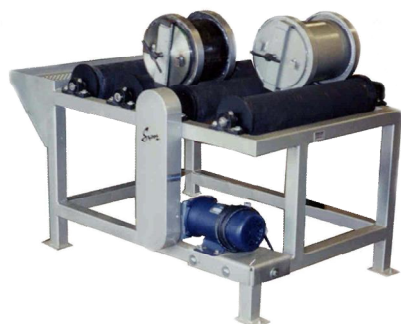


These durable, Marcy Gy-Roll Crushers are available in 6" and 10", and are capable of reducing 0.5" feed to 10 mesh in a single pass by choke or free feeding. Due to the gearless design, operation is quiet and overheating is minimal. The threaded top provides an accurate method of adjusting the crusher for desired particle size, while easy access to the grinding surfaces facilitates complete cleaning between operations. Concave and mantel wear plates are made of cast manganese steel. Under no load, the head is designed to idle and thereby extend thrust bearing life.

CATALOG NUMBER	HOPPER DIA. (In.)	MOTOR (HP)	CAPACITY (Lbs./Hr.)	DIMS. (In.)	Ship Wt. (Lbs.)
010B-001	6	0.5	250	23x15x21	250
010B-002	10	2	500	30x20x20	600



Fine Grinding, Pulverizing



These 5 inch diameter roll jar drives are widely used in metallurgical laboratories for grinding, cyanidation, amalgamation, mixing and other conditioning. Designed to roll the Sepor Batch Ball/Rod Mills as well as other containers up to 5 gallons in volume. 5"D x 24"L rubber covered rolls, set on 10" centers, are lathe cut to promote central rotation and minimize migration. The tubular steel frame has a rack with liquid-tight sides and a perforated discharge grate. The grate retains the grinding media while allowing the product to fall into the receiving drawer below. The underside of the grate is equipped with drip flanges to prevent sample loss. The rolls can be driven at any incremental speed, between 40 and 230 RPM, by a 0.5 HP DC motor with an SCR motor controller.



The batch ball and rod mill are identical. They are designed to be companion equipment to the SEPOR drive rolls, these durable containers will grind from 1000 to 2500 gram charges. Heavy duty construction, including machined rolling rings, a quick-threaded removable yoke, a urethane gasketed lid with handles, and interior lifter bars. The mills are available in mild steel, lined mild steel, and stainless steel constructions.

5 INCH JAR DRIVES

CATALOG NUMBER	No. OF ROLLS	SHIP WT. (Lbs.)	DIMENSIONS L x W x H (In.)
010E-001	2	250	43 x 33 x 30
010E-002	3	300	43 x 33 x 30
010E-003	4	350	54 x 33 x 30

STEEL BALL/ROD MILL CHARGE

CATALOG NUMBER	DESCRIPTION
010E-015	CARBON STEEL BALL MILL CHARGE, 20 Lbs.
010E-016	STAINLESS STEEL BALL MILL CHARGE, 20 Lbs.
010E-098	CARBON STEEL ROD MILL CHARGE, 20 Lbs.
010E-099	STAINLESS STEEL ROD MILL CHARGE, 20 Lbs.

STEEL GRINDING JARS

CATALOG NUMBER	DESCRIPTION	INTERIOR DIMENSIONS L x W x H (In.)	OVERALL DIMS. L X W X H (In.)	WEIGHT (Lbs)
010E-007	CARBON STEEL BALL.ROD MILL	8 X 9.75	10.5 X 14.75	40
010E-008	CARBON STEEL BALL.ROD MILL	8 X 9.75	10.5 X 14.75	40
010E-011	URETHANE LINED ROD/BALL MILL	7.5 X 9	10.5 X 14.5	49
010E-012	URETHANE LINED ROD/BALL MILL	7.5 X 9	10.5 X 14.5	49
010E-013	STAINLESS STEEL BALL.ROD MILL	8 X 9.75	10.5 X 14.75	40
010E-014	STAINLESS STEEL BALL.ROD MILL	8 X 9.75	10.5 X 14.75	40
010E-010	ADDITIONAL RUBBER MILL GASKETS			0.1



Fine Grinding, Pulverizing



A 2 Tier, 2" Diameter by 24"
Long Roll Drive

These continuous duty jar drives are used for batch wet or dry grinding. This series of roll drives are also suited for bottle leaching of ores, as the rolls may be moved closer or farther apart to accommodate differing sizes of bottles for leaching tests. Roll spacing is adjustable to accommodate jar sizes of 2" to 15" diameter. Variable speed DC drive for an output range of 20 to 345 Roller RPM; thus an 8" diameter. Water tight electrical system and totally enclosed gear motor. Available in 115 V/ 1Ph/60 Hz or 230 V/1Ph/50 Hz. All models have free wheeling jar stops. Optional accessories include: Revolution counters, automatic timers. Constructed of highest quality materials, superior to most units now offered. These mill drives are built to last with very little maintenance and can drive heavy, fully charged mills with ease.

CATALOG NUMBER	NO. TIERS	MAX. NO. JARS	ROLL LENGTH (In.)	MOTOR HP	DIMENSIONS L X W X H (In.)	SHIP WT. (Lbs.)
010E-027	1	1	13	0.25	20x14x15	70
010E-029	2	2	13	0.25	22x14x28	130
010E-030	3	3	13	0.33	22x14x42	155
010E-028	1	2	24	0.25	30x15x15	90
010E-031	2	4	24	0.5	32x14x28	205
010E-032	3	6	24	0.75	32x14x42	255
010E-033	1	4	48	0.5	56x14x18	300
010E-035	2	8	48	0.75	56x14x30	460
010E-037	3	12	48	1	56x14x45	630
010E-034	1	6	72	0.75	80x14x18	385
010E-036	2	12	72	1	80x14x30	610
010E-038	2 with 3 Rolls/Tier	24	72	1.5	84x24x43	640



15 x 21 Batch Ball Mill

For larger batch grinding, 50 to 120 pounds of ore, the SEPOR 15 x 21 Batch Ball Mill is suitable for this task. It is constructed of 316 stainless steel (wetted parts).. It has a discharge port with ball retainer plate and a clean-out/feed port opposite from the discharge port. May be used for wet or dry grinding. Operates at 70% of critical speed. Includes motor, gear reducer, lifter bars belt drive with guards, a start/stop control box with a jog button for positioning of the mill for loading, discharge and clean out.

CATALOG NUMBER	MILL SIZE (DIA. X L) In.	MOTOR HP
010E-200	8 x 24	0.5
010E-201	15 x 21	0.5
010E-202	24 x 36	10



Fine Grinding, Pulverizing



The Thor Mill

A favorite fine grinding machine for Assay Labs is the THOR rotary cup mill. It is ideal for grinding 1.2 Kg samples of any friable material. The mill will grind - 1/4" particle size to -325 mesh in a few minutes. The large capacity grinding sets utilize the bowl and a puck to rapidly reduce the samples to the desired particle size. A control timer may be set to between 0-5 minutes, for reproducible results on similar materials. A pneumatic bowl clamping device is used for easy, secure clamping of grinding sets in the mill. Grinding sets are available in a hard (70 RC) chrome steel in a variety of capacities. Capacities are in grams, based on a material density of 2.4. Higher density material will have a slightly higher capacity. Areas of applicability include gold, copper ores, minerals, ore, cement, rock, soil, and similar materials. During operation, the insulated cabinet is sealed for reduced noise, <80dB. Supplied complete with a 400 to 600 gm or a 1,000 gm to 1,200 gm capacity chrome steel grinding set and a magnetic starting switch.

Motor is 1 HP, for 230 v/3Ph/60hz or 380 V/3 Ph/50 Hz. Shipping Dim: 43"W x 28"D x 53"H. SW: 750 lbs.



1.2 Kg Grinding Set for
The Thor Mill

CATALOG NUMBER	DESCRIPTION
010G-150	Thor Mill, 230 V/3 Ph/60 Hz
010G-151	Thor Mill, 380 V/3 Ph/50 Hz
010G-153	600 Gram Chrome Steel Grinding Set
010G-154	1200 Gram Chrome Steel Grinding Set



UA Pulverizer

The UA disc pulverizers are suitable for grinding ore to -100 mesh at a rate of up to 100 pounds (45 Kg.) per hour. Ore previously crushed to -0.25" is reduced to desired mesh in a single operation. Quartz of Mohs hardness 7 has been reduced to 100 mesh at a rate of 60 lbs/ hr. The method of operation is a revolving 8" dia. grooved plate rotating against a grooved stationary plate to produce the grinding action. The material is fed through a spout in the door and passes into the grinding chamber through an opening in the center of the stationary plate. The small space which separates the plates determines the product fineness and is adjustable by means of a screw at the end of the shaft. Finished product falls through the plate spacing into the pan below. Constructed with a high tensile cast iron frame and an alloy steel shaft. All parts are easily accessible for cleaning. Disc plates can be changed in a few minutes and are available in a variety of materials to control wear and contamination. One set of standard grinding plates is supplied with each pulverizer. The UA model is belt driven and supplied with motor, motor mount, magnetic starter with overload protection, V-belts, and special grooved pulley.

CATALOG NUMBER	DESCRIPTION	DIMENSIONS (In.)	SHIP WT. (Lbs.)
010F-003	UA, 3 HP	38 x 33 x 16(H)	430



Reducing Primary Sample Size For Analysis



Sepor's 24 Inch Rotary Sample Splitter

Often called a spinning riffler, rotary sample splitters are the most accurate method of extracting representative samples from dry granular or powdered material. It consists of a turn table having removable sample containers passing thru a cascading flow from a vibrating tray fed from a materials hopper. Made in two different models to accommodate 12 or 24 stainless steel sample containers. The sample containers are self-aligning and interlocking, which allows fast assembly and clean-up between charges.

Both the rotating table and the vibrating feeder have SCR controlled variable speed controls. Table rotation speeds of 10-20 RPM is recommended. Hopper capacities are 1.2 for the 24" diameter table splitter and 2.4 cu. ft. for the larger 48" diameter table splitter. Split samples are representative and can be combined to yield the size sample needed. For particles from powder to 1/2". Comes complete, ready to operate on delivery. The frame is mounted on locking casters for easy mobility.

CATALOG NUMBER	DESCRIPTION	NUMBER OF CONTAINERS	DIMENSIONS, L x W x H (In.)	WEIGHT (Lbs.)
040J-001	24 Inch Rotary Splitter	12	25 x 40 x 53	240
040J-002	48 Inch Rotary Splitter	24	49 x 60 x 52	440



Sepor's 1/2" x 16 Chute Precision Splitter

The Sepor Precision Riffle Splitter (Jones Type) is also known as a riffler or riffle splitter. It is precisely designed to reduce the bulk of material to a convenient representative size for laboratory analysis. When used properly, it provides an accuracy that is recognized throughout the industry.

A riffle splitter with a hopper a feed gate at the bottom of the hopper is called a precision splitter. By eliminating the potential bias resulting from differing pouring motions, a increased accuracy of up to 1% is achieved. A standard Jones riffle splitter has a error margin of 3.7%. A Precision Riffle Splitter is around 2.7%, by eliminating pouring induced error.

CATALOG NUMBER	DESCRIPTION	HOPPER VOL- UME (IN ³)	SHIP WEIGHT (Lbs.)
040G-005	1/4", 12 Chute Precision Splitter	160	20
040G-006	1/2", 16 Chute Precision Splitter	150	20
040G-007	3/8", 22 Chute Precision Splitter	160	20
040G-008	Aluminum pan for 040G-005, 006, 007	NA	2
040G-009	1/4", 64 Chute Precision Splitter	325	30
040G-010	1/2", 32 Chute Precision Splitter	315	30
040G-011	3/8", 44 Chute Precision Splitter	325	30
040G-012	SS Pan for 040G-009, 040G-011	NA	10
040G-013	SS Pan for 040G-010	NA	10



Classifying Samples For Particle Size Analysis



RoTap With 8" Sieves

The Tyler RoTap is the preeminent sieve machine for classification of ore in laboratories and it meets all ASTM, Government, and Industrial specifications. It will fit 14 half-height 8" diameter sieves. Featuring: enclosed driving mechanism, meets OSHA standards, virtually maintenance free, vertical mounted motor, new adjustment plate support for easier sieve handling, smaller area and easier to anchor (2 bolts), built-in 30 minute digital timer, and adjustable leveling feet. A version is available for 12" sieves, that has a kit to convert the 12" RoTap for use with 8" sieves.

CATALOG NUMBER	DESCIPTION	SHIPPING WT. (Lbs.)
040B-010	RoTap, 8", 110 - 220 V/1 Ph/60 Hz	220
040B-011	RoTap, 8", 220 V/1 Ph/50 Hz	220
040B-012	RoTap, 12", 110 - 220 V/1 Ph/60 Hz	300
040B-013	RoTap, 12", 220 V/1 Ph/50 Hz	300
040B-015	RoTap Wet Sieving Kit	20
040B-015	RoTap Sound Enclosure	120



The SEPOR Wet-Dry Sieve Shaker is a lightweight cast aluminum, electrically operated portable sieve shaker is designed for use with one or two 8" diameter full-height or four half-height testing sieves. Used for wet or dry screening of solid particles. When placed over a bucket or sink, the unit provides the necessary shaking motion and frees the operator from a fatiguing task. The sieve shaker has the advantage of being portable for making dry gross separations and is convenient in making wet separations.

The sieves are held firmly in place by a friction fit of the sieve's nesting ring, so a pan having a nesting ring can be used in lieu of one sieve. All PVC coated, 115v/60hz for intermittent duty, 3 wire cord and plug, on-off switch, and a neoprene wet- protective motor cap. An optional 5-gallon bucket has three notches cut to accommodate the sieve shaker. It is convenient to use as a platform and to save the fines discharge in wet or dry sieving.

CATALOG NUMBER	DESCIPTION	SHIPPING WT. (Lbs.)
040B-001	Sepor Wet Dry Sieve Shaker, 110 V/1 Ph/60 Hz	20
040B-002	Electrical kit for operation on 220 V/50 or 60 Hz	2
040B-003	Additional neoprene motor cap	1
040B-007	Notched 5 gallon bucket for use with sieve shaker	7



Classifying Samples For Particle Size Analysis

All sieves below are WS Tyler manufactured, 8 inch diameter (20.32 cm), full height, 2 " (5.08 cm), with stainless steel frames and stainless steel cloth. They meet US (ASTM) and international (ISO) standards for laboratory sieves. Sieve sizes below, including mesh designation, is US Standard.

CATALOG NUMBER	Description	Opening Microns
040A-805-.25"	1/4"OPG SIEVE	6300
040A-805-3.5"	3-1/2 Mesh SIEVE	5600
040A-805-4	4 Mesh SIEVE	4750
040A-805-5	5 Mesh SIEVE	4000
040A-805-6	6 Mesh SIEVE	3360
040A-805-7	7 Mesh SIEVE	2830
040A-805-8	8 Mesh SIEVE	2360
040A-805-10	10 Mesh SIEVE	2000
040A-805-12	12 Mesh SIEVE	1700
040A-805-14	14 Mesh SIEVE	1400
040A-805-16	16 Mesh SIEVE	1180
040A-805-18	18 Mesh SIEVE	1000
040A-805-20	20 Mesh SIEVE	850
040A-805-25	25 Mesh SIEVE	710
040A-805-30	30 Mesh SIEVE	600
040A-805-35	35 Mesh SIEVE	500
040A-805-40	40 Mesh SIEVE	425
040A-805-45	45 Mesh SIEVE	325
040A-805-50	50 Mesh SIEVE	300
040A-805-60	60 Mesh SIEVE	250
040A-805-70	70 Mesh SIEVE	212
040A-805-80	80 Mesh SIEVE	180
040A-805-100	100 Mesh SIEVE	150
040A-805-120	120 Mesh SIEVE	125
040A-805-140	140 Mesh SIEVE	106
040A-805-170	170 Mesh SIEVE	90
040A-805-200	200 Mesh SIEVE	75
040A-805-230	230 Mesh SIEVE	63
040A-805-270	270 Mesh SIEVE	53
040A-805-325	325 Mesh SIEVE	45
040A-805-400	400 Mesh SIEVE	37
040A-805-500	500 Mesh SIEVE	32
040A-805-450	450 Mesh SIEVE	25
040A-805-635	635 Mesh SIEVE	20
040A-805-PAN	8"-Full Height PAN	NA
040A-805-HHPAN	8"-Half Height PAN	NA
040A-805-XPAN	8"-Full Height PAN-W/ SKT	NA
040A-805-HXPAN4	8"-Half Height PAN-W/ SKT	NA
040A-805-CVR	8" COVER-W/RING	NA



CATALOG NUMBER	Description	OPENING (mm)
040A-805-4"	4" OPG. SIEVE	100.0
040A-805-3.5"	3-1/2"OPG SIEVE	90.0
040A-805-3"	3.00"OPG SIEVE	75.0
040A-805-2.5"	2-1/2"OPG SIEVE	63.0
040A-805-2"	2.00"OPG SIEVE	50.0
040A-805-1.75"	1-3/4"OPG SIEVE	45.0
040A-805-1.5"	1-1/2"OPG SIEVE	37.5
040A-805-1.25"	1-1/4"OPG SIEVE	31.5
040A-805-1.06"	1.06"OPG SIEVE	26.5
040A-805-1"	1.00"OPG SIEVE	25.0
040A-805-/875"	7/8"OPG SIEVE	22.0
040A-805-.75"	3/4"OPG SIEVE	19.0
040A-805-.625"	5/8"OPG SIEVE	16.0
040A-805-.53"	.530"OPG SIEVE	13.2
040A-805-.5"	1/2"OPG SIEVE	12.5
040A-805-.4375"	7/16"OPG SIEVE	11.2
040A-805-.375"	3/8"OPG SIEVE	9.5
040A-805-.3125"	5/16"OPG SIEVE	8.0
040A-805-.265"	.265"OPG SIEVE	6.7

