SUPERIOR INDUSTRIES

FIELD GUIDE

QUICK REFERENCE GUIDE
TO IMPROVE YOUR
AGGREGATE OPERATION

SUPERIOR®

SUPERIOR'S POCKET FIELD GUIDE

This field guide was compiled for the benefit of all those involved in the set-up, deployment, and operation of Superior Industries products. When carefully read, and suggested operating and service procedures applied, the information contained within this field guide can save valuable time and eliminate broad assumptions.

A careful study by everyone operating on the equipment should be made of this field guide to familiarize yourself with the capabilities and design features of the product before it is placed in operation. It contains guidance information for safe, optimal and economical use of the equipment. Follow these suggestions to avert possible hazards, cut repair costs and the number of failures, increase the equipment's reliability and prolong its service life.

The data contained within this field guide should be implemented within the confines of local safety and environmental protection regulations. In addition, the generally accepted technical rules governing safety in the workplace should be followed. A copy of the owner's manual should always be available near the equipment.

Superior Industries reserves the right to discontinue it's models at any time and change the specification or drawings, without notice or any obligation.

Should you have any questions regarding the equipment or this publication, please contact Superior Industries.

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TABLE OF CONTENTS

TABLE OF CONTENTS

SUPERIOR LOCATIONS

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CRUSHING
STAGES OF CRUSHING

Rock crushing needs to be done in stages, as there is no "one" crusher that can reduce the size of shot rock or large river gravel into product size materials. As a general rule of thumb, the more stringent the specifications the more crushing stages required.

FOUR STAGES OF AGGREGATE PROCESSING

- Primary
- Secondary
- Tertiary
- Quaternary

Primary Stage simply sizes the material down for another stage.

Typical crushers in this stage are: Gyratory Crusher, Jaw Crusher, HSI

Secondary Stage is used to further reduce material as it advances in the crushing circuit from the primary stage and will likely be in an open circuit set up if there is another crusher in the circuit. This stage is usually used to create material over 1".

Typical crushers in this stage are: Cone Crusher (Standard liners), HSI

Tertiary Stage is used to further material reduction as it advances in the crushing circuit from the secondary stage. Will likely be in a closed circuit set up. This stage is usually is used to create material in the 1" x3/8" size.

Typical crushers in this stage are: Cone Crusher (Short Head liners), VSI

Quaternary Stage is used to further material as it advances in the crushing circuit from the tertiary stage. This stage is likely used to shape material. You're usually producing a manufactured sand.

Typical crushers in this stage are: Cone Crusher (SH liners), VSI

TYPES OF CRUSHERS

Compression Crushers - Reduce material as it advances down through the crushing chamber by means of squeezing (compression) the material between a moving piece of steel and a stationary piece of steel.

- **Jaw** - 6:1 to 8:1 reduction ratio. Can handle shot rock, gravel, limestone and granite to basalt.
- **Cone** - 4:1 to 6:1 reduction ratio. Short head cones used in tertiary applications. Standard head in secondary, tertiary and quaternary applications.

Impact Crushers -Use the theory of mass and velocity to reduce the feed material. Generally speaking the faster the speed of the crusher, the finer the output.

- **Horizontal Shaft Impactor (HSI)** – Primary and secondary impact crushers that are used to process a high tonnage of material, provide excellent control over particle shape and size and accept nearly any kind of material—including recycle feed.
- **Vertical Shaft Impactor (VSI)** - Material is crushed by its impact with other rock, impeller shoes and further broken as it impact the anvils. The incoming material is accelerated via a rotor and then is impacted against other feed material or anvils.

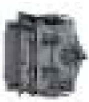
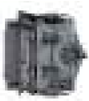
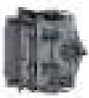
BEST PRACTICES

- Maximize tons per hour within the processing circuit
- Consistently operate all equipment at max design capacity
- Make sizes you need with the production circuit
- Avoid re-handling of finished size materials

PRODUCT SHAPE - Cubical is desired.

- Better particle interlocking
- Uses less oil in asphalt and less water/cement in concrete
- Promotes better pumpabilty in concrete
- Improves strength in asphalt and concrete

SELECTION GUIDE
BASED ON FINAL PRODUCT SIZE

15" - 5" (380 - 125mm)	5" - 1 ½" (125 - 40mm)	1 ½" - ½" (40 - 12.7mm)	$^{3}/_{8}$" - #6 (9.75 -3mm)	Minus #8 (-2mm)
 JAW CRUSHER	 SECONDARY CONE	 TERTIARY CONE	 TERTIARY CONE	 ROR VSI
 PRIMARY IMPACTOR	 SECONDARY IMPACTOR	 SECONDARY IMPACTOR	 ROS VSI	
	 SOS VSI	 SOS VSI	 ROR VSI	

REDUCTION RATIOS

REDUCTION RATIO

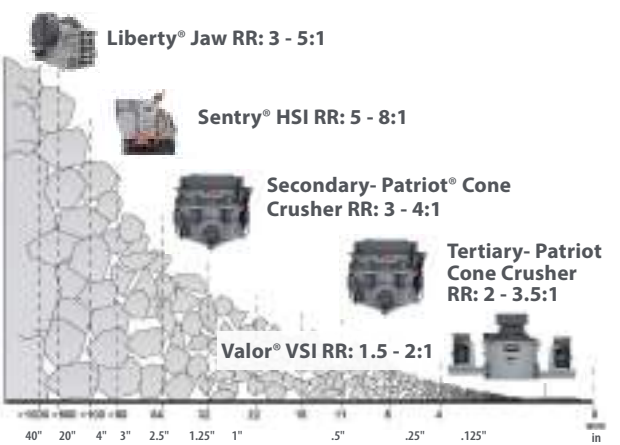
The total reduction from feed to products. Reduction ratios help to determine the number of crushing stages required to make the finish product(s).

Rock type also affects the reduction ratio that is achievable, the harder the rock the lower the reduction ratio.

Guideline = 20% target in closed-circuit applications

CRUSHER	RR (P80)
Jaw Crusher	3 - 5
Horizontal Shaft Impactor	5 - 8
Secondary Cone Crusher	3 - 4
Tertiary Cone Crusher	2 - 3.5
Vertical Shaft Impactor (ROR)	1.5 - 2
Vertical Shaft Impactor (ROS)	1.5 - 3

REDUCTION RATIO RECOMMENDATIONS



SELECTING A CRUSHER BASED ON MATERIAL ABRASION

100% - 75% Silica		75% - 35% Silica		35% - 0% Silica	
JAW CRUSHER	SECONDARY CONE	JAW CRUSHER	SECONDARY	JAW CRUSHER	SECONDARY
TERTIARY CONE	ROR VSI	TERTIARY CONE	ROR VSI	TERTIARY CONE	ROR IMPACTOR
		ROS VSI		ROS VSI	SOS IMPACTOR
				PRIMARY IMPACTOR	SECONDARY IMPACTOR

CRUSHING APPLICATIONS

COMPRESSION CRUSHING

Compression crushers reduce material as it advances down through the crushing chamber by means of squeezing the material (compression) between a moving piece of steel and a stationary piece of steel.

- **Gyratory** - Capable of creating high compressive force to crush larger and very abrasive material.
- **Jaw** - 3:1 to 5:1 reduction ratio. Can handle shot rock, gravel, limestone and granite to basalt.
- **Cone** - 3:1 to 4:1 reduction ratio. Short head cones used in tertiary applications. Standard head in secondary, tertiary and quaternary applications.
- **Roll** - Uses a combination of impact, shear, and compression forces to crush and create required size reduction. Produces fine grinding. Typical feed materials include: bauxite, cement clinker, chalk, cinders, clay, coal, glass, gypsum, limestone, burnt lime, rock salt, sandstone, shale, sulfur ore, sea shells, and sewer sludge clinker.

CRUSHING APPLICATIONS

IMPACT CRUSHING

Impact crushers use the theory of mass and velocity to reduce the feed material. Generally speaking the faster the speed of the crusher, the finer the output.

- **Horizontal Shaft Impactors (HSI)** – Primary and secondary impact crushers used to process a high tonnage of material, provide excellent control over particle shape and size and accept nearly any kind of material—including recycle feed.
- **Vertical Shaft Impactors (VSI)** - Material is fed into the crusher rotor or table and thrown outwards against stationary anvils or a rock lined shelf to reduce particles.

JAW CRUSHER

LIBERTY® JAW CSS CHART

CSS / CAPACITY RANGES				
Model	CSS (Closed Side Setting)		Capacity	
	mm	in	MTPH	STPH
2155B	40 - 130	1.6" - 5.1"	90 - 400	100 - 440
2636B	60 -160	2.4"- 6.3"	110 -360	120 -396
3042B	70 - 200	2.75" - 8"	150 - 500	165 - 550
3343B	80 -200	3.2"- 8"	180 - 620	200 - 680
3055B	70 - 200	2.75" - 8"	240 - 780	265 - 855
3448B	70 - 200	2.75″ - 8"	170 -560	185 - 615
3455B	100 -200	4"-8"	320 - 800	353 - 880
4051B	100 -200	4"-8"	290 - 880	320 - 970
4655B	150 -250	6"-10"	400 - 900	440 - 990
5165B	150 - 270	6"-10.5"	550 -1,100	605 -1,210
6080B	200 -300	8"-12"	700 -1,450	770 -1,595

Projected crusher capacities are based on a material having a work index of 12-14, with a bulk density of 100 lbs/ft^3 (1.6 mt/m^3).

JAW CRUSHER

LIBERTY® JAW CAPACITIES

CAPACITY CHART

Model	2155B	2636B	3042B	3343B	3055B	3448B	3455B	4051B	4655B	5165B	6080B
CSS (in)	STPH	STPH	STPH	STPH	STPH	STPH	STPH	STPH	STPH	STPH	STPH
2	139-169										
2.5	167-207	120-160									
3	211-261	145-205	165-245		265-325	185-305					
3.5	258-312	165-235	200-270	225-275	290-370	220-340					
4	375-440	185-265	230-300	250-310	320-410	255-375	350-400	315-405			
5		225-325	280-360	300-380	380-490	325-445	400-480	360-500			
6		265-395	340-410	350-460	440-590	395-515	465-575	400-610	440-600	605-695	
7			405-485	390-550	500-700	470-580	520-710	440-760	505-725	640-780	
8			470-550	410-680	545-855	545-615	570-880	480-960	570-880	680-890	770-1110
10									690-990	770-1140	855-1225
12											940-1340
14											1115-1595

Projected crusher capacities are based on a material having a work index of 12-14, with a bulk density of 100 lbs/ft³ (1.6 mt/m³). The feed grading must have less than 10% passing the crusher setting. The crusher drive assemblies are to be maintained in good working order with the ability to apply all available horsepower without drive belt slippage. Plant installation to ensure the crusher is able to operate continuously consuming the FLA rating of the motor(s) with the equipment able to accept and discharge material freely. For secondary cone crusher applications to be used in closed circuit applications consult Superior for capacity adjustments.

JAW CRUSHER

LIBERTY® JAW HYDRAULIC TOGGLE SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Weight		Feed Opening						Speed	Power	
	kg	lbs	mm x mm			in x in			rpm	kW	hp
2636B	31,000	14,050	650	x	900	26"	x	36"	300	75	100
3042B	34,600	15,700	750	x	1,070	30"	x	42"	280	110	150
3343B	49,200	22,300	830	x	1,100	33"	x	43"	270	110	150
3055B	59,000	26,950	760	x	1,400	30"	x	55"	260	160	200
3455B	69,445	31,500	860	x	1,400	34"	x	55"	250	160	200
3365B	67,250	30,500	830	x	1,600	33"	x	63"	230	150	200
4051B	92,600	42,000	1010	x	1,300	40"	x	51"	230	160	200

CSS / CAPACITY RANGES

Model	CSS		Capacity	
	mm	in	MTPH	STPH
2636B	60 -160	2.4" - 6.3"	110 -360	120 -396
3042B	70 - 200	2.75" - 8"	150 - 500	165 - 550
3343B	80 -200	3.2"- 8"	180 - 620	200 - 680
3055B	70 - 200	2.75" - 8"	240 - 780	265 - 855
3455B	100 -200	4"-8"	320 - 800	353 - 880
3365B	80 - 200	3.2"- 8"	270 - 760	297 - 837
4051B	100 - 200	4"- 8"	290 - 880	320 - 870

JAW CRUSHER

LIBERTY® JAW GRADATIONS

PERCENT PASSING FOR A GIVEN CLOSED SIDE SETTING AVERAGE FEED MATERIAL (12-14 work index)

GRADATION CHART

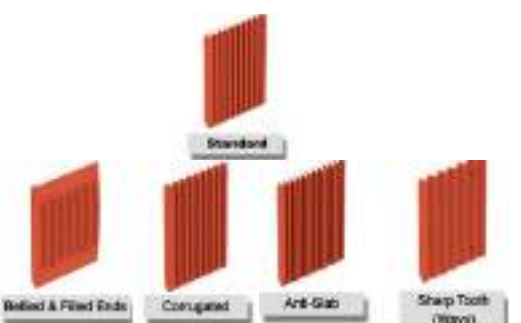
SIZE OF MATERIAL in	mm	1.5" (38mm)	2" (50mm)	2.5" (63mm)	3" (76mm)	3.5" (88mm)	4" (101mm)	5" (127mm)	6" (152mm)	7" (177mm)	8" (203mm)	10" (254mm)	11" (279mm)	12" (304mm)
18"	457												100%	100%
16"	406											100%	98	94
14"	355											98	90	83
12"	304										100%	84	77	70
10"	254								100%	100%	88	70	64	58
8"	203							100%	94	80	70	56	51	47
7"	177							94	82	70	61	49	45	41
6"	152					100%	100%	82	70	60	53	42	38	35
5"	127				100%	99	87	70	58	50	44	35	32	29
4"	101		100%	100%	92	80	70	56	47	40	35	28	25	23
3"	76	100%	95	83	70	60	53	42	35	30	27	21	19	18
2.5"	63	95	85	70	59	50	44	35	29	25	22	18	16	15
2"	50	85	70	57	48	40	35	28	24	20	18	14	13	12
1.5"	38	69	52	42	35	30	26	21	18	15	14	11	10	9
1"	25	44	34	28	23	20	17	14	12	10	9	7	7	6
0.75"	19	32	25	21	18	15	13	11	9	8	7	5	5	5
0.5"	12	22	18	15	12	10	9	7	6	5	5	4	4	3
0.25"	6	12	10	8	6	5	5	4	3	3	2	2	2	1

JAW CRUSHER

JAW LINER APPLICATION GUIDE

STYLE	APPLICATION	BENEFIT
Standard	• Shot rock • Recycled materials	Broad tooth profile maximizes liner life.
Corrugated	• Shot rock • Gravel • Recycled materials	Moderate tooth spacing good for all-purpose applications.
Sharp Tooth (Wavy)	• Rounded rock • Slippery materials	Moderate tooth spacing good for all-purpose applications with less wear life.
Bellied & Filled Ends	• Shot rock • Abrasive materials	Helps maintain a high position of crushing. Filled ends provide maximum liner life.
Anti-Slab	• Recycled materials	Uneven tooth height generates less "slabby" product.

Ask your Superior dealer on how a different liner may help performance.



See our Jaw Crushing Application Questionnaire:
superior-ind.com/q-jaw-crushing

JAW CRUSHER

JAW LINER WEAR GUIDE

Proper liner usage is achieved by wearing the jaw die surface evenly along the length of liner and utilizing 50-55% of the original liner weight. Even wear is accomplished by evenly distributing feed into the jaw, and flipping the liners at the appropriate time.

Jaws dies can be flipped from original position to maximize wear life. There are four options available when considering the correct time to change liners.

OPTION 1: TOOTH HEIGHT

Flip or change the liners when the bottom area of the jaw dies are worn to the valley bottom of the wear profile. The yellow lines in Figure 1(next page) illustrate when to flip the liners. During maintenance, measure the distance between the peaks and valleys of the teeth (Figure 2 - next page.) If the distance is less than 3/8" (10mm), your liners should be replaced.

OPTION 2: POWER DRAW

Flip when the power draw becomes higher than normal. As the jaw dies wear and get closer to the end life, the jaw will begin to pull more amps while crushing. This may cause the jaw and/or motor to pull more amps under normal crushing conditions than designed. We would recommend either flipping or changing jaw dies at this stage.

OPTION 3: TOTAL TONNAGE

Once a baseline is established, you can simply record how much material tonnage has gone through the crusher to utilize 50-55% of the stationary and moveable jaw die's original weight. Use the tonnage to predict when the next liner change will take place.

OPTION 4: CRUSHING HOURS

Once a baseline is established, you can simply record how much material tonnage has gone through the crusher to utilize 50-55% of the stationary and moveable jaw die's original weight. Use the hours to predict when the next liner change will take place.

JAW CRUSHER

JAW LINER WEAR GUIDE

Figure 1: Tooth Height

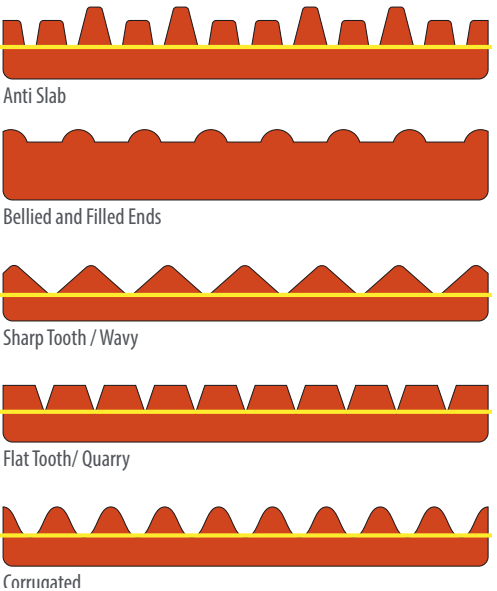
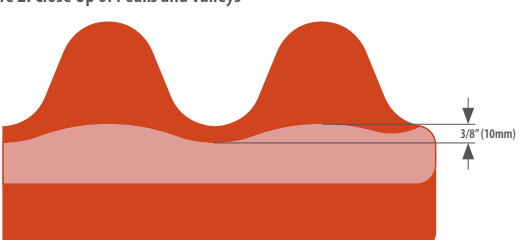


Figure 2: Close Up of Peaks and Valleys



(If the distance is less than 3/8" (10mm), your liners should be replaced.)

CONE CRUSHER

PATRIOT® CONE CRUSHER SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Head Diameter		Weight		Recommended HP		Max Feed Opening		Countershaft Speed	CSS	
	mm	in	kg	lbs	kW	hp	mm	in	rpm	mm	in
P200	970	38"	19,485	8,838	150	200	236	9.3"	750 -1,200	10 - 50	0.375" - 2"
P300	1,117	44"	35,340	16,029	225	300	270	10.6"	700 -1,200	10 - 50	0.375" - 2"
P400	1,320	52"	53,200	24,130	300	400	310	12.2"	700 -1,000	10 - 50	0.375" - 2"
P500	1,500	59"	74,000	33,566	375	500	343	13.5"	1,100 -1,400	10 - 50	0.375" - 2"
P600	1,500	59"	112,685	51,113	450	600	356	14.0"	1,100 -1,400	10 - 50	0.375" - 2"

CONE CRUSHER

PATRIOT CONE GRADATIONS

PERCENT PASSING FOR A GIVEN CLOSED SIDE SETTING
AVERAGE FEED MATERIAL (12-14 work index)

GRADATION CHART

Product Size		10 mm	13 mm	16 mm	19 mm	22 mm	25 mm	31 mm	38 mm	50 mm
mm	in	0.375"	0.5"	0.625"	0.75"	0.875"	1.0"	1.25"	1.5"	2.0"
100.0	4.0"									100.0
75.0	3.0"								100.0	96.0
63.0	2.5"							100.0	97.0	89.0
50.0	2.0"						100.0	98.0	90.0	71.0
45.0	1.75"					100.0	99.0	95.0	83.0	60.0
38.0	1.5"				100.0	99.0	96.0	88.0	72.0	49.0
31.0	1.25"			100.0	99.0	96.0	90.0	74.0	55.0	39.0
25.0	1.0"		100.0	99.0	95.0	86.0	76.0	56.0	41.0	30.0
22.0	0.875"	100.0	99.0	96.0	89.0	78.0	66.0	46.0	35.0	26.0
19.0	0.75"	99.0	96.0	90.0	79.0	68.0	57.0	38.0	30.0	22.0
16.0	0.625"	97.0	91.0	80.0	69.0	56.0	46.0	31.0	25.0	18.0
13.0	0.5"	92.0	81.0	69.0	57.0	45.0	36.0	26.0	20.0	15.0
10.0	0.375"	81.0	66.0	54.0	45.0	34.0	28.0	20.0	15.0	11.5
6.0	0.25"	58.0	45.0	36.0	30.0	24.0	19.0	14.0	11.0	8.0
5.0	4M	45.0	35.0	28.0	23.0	18.0	15.0	11.0	9.0	6.0
3.0	6M	33.0	26.0	21.0	17.0	13.0	11.0	8.0	6.0	4.0
2.0	(8M)	26.0	20.0	16.0	13.0	10.0	8.0	5.0	4.0	2.0

Values will vary depending on feed distribution, cavity level, feed gradation, crushing chamber, moisture, and material density.

CONE CRUSHER

PATRIOT® CONE CAPACITY CHART

CAPACITY CHART

Setting		P200		P300		P400		P500		P600	
		Capacity*		Capacity*		Capacity*		Capacity*		Capacity*	
mm	in	MTPH	STPH	MTPH	STPH	MTPH	STPH	MTPH	STPH	MTPH	STPH
8	.03125″	68 - 91	75 - 100	- -	- -	- -	- -	- -	- -	- -	- -
10	0.375"	86 - 123	95 - 135	123 - 163	135 - 180	127 - 181	140 - 200	163 - 226	180 - 250	195 - 272	215 - 300
13	0.5"	118 - 154	130 - 170	145 - 200	160 - 220	177 - 227	195 - 250	226 - 285	250 - 315	254 - 322	280 - 355
16	0.625"	132 - 195	145 - 215	172 - 236	190 - 260	213 - 272	235 - 300	272 - 340	300 - 375	308 - 381	340 - 420
19	0.75"	154 - 200	170 - 220	191 - 272	210 - 300	240 - 308	265 - 340	317 - 394	350 - 435	354 - 436	390 - 480
22	0.875″	163 - 209	180 - 230	209 - 304	230 - 335	263 - 340	290 - 375	335 - 422	370 - 465	377 - 472	415 - 520
25	1"	172 - 222	190 - 245	222 - 331	245 - 365	281 - 377	310 - 415	363 - 458	400 - 505	408 - 508	450 - 560
32	1.25"	186 - 240	205 - 265	240 - 363	265 - 400	309 - 422	340 - 465	408 - 503	450 - 555	454 - 553	500 - 610
38	1.5"	200 - 259	220 - 285	290 - 404	320 - 445	340 - 476	375 - 525	480 - 581	530 - 640	508 - 612	560 - 675
45	1.75"	227 - 281	250 - 310	331 - 454	365 - 500	390 - 526	430 - 580	521 - 653	575 - 720	581 - 730	640 - 805
51	2"	245 - 308	270 - 340	363 - 490	400 - 540	436 - 581	480 - 640	594 - 725	655 - 800	626 - 744	690 - 820

*Projected crusher capacities are based on a material having a work index of 12-14, with a bulk density of 100 lbs/ft^3 (1.6 mt/m^3). The feed grading must have less than 10% passing the crusher setting. The crusher drive assemblies are to be maintained in good working order with the ability to apply all available horsepower without drive belt slippage. Plant installation to ensure the crusher is able to operate continuously consuming the FLA rating of the motor(s) with the equipment able to accept and discharge material freely. For secondary cone crusher applications to be used in closed circuit applications consult Superior for capacity adjustments.

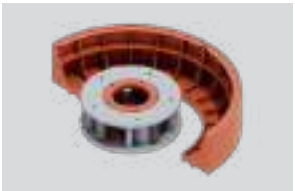
TYPICAL PHYSICAL PROPERTIES

		Max Feed Size		Table/Rotor Diameter		Estimated Max Throughput		Typical HP Range		Max Weight	
Model	Configuration	mm	in	mm	in	MTPH	STPH	kW	hp	kg	lbs
V1680	Impeller Table & Anvils (SOS)	50	2.0"	660	26"	225	250	Up to 186	Up to 250	17,600	8,000
	Rotor & Anvil (ROS)	38	1.5"	686	27"	70 - 180	77 - 198	Up to 186	Up to 250	17,980	8,156
	Rotor & Rockbox (ROR)	38	1.5"	686	27"	70 - 180	77 - 198	Up to 186	Up to 250	16,324	7,404
V2160 Single	Impeller Table & Anvils (SOS)	127	5.0"	914 - 1,066	36" - 42"	180 - 385	200 - 425	Up to 300	Up to 400	26,350	11,952
	Rotor & Anvil (ROS)	60	2.38"	812 - 914	32" - 36"	163 - 362	180 - 400	Up to 300	Up to 400	25,317	11,483
	Rotor & Rockbox (ROR)	60	2.38"	812 - 914	32" - 36"	163 - 362	180 - 400	Up to 300	Up to 400	19,805	8,983
V2160 Dual	Impeller Table & Anvils (SOS)	127	5.0"	914 - 1,066	36" - 42"	180 - 385	200 - 425	Up to 522	Up to 700	33,000	14,968
	Rotor & Anvil (ROS)	60	2.38"	812 - 914	32"- 36"	163 - 362	180 - 400	Up to 522	Up to 700	31,967	14,500
	Rotor & Rockbox (ROR)	60	2.38"	812 - 914	32" - 36"	163 - 362	180 - 400	Up to 522	Up to 700	26,455	12,000

Projected crusher capacities are based on a material having a work index of 12-14, with a bulk density of 100 lbs/ft3 (1.6 mt/m3). The crusher drive assemblies are to be maintained in good working order with the ability to apply all available horsepower without drive belt slippage. Plant installation to ensure the crusher is able to operate continuously consuming the FLA rating of the motor(s) with the equipment able to accept and discharge material freely.

VSI CRUSHER

CRUSHING CHAMBER CONFIGURATIONS



ROCK ON ROCK (ROR)

- Enclosed Rotor and Rock Shelf
- Feed sizes to 2-3/8"
- High abrasion materials

ROCK ON STEEL (ROS)

- Enclosed Rotor and Anvils
- Feed sizes to 2-3/8"
- Medium abrasion materials

STEEL ON STEEL (SOS)

- Shoe and Anvil
- Feed size up to 4"
- Low to medium abrasion materials

VSI CRUSHER

HEAD CONFIGURATIONS

CAST ROTOR

- 4 port available
- Parts interchangeable between top and bottom
- No hardfacing required

FABRICATED ROTOR

- 5-port available
- Designed with fewest parts possible
- No hardfacing required

OPEN SHOE TABLE

- 4, 5 and 6 shoes available
- 28% chrome and ceramic available
- Designed for easy maintenance

VSI CRUSHER

CHAMBER CONFIGURATIONS

ROCK SHELF

ANVIL RING

HYBRID RING

HSI CRUSHER

SENTRY HSI SPECS & CAPACITY RANGES

TYPICAL PHYSICAL PROPERTIES

Model	Rotor Size (D x W)		Max Feed Size		Feed Opening		Capacity		Motor Power		Weight	
	mm x mm	in x in	mm	in	mm x mm	in x in	MTPH	STPH	kW	hp	kg	lbs
SP5155	1,300 x 1,400	51" x 55"	900	35.4"	1,325 x 1,512	52" x 59"	250 - 350	275 - 385	250	350	40,785	18,500
SP5054	1,270 x 1,371.6	50" x 54"	698.5	27.5	883 x 1,435	35" x 57"	220 - 350	240 - 385	250	350	41,701	18,915
SP5565	1,400 x 1,650	55" x 65"	800	31.5"	1,150 x 1,570	45" x 62"	355 - 500	390 - 550	350	500	57,332	26,000
SP6384	1,600 x 2,130	63" x 84"	1,000	39.4"	1,600 x 2,150	63" x 85"	700 - 900	770 - 990	500	700	92,813	42,000
SS3936	1,000 x 900	39" x 36"	400	15.7"	650 x 950	26" x 37"	80 - 150	90 - 165	110	150	20,948	9,500
SS4355	1,100 x 1,400	43" x 55"	450	17.7"	700 x 1,450	28" x 57"	150 - 250	165 - 275	185	250	27,563	12,500
SS5165	1,300 x 1,650	51" x 65"	500	19.7"	750 x 1,700	30" x 67"	250 - 440	275 - 484	350	500	52,481	23,800
SS5583	1,400 x 2,100	55" x 83"	600	23.6"	850 x 2,150	33" x 85"	300 - 500	330 - 550	600	800	72,767	33,000
SS4355G	1,100 x 1,400	43" x 55"	450	17.7"	700 x 1,450	28" x 57"	150 - 250	165 - 275	185	250	29,768	13,500
SS5165G	1,300 x 1,650	51" x 65"	500	19.7"	750 x 1,700	30" x 67"	250 - 440	275 - 484	350	500	35,000	25,000
SS5583G	1,400 x 2,100	55" x 83"	600	23.6"	850 x 2,150	33" x 85"	300 - 500	330 - 550	600	800	77,178	55,127
SR3936	1,000 x 900	39" x 36"	500	19.7"	700 x 950	27" x 37"	80 - 150	90 - 165	110	150	23,153	10,500
SR4250	1,070 x 1,270	42" x 50"	500	19.7"	834 x 1300	33" x 51"	120-200	130-220	185	250	27,811	12,615
SR5165	1,300 x 1,650	51" x 65"	600	23.6"	800 x 1,450	31" x 57"	150 - 200	165 - 220	185	250	28,666	13,000
SR5583	1,400 x 2,100	55" x 83"	800	31.5"	900 x 1,700	35" x 67"	200 - 300	220 - 330	315	400	56,891	25,800

Projected crusher capacities are based on a material having a work index of 12-14, with a bulk density of 100 lbs/ft^3 (1.6 mt/m^3). The feed grading must have less than 10% passing the crusher setting. The crusher drive assemblies are to be maintained in good working order with the ability to apply all available horsepower without drive belt slippage. Plant installation to ensure the crusher is able to operate continuously consuming the FLA rating of the motor(s) with the equipment able to accept and discharge material freely. For secondary cone crusher applications to be used in closed circuit applications consult Superior for capacity adjustments.

SCREENING

SCREEN SELECTION GUIDE

Because of the need to produce material sized to a rigid specification, the vibrating screen has taken on more prominence than ever before in today's material processing plant. The proper type of screen, and a sufficient quantity to economically produce the sizes and tonnages needed, can mean the success or failure of an operation.

Horizontal vs Inclined Screen - When to select one or the other?

TRIPLE SHAFT HORIZONTAL SCREEN

- Better stratification and separation
- Larger stroke (5/8" - 3/4")
- Higher G-Forces (5.0-6.0)
- Uses screens oval throw to move material
- 60-65 feet per minute travel rate
- Heavier bed depths
- Low height for increased portability

INCLINED SCREEN

- Lower cost of ownership over time
- More clearance between decks
- Typically less weight
- Smaller stroke (1/4" - 1/2" with 3/8" standard)
- Lower G-Forces (3.8 typical)
- Uses gravity to move material
- 85-100 feet per minute travel rate
- Higher "conveying" capacity due to faster travel rate
- Usually mounted as stationary

TRIPLE SHAFT HORIZONTAL SCREENS

GUARDIAN® SCREEN SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Decks	Size		Motor Power		Weight (w/base & mtr)	
		mm x mm	ft x ft	kW	hp	lbs	kg
5162-TH32	2	1,562 x 4,900	5' x 16'	18.6	25	16,750	7,614
5163-TH32	3	1,562 x 4,900	5' x 16'	22.3	30	18,750	8,523
6162-TH32	2	1,930 x 4,900	6' x 16'	29.8	40	17,200	7,818
6163-TH32	3	1,930 x 4,900	6' x 16'	29.8	40	20,500	9,318
6202-TH32*	2	1,930 x 6,115	6'x 20'	29.8	40	19,250	8,750
6203-TH32*	3	1,930 x 6,115	6' x 20'	29.8	40	23,500	10,682
6204-TH38*	4	1,930 x 6,115	6' x 20'	37.2	50	28,500	12,955
7202-TH38*	2	2,235 x 6,115	7' x 20'	37.2	50	24,000	10,909
7203-TH38	3	2,235 x 6,115	7' x 20'	37.2	50	29,400	13,363
8202-TH38	2	2,540 x 6,115	8' x 20'	37.2	50	25,500	11,591
8203-TH38*	3	2,540 x 6,115	8 'x 20'	37.2	50	31,500	14,318
8204-TH40	4	2,540 x 6,115	8 'x 20'	44.7	60	39,750	18,068

* TS (triple-shaft sloped) 2.5 degree slope is optional

INCLINED SCREENS

ANTHEM® SCREEN SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Decks	Size		Motor Power		Weight	
		mm x mm	ft x ft	kW	hp	lbs	kg
5142-SI	2	1,600 x 4,250	5' x 14'	11	15	10,000	4,535
5143-SI	3	1,600 x 4,250	5' x 14'	18.5	25	12,800	5,806
5162-SI	2	1,600 x 4,900	5' x 16'	11	15	11,100	5,040
5163-SI	3	1,600 x 4,900	5' x 16'	15	20	13,500	6,150
6162-SI	2	1,890 x 4,900	6' x 16'	15	20	12,500	5,700
6163-SI	3	1,890 x 4,900	6' x 16'	15	20	15,400	6,982
6202-SI	2	1,890 x 6,115	6' x 20'	18.5	25	14,500	6,600
6203-SI	3	1,890 x 6,115	6' x 20'	18.5	25	17,600	7,977
6204-SI	4	1,890 x 6,115	6' x 20'	37	50	20,700	9,354
7202-SI	2	2,190 x 6,050	7' x 20'	22	30	20,000	9,100
7203-SI	3	2,190 x 6,050	7' x 20'	(2) 18.5	(2) 25	28,200	12,800
8202-SI	2	2,500 x 6,115	8' x 20'	(2) 18.5	(2) 25	23,100	10,500
8203-SI	3	2,500 x 6,115	8' x 20'	(2) 22.0	(2) 30	29,800	13,500
8204-SI	4	2,500 x 6,115	8' x 20'	(2) 30.0	(2) 40	39,600	18,000
8242-SI	2	2,500 x 7,320	8' x 24'	(2) 22.0	(2) 30	29,200	13,250
8243-SI	3	2,500 x 7,320	8' x 24'	(2) 30.0	(2) 40	38,580	17,500

*All Models: Max Feed Size: 8" (203mm) , Stroke: .39" (10mm), Speed: 700-1,000 rpm

GRIZZLY FEEDERS

INTREPID® VIBRATING GRIZZLY FEEDER SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Deck	Size		Weight (Static)		Required Power		Max Feed Size		Capacity*	
		mm x mm	in x ft	lbs	kg	kW	hp	mm	in	MTPH	STPH
3617VGF	1	920 x 5,180	36" x 17'	10,000	4,535	15	20	500	20"	200 - 300	220 - 330
4012VGF	1	1,040 x 3,660	40" x 12'	7,826	3,550	15	20	600	24"	320 - 420	360 - 470
4016VGF	1	1,040 x 4,875	40" x 16'	10,692	4,850	18.8	25	600	24"	320 - 420	360 - 470
4220VGF	1 or 2	1,067 x 6,090	42" x 20'	11,500	5,218	18.8	25	600	24"	320 - 420	360 - 470
4820VGF	1 or 2	1,219 x 6,090	48" x 20'	12,765	6,120	22.5	30	700	28"	450 - 570	500 - 635
4824VGF	1 or 2	1,219 x 7,320	48" x 24'	21,000	9,520	30	40	700	28"	450 - 570	500 - 635
5420VGF	1 or 2	1,372 x 6,090	54" x 20'	14,500	6,580	30	40	800	32"	535 - 685	595 - 760
5424VGF	1 or 2	1,372 x 7,320	54" x 24'	21,500	9,700	37.5	50	800	32"	535 - 685	595 - 760
6020VGF	1 or 2	1,534 x 6,090	60" x 20'	18,739	8,500	37.5	50	900	36"	615 - 765	685 - 850
6024VGF	1 or 2	1,534 x 7,320	60" x 24'	23,500	11,300	37.5	50	900	36"	615 - 765	685 - 850
6620VGF	1 or 2	1,670 x 6,090	66" x 20'	22,266	10,100	45	60	1,100	44"	750 - 900	830 - 1,020
6624VGF	1 or 2	1,670 x 7,320	66" x 24'	24,581	11,150	45	60	1,100	44"	750 - 900	830 - 1,020
7420VGF	1 or 2	1,870 x 6,090	74" x 20'	25,904	11,750	56.3	75	1,300	50"	880 - 1,020	980 - 1,130
7424VGF	1 or 2	1,870 x 7,320	74" x 24'	30,864	14,000	75	100	1,300	50"	880 - 1,020	980 - 1,130

Note: * Capacities based on 100 lbs/cu ft of free flowing material. Capacity will be affected by methods of loading, material type and gradation and other factors.

WASHING

CLASSIFYING PRODUCTS OVERVIEW

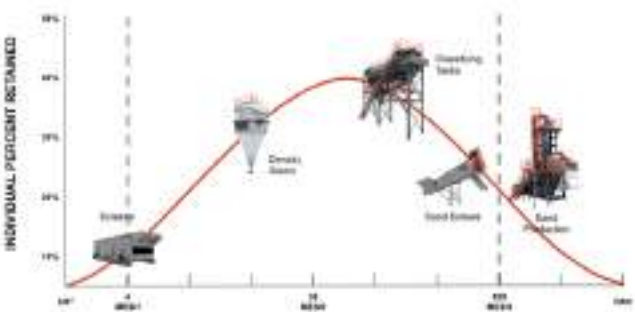
PROCESSING PURPOSE

- Alter feed gradation to meet specs
- Remove unwanted or harmful materials
- Remove lightweight particles
- Blend multiple feeds into one

FACTORS AFFECTING SETTLING

- Weir length
- Tub volume
- Tub depth
- Surface area
- Circuit distance
- Material density

MATERIAL REMOVAL BY PRODUCT



WASHING

COARSE MATERIAL WASHER

PURPOSE

- Mildly scrubs material greater than 3/4" (19mm) while removing unwanted material
- Remove dust from rock surface
- Remove sand from feed
- Unwanted/Deleterious overflow weirs
- Mild scrubbing of stone and gravel
- Section of paddles then flights
- No overlapping of paddles
- Coarse is usually defined >3/4"

DESIGN

- Pillow block bearing installed outside tank for protection and easy maintenance
- Adjustable overflow gate allows control of water bed depth for cleaner, drier product
- Alloy steel wear paddles and shoes
- Spiral flights move gravel up incline
- Curved belly pan eliminates dead spots for material to gather common to 90° angles
- Fully-guarded drive system utilizes common off-the-shelf, shaft-mounted gear reducer

SPECS

SINGLE SCREW

Model*	Screw Diameter		Max Material Size		Capacity		Screw Speed		Motor		
	in	mm	in	mm	STPH	MTPH	fpm	rpm	hp	kW	rpm
CMW24180BS	24"	610	1.5"	38	60 - 75	55 - 69	120	40	15	11	1,750
CMW30180BS	30"	770	2.0"	51	100 - 125	91 - 114	300	37	20	15	1,750
CMW30240BS	30"	770	2.0"	51	100 - 125	91 - 114	300	37	25	19	1,750
CMW36180BS	36"	920	3.0"	76	150 - 175	137 - 160	300	30	25	19	1,750
CMW3618FBS	36"	920	2.4"	60	149 - 176	136 - 160	300	32	30	22	1,750
CMW36280BS	36"	920	3.0"	76	150 - 175	137 - 160	300	30	30	22	1,750
CMW44200BS	44"	1,120	3.0"	76	200 - 250	182 - 228	300	26	30	22	1,750
CMW4420FBS	44"	1,120	3.0"	75	200 - 250	182 - 228	300	26	40	30	1,750
CMW44320BS	44"	1,120	3.0"	76	200 - 250	182 - 228	300	26	50	37	1,750
CMW48240BS	48"	1,220	3.5"	89	200 - 250	182 - 228	300	24	30	22	1,750
CMW48320BS	48"	1,220	3.5"	89	220 - 275	200 - 250	300	24	40	30	1,750

*Model names: OB = Outboard bearing, FB = Flange bearing

WASHING

COARSE MATERIAL WASHER SPECS

TWIN SCREW												
Model*	Screw Diameter		Max Material Size		Capacity		Screw Speed		Motor			
	in	mm	in	mm	stph	mtph	fpm	rpm	hp	kW	rpm	
CMW2418OBS	24"	610	1.5"	38	60 - 75	55 - 69	120	40	15	11	1,750	
CMW3018OBS	30"	770	2.0"	51	100 - 125	91 - 114	300	37	20	15	1,750	
CMW3024OBS	30"	770	2.0"	51	100 - 125	91 - 114	300	37	25	19	1,750	
CMW3618OBS	36"	920	3.0"	76	150 - 175	137 - 160	300	30	25	19	1,750	
CMW3618FBS	36"	920	2.4"	60	149 - 176	136 - 160	300	32	30	22	1,750	
CMW3628OBS	36"	920	3.0"	76	150 - 175	137 - 160	300	30	30	22	1,750	
CMW4420OBS	44"	1,120	3.0"	76	200 - 250	182 - 228	300	26	30	22	1,750	
CMW4420FBS	44"	1,120	3.0"	75	200 - 250	182 - 228	300	26	40	30	1,750	
CMW4432OBS	44"	1,120	3.0"	76	200 - 250	182 - 228	300	26	50	37	1,750	
CMW4824OBS	48"	1,220	3.5"	89	200 - 250	182 - 228	300	24	30	22	1,750	
CMW4832OBS	48"	1,220	3.5"	89	220 - 275	200 - 250	300	24	40	30	1,750	

*Model names: OB = Outboard bearing, FB = Flange bearing

WASHING

BLADE MILL

PURPOSE

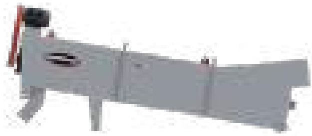
- Liquifies aggregate material before screening
- Improves screening efficiency up to 15%
- Improves sand equivalency (SE)
- Used prior to a screening and washing application to break up soluble clay, mud, silt or soil
- Remove organic materials
- Typical feed to it is 2.5" x 0" (63.5mm x 0mm)

DESIGN

- Single or twin screw options
- Off-the-shelf pillow block bearing installed outside tank for protection and easy maintenance
- Adjustable overflow gate allows control of water bed depth for cleaner, drier product
- Alloy steel wear paddles and shoes have abrasion-resistant cast iron used specifically for mining and earth-handling industries
- Spiral flights move gravel up incline
- Curved belly pan eliminates dead spots for material to gather common to 90° angles
- Fully-guarded drive system utilizes common off-the-shelf, shaft-mounted gear reducer
- Rigid skid allows for easy assembly
- Optional adjustable legs

WASHING

BLADE MILL WASHER SPECS



SINGLE SCREW

Model Number	Screw Diameter in	Screw Diameter mm	Max Material Size in	Max Material Size mm	Operating Angle	Capacity stph	Capacity mtph	Screw Speed rpm	Motor hp	Motor kW	Motor rpm	Water Capacity GPM	Water Capacity m^3/hr	Empty Weight kg	Empty Weight lbs	Loaded Weight kg	Loaded Weight lbs
BMW24180BS	24"	610	1.5"	38	2°-10°	60 - 110	55 - 100	40	15	11	1,750	120 - 130	28 - 75	3,180	7,000	9,080	20,000
BMW24240BS	24"	610	1.5"	38	2°-10°	60 - 110	55 - 100	40	20	15	1,750	120 - 330	28 - 75	3,540	7,800	11,250	24,800
BMW30180BS	30"	770	2.0"	51	2°-10°	100 - 165	91 - 150	37	20	15	1,750	200 - 495	46 - 113	4,310	9,500	12,030	26,500
BMW30240BS	30"	770	2.0"	51	2°-10°	100 - 165	91 - 150	37	25	19	1,750	200 - 495	46 - 113	4,810	10,600	14,790	32,600
BMW36180BS	36"	920	3.0"	76	2°-10°	150 - 250	137 - 228	30	25	19	1,750	300 - 750	69 - 171	4,990	11,000	15,430	34,000
BMW3618FBS	35.5"	900	2.5"	63	4°-6°	148 - 176	135 - 160	32	40	30	1,750	296 - 598	68 - 120	5,500	12,125	13,800	30,423
BMW36280BS	36"	920	3.0"	76	2°-10°	150 - 250	137 - 228	30	30	22	1,750	300 - 750	69 - 171	6,360	14,000	21,780	48,000
BMW44200BS	44"	1,120	3.5"	89	2°-10°	200 - 335	182 - 305	26	26	19	1,750	400 - 1,005	91 - 229	6,810	15,000	19,960	44,000
BMW4420FBS	43.3"	1,100	3.0"	75	4°-6°	198 - 248	180 - 225	26	50	37	1,750	396 - 744	90 - 169	9,360	20,635	16,590	36,574
BMW44320BS	44"	1,120	3.5"	89	2°-10°	200 - 335	182 - 305	26	50	37	1,750	400 - 1,005	91 - 229	8,850	19,500	29,260	64,500
BMW48240BS	48"	1,220	3.5"	89	2°-10°	220 - 360	200 - 328	24	40	30	1,750	440 - 1,080	100 - 246	6,810	15,000	19,960	44,000

WASHING

BLADE MILL WASHER SPECS

TWIN SCREW

Model Number	Screw Diameter		Max Material Size		Operating Angle	Capacity		Screw Speed	Motor			Water Capacity		Empty Weight		Loaded Weight	
	in	mm	in	mm		stph	mtph	rpm	hp	kW	rpm	GPM	m^3/hr	kg	lbs	kg	lbs
BMW24180BT	(2) 24"	610	1.5"	38	2°-10°	120 - 220	110 - 200	40	(2) 15	11	1,750	240 - 660	55 - 150	4,680	10,300	12,980	28,611
BMW24240BT	(2) 24"	920	1.5"	38	2°-10°	120 - 220	110 - 200	40	(2) 20	15	1,750	240 - 660	55 - 150	6,450	14,200	19,520	43,030
BMW30180BT	(2) 30"	770	2.0"	51	2°-10°	200 - 330	182 - 300	37	(2) 20	15	1,750	400 - 990	91 - 225	6,360	14,000	21,780	48,000
BMW30240BT	(2) 30"	1,120	2.0"	51	2°-10°	200 - 330	182 - 300	37	(2) 25	19	1,750	400 - 990	91 - 225	8,760	19,300	26,770	59,000
BMW36180BT	(2) 36"	920	3.0"	76	2°-10°	300 - 500	273 - 455	30	(2) 25	19	1,750	600 - 1,500	137 - 341	8,080	17,800	28,490	62,800
BMW3618FBT	(2) 35.5"	900	2.5"	63	4°-6°	175 - 228	159 - 207	32	(2) 40	30	1,750	350 - 684	80 - 156	10,000	22,046	22,640	49,912
BMW36280BT	(2) 36"	920	3.0"	76	2°-10°	300 - 500	273 - 455	30	(2) 30	22	1,750	600 - 1,500	137 - 341	10,440	23,000	35,980	79,310
BMW44200BT	(2) 44"	1,120	3.5"	89	2°-10°	400 - 670	364 - 610	26	(2) 26	19	1,750	800 - 2,010	182 - 457	13,610	30,000	36,290	80,000
BMW4420FBT	(2) 43.3"	1,100	3.0"	75	4°-6°	224 - 275	204 - 250	26	(2) 50	37	1,750	448 - 825	102 - 188	15,640	34,480	31,360	69,136
BMW44320BT	(2) 44"	1,120	3.5"	89	2°-10°	400 - 670	400 - 655	26	(2) 50	37	1,750	800 - 2,010	182 - 457	16,610	36,600	55,340	122,000
BMW48240BT	(2) 48"	1,220	3.5"	89	2°-10°	440 - 720	400 - 655	24	(2) 40	30	1,750	880 - 2,160	200 - 491	17,970	39,600	54,440	120,000
BMW60320BT	(2) 60"	1,530	5.0"	127	2°-10°	611 1,000	556 909	22	(2) 75	56	1,750	1,222 3,000	278 682	24,070	53,050	36,750	81,000

WASHING

LOG WASHER

PURPOSE	DESIGN
• Removes toughest, plastic clays • Dissolved clays overflow weir • Most aggressive scrubbing action • Paddles overlap each others' paths • Material-on-material scrubbing	• Pillow block bearing installed outside tank for protection and easy maintenance • Adjustable overflow gate allows control of water bed depth for cleaner, drier product • Twin shafts with A-532 wear paddles • Optional adjustable legs • Fully-guarded drive system utilizes common off-the-shelf, shaft-mounted gear reducer

SPECS

TYPICAL PHYSICAL PROPERTIES

Model	Screw Diameter		Max Material Size		Capacity		Screw Speed	Motor	
	in	mm	in	mm	stph	mtph	rpm	hp	kW
LGW24200BT	24"	610	2.0"	51	30 - 60	28 - 55	40	40	30
LGW36250BT	36"	914	3.0"	76	50 - 125	46 - 114	33	75	56
LGW36300BT	36"	914	3.0"	76	50 - 125	46 - 114	33	100	75
LGW36350BT	36"	914	3.0"	76	50 - 125	46 - 114	33	150	112
LGW38300BT	38"	965	2.5"	64	50 - 140	46 - 128	33	125	93
LGW38350BT	38 "	965	2.5"	64	60 - 140	69 - 160	33	150	112
LGW44250BT	44"	1,118	4.0"	102	75 - 175	69 - 160	26	150	112
LGW44300BT	44"	1,118	4.0"	102	75 - 175	69 - 160	26	150	112
LGW44350BT	44"	1,118	4.0"	102	75 - 175	69 - 225	26	200	149
LGW46300BT	46"	1,168	2.5"	64	75 - 190	69 - 173	26	200	149
LGW463500BT	46 "	1,168	2.5"	64	75 - 190	69 - 173	26	200	149

WASHING

ATTRITION MILL

PURPOSE	DESIGN
• Surface scrubbing and polishing • Break up bonded clusters • Help meet turbidity/color requirements • Material on material attrition	• Fully modular design • Link to increase retention time • Drive is designed for mixing • Rebuildable drive shaft • Sealed doors allow internal access

SPECIFICATIONS	
Outside Diameter - mm (in)	1,370 (54")
Tank Height - mm (in)	1,830 (72")
Capacity - mtph (tph)	67 (75 TPH)
Retention Time	2.5 minutes
Inlet Urethane Lined - mm (in)	610 x 610 (24" x 24")
Outlet urethane lined - mm (in)	405 (16")
Inspection Door - mm (in)	1,065 x 1,065 (42" x 42")
Clean-out Pipe - mm (in)	75 (3") flanged
Impellers - mm (in)	50 (2") urethane coating
Overflow Weir	Adjustable

WASHING

CLASSIFYING TANK

PURPOSE

- Convert variable feed to in-spec
- Uniform product from variable feed
- Make (2) spec and (1) excess product
- Scalp excess water from dredge feed
- Downstream dewatering efficiency
- For feed entry
- Remove oversized material first
- Introduce via feed box

DESIGN

- Stationary, skid-mounted or portable
- 6-11 stations per tank
- Feed methods
  - » Directly from dredge
  - » Flume from wet screen
  - » Slurry pump after wet screen
  - » Conveyor with spray bars

WASHING

CLASSIFYING TANK SPECS

SINGLE TANK TYPICAL									
Tank Size		Stations	Estimated Tank Weight		Estimated Support Structure Weight*		Water Capacity m^3/hr (gpm)		
m	ft		mtph	tph	kW	hp	150 µm (100 Mesh)	113 µm (150 Mesh)	75 µm (200 Mesh)
2 x 9	8′ x 28′	8	7,258	16,000	5,897	13,000	726 (3,200)	363 (1,600)	-
2 x 10	8′ x 32′	9	8,165	18,000	6,432	14,180	794 (3,500)	408 (1,800)	-
3 x 7	10′ x 24′	7	8,165	18,000	6,260	13,800	794 (3,500)	408 (1,800)	-
3 x 9	10′ x 28′	8	9,072	20,000	6,350	14,000	931 (4,100)	477 (2,100)	-
3 x 10	10′ x 32′	9	10,886	24,000	6,895	15,200	1,067 (4,700)	545 (2,400)	283 (1,250)
3 x 11	10′ x 36′	10	12,701	28,000	7,484	16,500	1,204 (5,300)	613 (2,700)	318 (1,400)
3 x 12	10′ x 40′	11	13,608	30,000	8,165	18,000	1,340 (5,900)	681 (3,000)	340 (1,500)
4 x 15	12′ x 48′	11	19,958	44,000	10,705	23,600	1,840 (8,100)	953 (4,200)	488 (2,150)
DOUBLE TANK									
3 x 10	10′ x 32′	9	22,181	48,900	13,744	30,300	2,135 (9,400)	1,090 (4,800)	567 (2,500)
3 x 11	10′ x 36′	10	24,040	53,000	14,833	32,700	2,408 (10,600)	1,226 (5,400)	635 (2,800)
3 x 12	10′ x 40′	11	25,401	56,000	15,967	35,200	2,680 (11,800)	1,363 (6,000)	681 (3,000)
4 x 15	12′ x 48′	11	39,009	86,000	21,863	48,200	3,679 (16,200)	1,908 (8,400)	976 (4,300)

WASHING

DENSITY SIZER

PURPOSE

- Extremely sharp classification
- Cut range between 30-100 mesh
- Separates by size or specific gravity
- Overcome inconsistent pressures

DESIGN

- Light waste product rises over weirs
- Heavier, coarser sand exits bottom
- -4 mesh maximum feed size
- Split point easily adjusted
- Usually packaged with:
  - » Hydrocyclones
  - » Sieve bend screens
  - » Sumps and pumps
  - » Attrition mills
  - » Dewatering screens

WASHING

AGGREDRY® DEWATERING WASHER

PURPOSE

- Same application as fine material
- Raking capacity is sized the same too
- Makes concrete sand and mason sand
- Remove -#200 material
- Dewatering (after classifying tank)
- Integrated into portable plants
- Larger tub retains more +#200

DESIGN

- Large settling area splits sand and silt
- Auger carries sand up incline
- Water drains out
- Rolling action perform some scrubbing
- Auger deposits to dewatering screen
- Motors/screen separate water/sand
- Fine sand gravity fed back to settling
- High overflow capacity

SINGLE SCREW

Screw Diameter		Capacity		Screw Speed	Max Material Size		Motor	
mm	in	MTPH	STPH	RPM	mm	in	kW	HP
610	24"	46	50	32	10	3/8 "	5.6	7.5
915	36"	91	100	20	10	3/8 "	11.2	15
1,220	48"	182	200	16	10	3/8 "	18.7	25
1,524	60"	273	300	13	10	3/8 "	29.9	40

TWIN SCREW

1,220	(2) 48"	364	400	17	10	3/8"	18.7	(2) 25
1,524	(2) 60"	545	600	15	10	3/8"	29.9	(2) 40
1,680	(2) 66"	728	800	14	10	3/8"	37.3	(2) 50

WASHING

ALLIANCE® LOW WATER WASHER

PURPOSE

- Combination agitating and dewatering
- Produce valuable manufactured sand
- Earn money from crusher dust
- Accepts dry feed in crushing circuit
- Greatly reduced water requirement
- No haulage to separate wash site
- Avoid multiple material handlings

DESIGN

- Feed with 20% passing #200 to < 5%
- If feed contains more than 20%:
- Multiple screens required
- Obtain < 5% passing #200 in product
- Wash crusher dust with 2 gpm/tph
- Traditional 50 gpm/tph of -200 mesh
- Takes less water to push than lift

SPECS

Model	Capacity		Max Material Size		Screen Size		Screen Area		Screen Motor		Screw	
	tph	mtph	in	mm	ft	m	ft^2	m^2	HP	kW	in x ft	mm x m
410	60-120	54-108	1/2"	13	4 x 10	1.2 x 3.0	82	7.7	7	5.3	30" x 12'	760 x 3.6
510	90-180	82-164	1/2"	13	5 x 10	1.5 x 3.0	94	8.8	11.4	8.6	30" x 12'	760 x 3.6
612	120-240	108-216	1/2"	13	6 x 12	1.8 x 3.6	124	11.6	9.4	7.1	36" x 12'	915 x 3.6
712	150-300	136-272	1/2"	13	7 x 12	2.1 x 3.6	137	12.8	17.4	13	36" x 12'	915 x 3.6

Model	Agitator Motor		Water Consumption		Screen Area		Horsepower*	
	HP	kW	GPM	m^3/hr	ft^2	m^2	HP	kW
410	15	11	200	45	40	4	29	22
510	15	11	300	68	50	4.7	38	28
612	20	15	400	91	72	7	39	29
712	20	15	500	114	84	8	55	41

WASHING

FINE MATERIAL WASHER

PURPOSE

- Classifies by specific gravity
- Converts feed into spec
- Light material washed over rear
- Heavy material augured up incline
- Materials dewaters as it travels
- Large overflow retains fine particles
- Accepts variable feed (surges)
- Least expensive in typical applications

DESIGN

- Max material size is 3/8" (#4) (935mm)
- Good at removing -100 mesh
- Twin or single shafts
- 0.2 HP/TPH (very low)
- Some scrubbing due to rolling/rubbing
- Discharge moisture of 20-25%

EQUIPMENT SELECTION

- What is end product specification?
- What is required capacity (TPH)?
- How much water is being introduced?
- What is feed gradation?
- How much silt is to be removed?

WASHING

FINE MATERIAL WASHER SPECS

SINGLE SCREW

Model*	Screw Diameter		Max Material Size		Capacity		Screw Speed	Auger Motor	
	in	mm	in	mm	stph	mtph	rpm	hp	kW
FMW12140BS	12"	310	3/8"	10	20	19	40	7.5	5.6
FMW24240BS	24"	610	3/8"	10	50	46	32	7.5	5.6
FMW24240BS	30"	770	3/8"	10	75	69	25	15	11.2
FMW36250BS	36"	920	3/8"	10	100	91	20	15	11.2
FMW3625FBS	36"	920	3/8"	10	100	91	21	15	11.2
FMW44320BS	44"	1,120	3/8"	10	175	160	17	20	15.0
FMW4432FBS	44"	1,120	3/8"	10	175	160	17	25	18.7
FMW48350BS	48"	1,220	3/8"	10	200	182	16	25	18.7
FMW54350BS	54"	1,380	3/8"	10	275	250	15	30	22.4
FMW5434FBS	54"	1,380	3/8"	10	275	250	14	40	29.9
FMW60350BS	60"	1,530	3/8"	10	340	310	13	40	29.9
FMW66350BS	66"	1,680	3/8"	10	400	364	12	50	37.3
FMW6636FBS	66"	1,680	3/8"	10	400	364	11	60	44.8
FMW72380BS	72"	1,830	3/8"	10	475	432	11	60	44.8
FMW84380BS	84"	2,140	3/8"	10	550	500	9	75	56.0

*Model names: OB = Outboard bearing, FB = Flange bearing

WASHING

FINE MATERIAL WASHER SPECS

TWIN SCREW									
Model*	Screw Diameter		Max Material Size		Capacity		Screw Speed	Auger Motor	
	in	mm	in	mm	stph	mtph	rpm	hp	kW
FMW24240BT	(2) 24"	610	3/8"	10	100	91	40	(2) 7.5	5.6
FMW30240BT	(2) 30"	770	3/8"	10	150	137	32	(2) 15	11.2
FMW36250BT	(2) 36"	920	3/8"	10	200	182	25	(2) 15	11.2
FMW3625FBT	(2) 36"	920	3/8"	10	200	182	20	(2) 15	11.2
FMW44320BT	(2) 44"	1,120	3/8"	10	350	319	20	(2) 20	15.0
FMW4432FBT	(2) 44"	1,120	3/8"	10	350	319	17	(2) 25	18.7
FMW48350BT	(2) 48"	1,220	3/8"	10	400	364	17	(2) 25	18.7
FMW54350BT	(2) 54"	1,380	3/8"	10	550	500	16	(2) 30	22.4
FMW5434FBT	(2) 54"	1,380	3/8"	10	550	500	15	(2) 40	29.9
FMW60350BT	(2) 60"	1,530	3/8"	10	680	619	15	(2) 40	29.9
FMW66350BT	(2) 66"	1,680	3/8"	10	800	728	14	(2) 50	37.3
FMW6636FBT	(2) 66"	1,680	3/8"	10	800	728	13	(2) 60	44.8
FMW72380BT	(2) 72"	1,830	3/8"	10	950	864	11	(2) 75	56.0
FMW7238FBT	(2) 72"	1,830	3/8"	10	950	864	11	(2) 100	74.6
FMW84380BT	(2) 84"	2,140	3/8"	10	1,100	1,000	9	(2) 100	74.6

*Model names: OB = Outboard bearing, FB = Flange bearing
NOTE: Low HP per ton or Superior efficient gearbox uses less HP than traditional fine material washers.

WASHING

FINE MATERIAL WASHER CAPACITIES

SINGLE SCREW

Model*	Water Capacity GPM (m^3/hr)						Empty Weight		Loaded Weight	
	100 Mesh		150 Mesh		200 Mesh		lbs	kg	lbs	kg
FMW12140BS	150	40	100	30	50	20	2,800	1,280	7,000	3,180
FMW24240BS	500	120	225	60	125	30	7,000	3,180	26,500	12,030
FMW24240BS	575	140	275	70	160	40	8,600	3,910	28,100	12,750
FMW36250BS	700	160	330	80	180	50	9,150	4,160	24,950	11,320
FMW3625FBS	700	160	330	80	180	50	12,742	5,780	29,872	13,550
FMW44320BS	1600	370	750	180	425	100	18,000	8,170	66,000	29,940
FMW4432FBS	1600	370	750	180	425	100	22,200	10,070	70,062	31,780
FMW48350BS	1700	390	850	200	450	110	20,500	9,300	65,500	29,720
FMW54350BS	1900	440	950	220	575	140	23,000	10,440	107,000	48,540
FMW5434FBS	1900	440	950	220	575	140	30,357	13,770	131,285	59,550
FMW60350BS	2200	500	1050	240	600	140	24,500	11,120	125,000	56,700
FMW66350BS	2400	550	1200	280	650	150	36,000	16,330	135,000	61,240
FMW6636FBS	2400	550	1200	280	650	150	40,344	18,300	131,285	59,550
FMW72380BS	2600	590	1300	295	700	159	33,000	14,970	170,000	77,120
FMW84380BS	3100	710	1600	370	850	200	43,000	19,510	190,000	86,190

*Model names: OB = Outboard bearing, FB = Flange bearing

WASHING

FINE MATERIAL WASHER CAPACITIES

TWIN SCREW

Model*	Water Capacity GPM (m³/hr)						Empty Weight		Loaded Weight	
	100 Mesh		150 Mesh		200 Mesh		lbs	kg	lbs	kg
FMW24240BT	890	210	420	100	235	60	2,800	1,280	61,000	27,670
FMW30240BT	1,000	230	490	120	280	70	7,000	3,180	76,000	34,480
FMW36250BT	1,250	290	620	150	340	80	8,600	3,910	84,000	38,110
FMW3625FBT	1,250	290	620	150	340	80	9,150	4,160	59,550	27,020
FMW44320BT	2,800	640	1,400	320	675	160	12,742	5,780	62,500	28,350
FMW4432FBT	2,800	640	1,400	320	675	160	18,000	8,170	134,000	60,790
FMW48350BT	3,000	690	1,450	330	750	180	22,200	10,070	112,000	50,810
FMW54350BT	3,500	800	1,750	400	950	220	20,500	9,300	117,250	53,190
FMW5434FBT	3,500	800	1,750	400	950	220	23,000	10,440	250,000	113,400
FMW60350BT	3,700	850	1,800	410	975	230	30,357	13,770	156,000	70,770
FMW66350BT	4,000	910	2,000	460	1,200	280	24,500	11,120	158,900	72,080
FMW6636FBT	4,000	910	2,000	460	1,200	280	36,000	16,330	250,026	113,410
FMW72380BT	4,500	1,030	2,200	500	1,250	290	40,344	18,300	190,000	86,190
FMW7238FBT	4,500	1,030	2,200	500	1,250	290	33,000	14,970	344,000	156,040
FMW84380BT	4,800	1,100	2,500	570	1,350	310	43,000	19,510	210,000	95,260

*Model names: OB = Outboard bearing, FB = Flange bearing

WASHING

DEWATERING SCREEN

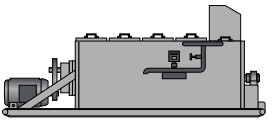
PURPOSE	DESIGN
• Dewater material • Higher stockpiles; No winter drainage • Water passes material/screen media • Moisture content as low as 8%	• Adjustable discharge dam • Adjustable deck (0 - 2°) • Urethane screen sidewalls • Fines recovery jet • Same day product shipping • Optional road portable package

STANDARD										
Model*	Capacity		Screen Size		Weight		Total Screening Area*		Screen Motor	
	MTPH	tph	m	ft	lbs	kg	m^2	ft^2	kW	hp
3081VBDS	36-72	40-80	0.9 x 2.4	3' x 8'	5,300	2,500	5.4	58	(2) 5.3	(2) 7.0
4081VBDS	54-108	60-120	1.2 x 2.4	4 'x 8'	5,700	2,600	6.4	68	(2) 5.3	(2) 7.0
4101VBDS	54-108	60-120	1.2 x 3.0	4' x 10'	6,500	3,000	7.7	84	(2) 5.3	(2) 7.0
5101VBDS	91-182	100-200	1.5 x 3.0	5' x 10'	8,200	3,800	8.8	94	(2) 11.4	(2) 8.6
6101VBDS	136-272	150-300	1.8 x 3.0	6 'x 10'	9,000	4,100	9.9	106	(2) 9.4	(2) 7.1
6121VBDS	136-272	150-300	1.8 x 3.6	6' x 12'	10,000	4,600	11.6	124	(2) 9.4	(2) 7.1
7121VBDS	182-364	200-400	1.2 x 3.6	7 'x 12'	11,000	5,000	12.8	137	(2) 17.4	(2) 13.0
LOW PROFILE										
3081VBDSLP	36-72	40-80	0.9 x 2.4	3' x 8'	5,000	2,300	4.4	47	(2) 5.3	(2) 7.0
4081VBDSLP	54-108	60-120	1.2 x 2.4	4' x 8'	5,500	2,500	5.3	57	(2) 5.3	(2) 7.0
5101VBDSLP	91-182	100-200	1.5 x 3.0	5' x 10'	8,000	3,700	7.6	81	(2) 5.3	(2) 11.4

*Total screening area is the sum of the bottom, angeled and side deck area which allows for maximum drainage of moisture.

WASHING

PUGMILL



SPECIFICATIONS

Model	Shaft Speed	Capacity		Motor	
		mtph	tph	kW	hp
36 x 9 Pugmill Mixer	33	315-680	(350 -750)	75	100
44 x 12 Pugmill Mixer	26	545-1,090	(600-1,200)	110	150

CONVEYING

STOCKPILE CONVEYORS

TELESTACKER® CONVEYOR

For segregation and large stockpiles

POWERSTACKER® CONVEYOR

For large stockpiles and portability

PINNACLE® CONVEYOR

For stockpiles at higher angle of incline

RADIAL STACKING CONVEYORS

For basic stockpiling

SLIDE-STAC™ CONVEYORS

Three stacking conveyors in one load

TRIPPER CONVEYORS

Large linear stockpiles

CONVEYORS

OVERLAND CONVEYORS

ZIPLINE® CONVEYORS

An economical overland alternative

TRAILBLAZER® CONVEYORS

World's only portable overland conveyor

ENGINEERED CONVEYORS

Custom-engineered long-distance conveying

CONVEYORS

TRANSFER CONVEYORS

STACKABLE CONVEYORS

Up to eight conveyors in one load

JUMP CONVEYORS

Workhorse transfer conveyors

SLIDE-PAC™ CONVEYOR

Roll from transport to operation

EXTENDER CONVEYORS

Extend or retract head pulley

CONVEYORS

FEED CONVEYORS

RAZERTAIL® TRUCK UNLOADER

Transfers material from truck to target

RAZERLINK® MOBILE CONVEYOR

Transfer material from truck to multiple targets

STATIONARY TRUCK UNLOADER

Stationary truck unloading system

TUNNEL RECLAIM CONVEYOR

On-demand access to surge piles

CONVEYORS

STATIONARY CONVEYORS

STACKING CONVEYORS

Performance-matched engineering to be structurally sound

IN-PLANT CONVEYORS

Connect systems like feeding, crushing, screening and washing equipment

FEED HOPPERS

Used in bulk material applications including stone, sand, gravel, recycle and organics

CONVEYOR PULLEYS

PULLEY HUB STYLES

WELDED HUB

- Best value
- High tension is no concern

INTEGRAL HUB

- One piece machined end disc
- Eliminates two welds of hub to end disc

PROFILE DISC

- Best value
- High tension is no concern

T-SECTION

- Joins with butt welds and rim
- Belts over 2500 PIW

TURBINE END DISC

- Solid profile disc
- Two side machining
- Meets specific loads and tensions

CONVEYOR PULLEYS

PULLEY BUSHING TYPES

XT BUSHING

- Conveyor pulley design
- 2″ per foot taper
- Self-seating, no hammer
- Less axial movement
- Equally spaced bolts

QD BUSHING

- Wide variety of applications
- 3/4″ per foot taper
- Self-seating, no hammer
- High clamping force

TAPER-LOCK BUSHING

- Flush fit
- 1-11/16″ per foot of taper

KEYLESS LOCKING DEVICE

- Conveyor pulley design
- High torque capability
- No keyway stress concentration
- Tight mechanical shrink fit

CONVEYOR PULLEYS

DRUM PULLEY SPECS

	CEMA DUTY	PRIME® PULLEY	MINE DUTY	SUPER DUTY
Diameter	8″ - 60″	8″ - 30″	8″ - 30″	8″ - 30″
Face Width	12″ - 78″	12″ - 78″	12″ - 78″	12″ - 78″
Belt Style	Fabric	Fabric	Fabric	Fabric
Belt Start	No Load	Full Load	Full Load	Full Load
Starts & Stops	Infrequent	Frequent	Frequent	Frequent
Feed Style	Uniformly Loaded	Non-Uniformly	Non-Uniformly	Non-Uniformly

CEMA DUTY

PRIME PULLEY

MINE DUTY

SUPER DUTY

CONVEYOR PULLEYS

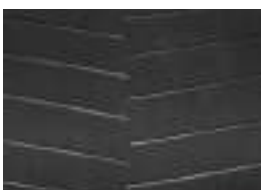
DRUM LAGGING

SMOOTH

Bend, Snub

CHEVRON

Drive, HT, One Direction



HERRINGBONE

Drive, HT, One Direction

DIAMOND

Drive, HT, One Direction

SLIDE LAG

Drive, Head

CERAMIC

High Tension, High HP

URETHANE

Bend, Wing Lag

CONVEYOR PULLEYS

WING PULLEY SPECIFICATIONS

	CEMA DUTY		MINE DUTY		SUPER DUTY	
	Traditional Wing	Chevron® Wing	Traditional Wing	Chevron Wing	Traditional Wing	Chevron Wing
Diameter	6″ - 60″	10″ - 48″	10″ - 60″	10″ - 48″	10″ - 60″	10″ - 48″
Belt Start	No Load	Full Load	Full Load		Full Load	
Starts & Stops	Infrequent	Frequent	Frequent		Frequent	
Feed Style	Uniformly Loaded	Non-Uniformly	Non-Uniformly		Non-Uniformly	
Wing Bar	Flat or Round	Half Round	Flat or Round	Round	Flat or Round	Round
Bar Thickness	1/4″ x 1-1/2″	1″ x 1/2″	5/8″ x 1-1/2″	1″	3/4″ x 2″	1-1/2″

TRADITIONAL WING

CHEVRON WING

SPIRAL WING

ROUND BAR WING

USEFUL CALCULATIONS

PULLEY FORMULAS

PULLEY REVOLUTIONS PER MINUTE & FORMULAS

DIA. OF PULLEY (IN)	PULLEY CIRC. (FT)	BELT SPEEDS IN FEET PER MINUTE								
		100	150	200	250	300	350	400	500	600
		PULLEY REVOLUTIONS PER MINUTE								
12	3.14	31.8	47.7	63.7	79.6	95.6	111.4	127.3	159.2	191
14	3.67	27.2	40.8	54.5	68.2	81.7	95.5	109.1	136.4	163.7
16	4.18	23.9	35.8	47.8	59.8	71.8	85	95.5	119.4	143.2
18	4.72	21.1	31.8	42.4	53	63.6	74.2	84.9	106.1	127.3
20	5.24	19.1	28.6	38.2	47.7	57.2	66.8	76.4	95.5	114.6
24	6.28	16	23.9	31.9	39.8	47.8	55.7	63.7	79.7	95.5
26	6.8	14.7	22	29.4	36.7	44.2	51.5	58.8	73.5	88.1
28	7.32	13.7	20.5	27.3	34.2	41	47.8	54.7	68.3	81.9
30	7.85	12.7	19.1	25.5	31.8	38.2	44.6	51	63.7	76.4
32	8.37	11.9	17.9	23.9	29.8	35.8	41.8	47.7	59.7	71.6
36	9.42	10.6	15.9	21.2	26.5	31.8	37.2	42.5	53	63.7

PULLEY APPLICATION FORMULAS

TO OBTAIN	HAVING	FORMULA
Belt speed feet per minute	Diameter (D) of pulley inches and revolutions per minute (RPM)	S = 0.2618 x D x RPM
Shaft speed revolutions per minute (RPM)	Velocity (S) ft. per minute and diameter (D) of pulley inches	RPM = S ÷ 0.2618 x D
Diameter (D) of pulley inches	Velocity (S) ft. per minute and revolutions per minute (RPM)	D = S ÷ 0.2618 x RPM
Torque (T) in (lbs)	Force (W) lbs and radius (R) inches	T = W x R

BASIC IDLER STYLES


EQUAL TROUGHING IDLERS


IMPACT IDLERS


OFFSET CENTER ROLL IDLERS


CHANNEL MOUNT LOW PROFILE IDLERS


FEEDER/PICKING IDLERS


UNEQUAL TROUGHING IDLERS


CB504 SERIES IDLERS


GARLAND IDLERS


RETURN BELT IDLERS


RUBBER CUSHION RETURN IDLERS


URATHON® RETURN ROLL


SPIRAL URATHON® RETURN ROLL


SELF-ALIGNER IDLERS


SELF-ALIGNER RETURNS


FLAT CARRIER IDLERS


RUBBER CUSHION FLAT CARRIES


LIVE SHAFT ROLLERS


40 SERIES IDLERS


VARIABLE PITCH IDLERS


V-RETURN IDLERS


WIRE ROPE IDLERS


BEATER BAR


URATHON® BEATER ROLL

Note: The color orange on conveyor idlers is a federally registered trademark of Superior Industries, Inc.

IDLER OFFERINGS

STEEL ROLL OFFERING BY CLASS

CLASS	BEARING	DIAMETER in (mm)	SHELL THICKNESS in (mm)	BELT WIDTH in (mm)	TUBE
CEMA B	17mm	4", 5" (101, 127)	1/8", 5/32" (3.1, 3.9)	18" - 48" (457 - 1,219)	Single
CEMA C	20mm	4", 5", 6" (101, 127, 152)	1/8", 5/32", 3/16" (3.1, 3.9, 4.7)	18" - 60" (457 - 1,524)	Single
CEMA D	25mm	5", 6" (127, 152)	5/32", 3/16" (3.9, 4.7)	24" - 72" (609 - 1,828)	Single
DX	30mm	5", 6" (127, 152)	1/4" (6.3)	30" - 72" (762 - 1,828)	Single
CEMA E	40mm	6", 7" (152, 177)	1/4" (6.3)	36" - 96" (914 - 2,438)	Single
40DT	40mm	6", 7" (152, 177)	1/4" x 2" (6.3 x 2)	36" - 72" (914 - 1,828)	Double
45DT	45mm	6", 7", 7.5" (152, 177, 190)	1/4" x 2" (6.3 x 2)	54" - 108" (1,371 - 2,743)	Double
CEMA F	50mm	7", 8" (177, 203)	1/2", 3/4" (12.7, 19.0)	42" - 120" (1,066 - 3,048)	Single
50DT	50mm	7", 8" (177, 203)	1/4" x 2" (6.3 x 2)	42" - 120" (1,066 - 3,048)	Double
60DT	60mm	7", 8" (177, 203)	1/4" x 2" (6.3 x 2)	60" - 120" (1,524 - 3,048)	Double

IMPACT ROLL OFFERING BY CLASS

CLASS	BEARING	DIAMETER in (mm)	BELT WIDTH in (mm)	IDLER TYPES	
				EI	RETI
CEMA B	17mm	4", 5" (101, 127)	18" - 48" (457 - 1,219)	tires	tires
CEMA C	20mm	4", 5", 6" (101, 127, 152)	18" - 60" (457 - 1,524)	tires	tires
CEMA D	25mm	5", 6" (127, 152)	24" - 72" (609 - 1,828)	tires	tires
DX	30mm	5", 6" (127, 152)	30" - 72" (762 - 1,828)	vulcanized	vulcanized
CEMA E	40mm	6", 7" (152, 177)	36" - 96" (914 - 2,438)	tires	tires
CEMA F	50mm	7", 8" (177, 203)	42" - 120" (1,066 - 3,048)	vulcanized	vulcanized
CEMA G	60mm	7", 8" (177, 203)	60" - 120" (1,524 - 3,048)	vulcanized	vulcanized
40DT	40mm	6", 7" (152, 177)	36" - 72" (914 - 1,828)	vulcanized	vulcanized
45DT	45mm	6", 7", 7.5" (152, 177, 190)	54" - 108" (1,371 - 2,743)	vulcanized	vulcanized
50DT	50mm	6", 7", 8" (152, 177, 203)	42" - 120" (1,066 - 3,048)	vulcanized	vulcanized
60DT	60mm	7", 8" (177, 203)	60" - 120" (1,524 - 3,048)	vulcanized	vulcanized

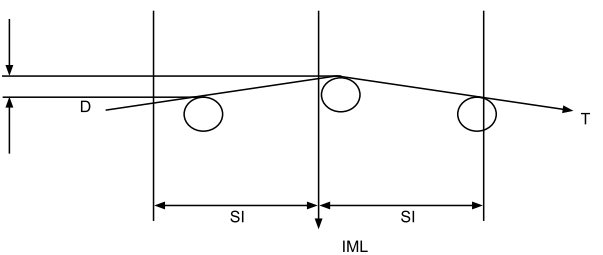
IDLER SELECTION PROCEDURE

INITIAL SELECTION; STEPS 1, 2, AND 3:

Select idler class by comparing calculated idler load with idler load ratings (CIL and CILR) from **Tables 1-5** through **1-11** Select impact idler class, if necessary, as shown in Step 3. CEMA idler manufacturers have standard designs meeting these load ratings and dimensional standards shown in tables listed in this publication.

STEP 1: TROUGHING IDLERS SERIES SELECTION

Calculated Idler Load (lbs) = CIL = ((WB + (WM x K1)) x SI) + IML
Where:
WB= Belt weight (lbs/ft) use actual or estimate from **Table 1-1**
WM= Material weight (lbs/ft) = (Q x 2000) / (60 x V)



Q= Quantity of material conveyed (Tons per hour)

V= Design belt speed (FPM)

SI= Spacing of idlers (ft)

K1= Lump adjustment factor (see **Table 1-2**)
Note: Actual weight of lump should be compared with WM value. In situations it may be necessary to use actual lump weight as WM.

IML= Idler misalignment load (lbs) due to idler height deviation and belt tension = (D x T) / (6 x SI)
Where:

D= Misalignment (in)

T= Belt Tension (lbs)

SI= Idler Spacing (ft)

When an idler is higher than the adjacent idler, a component of belt tension will add load to that idler. The amount of height deviation can vary with the installation and type of idler. CEMA publication on "Conveyor Installation Standards" (Appendix D, "Belt Conveyors for Bulk Material," Fifth Edition or later) lists recommendations on structure misalignment.

IDLER SELECTION PROCEDURE

Use CIL and select proper series of idler from **Tables 1-1** through **1-4**. CIL value should be equal to or less than idler rating.

This troughing idler selection procedure for calculating idler load does not include the following:

1. Impact force on idler at loading points.

2. Effect of belt transitions (head and tail pulley) on idler load.

STEP 2: RETURN IDLER SERIES SELECTION

Calculated Idler Load (lbs) = CILR = (WB x SI) + IML
Use CILR and select proper series of idler form **Tables 1-1** through **1-4**. CILR should be equal to or less than return idler rating.

STEP 3: IMPACT IDLER SERIES SELECTION

For homogeneous material without lumps:
Impact Force (lbs) = $F = (0.1389)Q\sqrt{H}$
Where:
Q= Rate of flow (ST/hr)
H= Height of fall (ft)

The calculated impact force (F), is then multiplied by an impact idler spacing factor, f (**Table 1-3**), to determine the impact force on one idler.

Unit Impact Force (lbs) = Fu = F(f)

Use this unit impact force (Fu) and select proper series of impact idler from **Tables 1-1** through **1-4**. Fu should be equal to or less than idler rating.

For material containing large lumps:
Impact Force (lbs) = $F = W + (2kWH)^{1/2}$
Where:
W= Weight of lump (lbs)
H= Height of fall (ft)
k= Spring constant for specific idler type (lbs/ft)

Use calculated energy rating, WH, and maximum lump size to select proper series of impact idler from **Table 1-4**. Both WH and lump size should be equal to or less than energy rating and maximum lump size.

Note: Both cases (material without lumps and material containing large lumps) should always be considered and the heavier duty idler selected to insure adequate impact resistance capabilities.

IDLER SELECTION PROCEDURE

TABLE 1-1 WB ESTIMATED AVERAGE BELT WEIGHT FOR MULTIPLE AND REDUCED PLY BELTS PER UNIT LENGTH

BELT WIDTH (IN)	MATERIAL CARRIED, LBS/CU FT		
	30-74	75-129	130-200
18"	3.5	4	4.5
24"	4.5	5.5	6
30"	6	7	8
36"	9	10	12
42"	11	12	14
48"	14	15	17
54"	16	17	19
60"	18	20	22
72"	21	24	26
84"	25	30	33
96"	30	35	38

1. Steel cable belts increase above value by 50%.

2. Actual belt weights may vary with different constructions, manufacturers, cover gauges, etc. Use the above values for estimating. Obtain actual values from the belt manufacturer whenever possible.

TABLE 1-2 K1 LUMP ADJUSTMENT FACTOR

MATERIAL LUMP SIZE (IN)	MATERIAL WEIGHT, LBS/CU FT						
	50	75	100	125	150	175	200
4"	1.0	1.0	1.0	1.0	1.1	1.1	1.1
6"	1.0	1.0	1.0	1.1	1.1	1.1	1.1
8"	1.0	1.0	1.1	1.1	1.2	1.2	1.2
10"	1.0	1.1	1.1	1.1	1.2	1.2	1.2
12"	1.0	1.1	1.1	1.2	1.2	1.2	1.3
14"	1.1	1.1	1.1	1.2	1.2	1.3	1.3
16"	1.1	1.1	1.2	1.2	1.3	1.3	1.3
18"	1.1	1.1	1.2	1.2	1.3	1.3	1.4

TABLE 1-3 IMPACT IDLER SPACING FACTOR

SI IMPACT	FACTOR (f)
1' 0"	0.5
1' 6"	0.7
2' 0"	0.9
>2' 0"	1

TABLE 1-4 ENERGY RATINGS FOR IMPACT IDLERS

3-ROLL RUBBER IMPACT IDLERS (EQUAL LENGTH ROLLS)		
CEMA Series	WH (lbs-ft)	Maximum Lump Size (in)
B	40	4"
C	160	6"
D	240	8"
E	460	12"

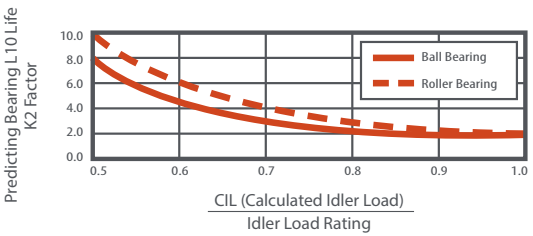
IDLER SELECTION PROCEDURE

BEARING L10 LIFE CORRECTION; STEPS 4, 5, & 6:

Factors K2 (**Fig. 1**) and K3A (**Fig. 2**) are multiplying factors used to adjust basic L10 life rating of idler class selected. Factor K2 is based on percent of idler load and K3A is factor of actual roll speed (RPM). Determining K3B in step 6 is an optional step to show the advantage of using larger diameter rolls. It can be used as a multiplier to save repeating step 5 if a larger diameter roll is used.

STEP 4: K2 = EFFECT OF LOAD ON PREDICTED BEARING L10 LIFE

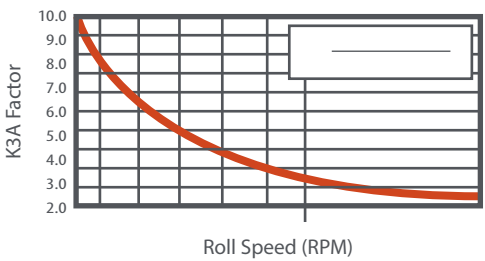
When Calculated Idler Load (CIL) is less than CEMA load rating of series idler selected, the bearing L10 life will increase.



(Fig. 1) Effect of Load on Predicted Bearing L10 Life

STEP 5: K3A = EFFECT OF BELT SPEED ON PREDICTED BEARING L10 LIFE

CEMA L10 life ratings are based on 500 rpm. Slower speeds increase life and faster speeds decrease life. Figure 2-6 shows this relationship.



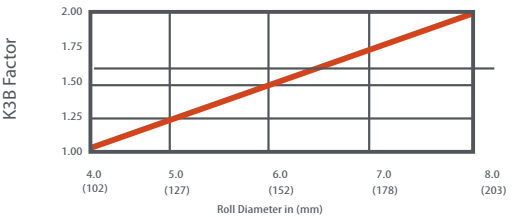
(Fig. 2) Effect of Belt Speed on Predicted Bearing L10 Life

IDLER SELECTION PROCEDURE

STEP 6: K3B= EFFECT OF ROLL DIAMETER ON PREDICTED BEARING L10 LIFE

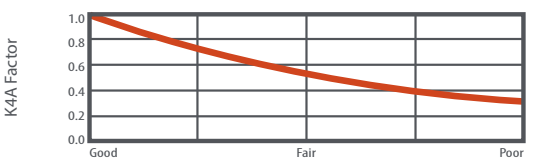
For a given belt speed, using larger diameter rolls will increase idler L10 life adjustments for various roll diameters using 4" diameter as a value of 1.0. Percent life increase can be calculated for each roll diameter increase.

Example: 1.5 for 6" diameter or 1.25 for 5" diameter=
1.20 or 20% increase in L10 life.

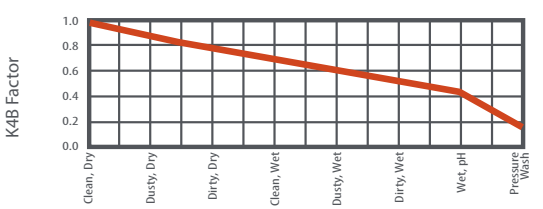


Note: In addition to increased predicted bearing L10 life, larger diameter rolls can increase idler wear life.

(Fig. 3) K3B= Effect of Roll Diameter on Predicted Bearing L10 Life (Based on the same belt speed)



(Fig. 4) K4A= Effect of maintenance on potential idler life

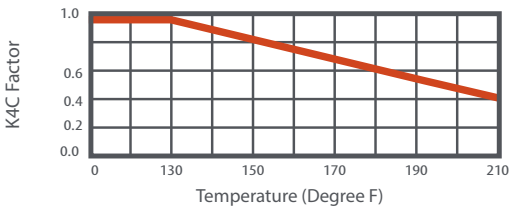


(Fig. 5) K4B= Effect of environment on potential idler life

IDLER SELECTION PROCEDURE

DETERMINE POTENTIAL IDLER LIFE; STEP 7:

Factors K4A (**Fig. 3**), K4B (**Fig. 4**), and K4C (**Fig. 5**) show conditions which will affect idler life and are independent of bearing L10 life, idler load and idler class. Use these figures to evaluate the potential expected idler life.



(Fig. 5) K4C= Effect of operating temperature on potential idler life

Based on collective application experience by CEMA idler manufacturers these conditions are important in determining potential idler life. However, exact mathematical basis is subjective so contact your CEMA idler manufacturer for assistance.

IDLER SELECTION PROCEDURE

TABLE 1-5 LOAD RATINGS FOR CEMA B IDLERS, LBS

BELT WIDTH (IN)	TROUGHED ANGLE			SINGLE ROLL RETURN
	20°	35°	45°	
18"	410	410	410	220
24"	410	410	410	190
30"	410	410	410	165
36"	410	410	396	155
42"	390	363	351	140
48"	381	353	342	125

TABLE 1-6 LOAD RATINGS FOR CEMA C IDLERS, LBS

BELT WIDTH (IN)	TROUGHED ANGLE			SINGLE ROLL RETURN	TWO ROLL VEE RETURN
	20°	35°	45°		
18"	900	900	900	475	-
24"	900	900	900	325	500
30"	900	900	900	250	500
36"	900	837	810	200	500
42"	850	791	765	150	500
48"	800	744	720	125	500
54"	750	698	675	*	500
60"	700	650	630	*	500

*Use CEMA D Return Idler.

TABLE 1-7 LOAD RATINGS FOR CEMA D IDLERS, LBS

BELT WIDTH (IN)	TROUGHED ANGLE			SINGLE ROLL RETURN	TWO ROLL VEE RETURN
	20°	35°	45°		
24"	1200	1200	1200	600	-
30"	1200	1200	1200	600	-
36"	1200	1200	1200	600	850
42"	1200	1200	1200	500	850
48"	1200	1200	1200	425	850
54"	1200	1116	1035	375	850
60"	1150	1070	1035	281	850
66"	-	-	-	215	850
72"	1050	977	945	155	850
78"	-	-	-	125	850

IDLER SELECTION PROCEDURE

TABLE 1-8 LOAD RATINGS FOR CEMA E IDLERS, LBS

BELT WIDTH (IN)	TROUGHED ANGLE			SINGLE ROLL RETURN
	20°	35°	45°	
36"	1800	1800	1800	1000
42"	1800	1800	1800	1000
48"	1800	1800	1800	1000
54"	1800	1800	1800	925
60"	1800	1800	1800	850
66"	-	-	--	775
72"	1800	1800	1800	700
78"	-	-	-	625
84"	1800	1674	1620	550
90"	-	-	-	475
96"	1750	1628	1575	400
102"	-	-	-	250

TABLE 1-9 LOAD RATINGS FOR CEMA F IDLERS, LBS

BELT WIDTH (IN)	TROUGHED ANGLE			SINGLE ROLL RETURN
	20°	35°	45°	
60"	3000	3000	3000	1500
72"	3000	3000	3000	1200
84"	3000	3000	3000	900
96"	2800	2800	2800	600

Notes for Tables 1-1 through 1-12

1. Troughing idler load ratings are for three equal length rolls.
2. Load ratings also apply for impact rolls.
3. Troughing idler load ratings are based on a load distribution of 70% on center roll and 15% on each end roll for all trough angles.
4. CEMA B and C ratings based on min. L10 of 30,000 hours at 500 RPM.
5. CEMA D and E ratings based on Min. L10 of 60,000 hours at 500 RPM.

IDLER SELECTION PROCEDURE

TABLE 1-10 LOAD RATINGS FOR CEMA PICKING IDLERS, LBS

BELT WIDTH (IN)	CEMA C	CEMA D	CEMA E
24"	475	600	-
30"	475	600	-
36"	325	600	1260
42"	250	600	1200
48"	200	530	1000
54"	150	440	1000
60"	125	400	1000
66"	-	-	1000
72"	-	280	925
84"	-	-	775
96"	-	-	625

TABLE 1-11 LOAD RATINGS FOR CEMA LIVE SHAFT IDLERS, LBS

BELT WIDTH (IN)	CEMA C	CEMA D	CEMA E
18"	1200	-	-
24"	1200	1400	2100
30"	1200	1400	2100
36"	1200	1400	2100
42"	1100	1400	2100
48"	1000	1275	2100
54"	875	1150	2100
60"	780	1000	2100
72"	-	850	2100
84"	-	-	1825
96"	-	-	1550

TABLE1-12 BEARING SIZE

CEMA C	CEMA D	CEMA E
1 7/16"	1 15/16"	203

IDLERS AND BELT CAPACITY

TRAINING IDLERS

Self-aligning idlers operate effectively when empty belt tensions are 200-lbs/in or less. When empty belt tensions exceed this range, the belt becomes too stiff and makes training difficult. Belt loaded at high tensions and which generate detraining forces due to off-loading cannot be re-aligned with self-aligning idlers. Self-aligning idlers work effectively at low belt tensions to overcome small amounts of idler skew, which make narrow belts easier to train. Self-aligning idlers are especially needed on low tension reversible belts. Conveyor belts that are 48" and wider usually do not need self-aligning idlers even at low belt tensions because the weight of the belt has more training force than is obtainable with a trainer.

The removal of one return idler on each side of a self-aligning return to increase conveyor belt wrap on the idler will increase its self-aligning capacity. An alternative in removing the return idlers is to raise the self-aligner above the return belt line.

When self-aligning return idlers are used, they should be no closer than 12 belt widths from terminals and should not be located on vertical curves.

SELF-ALIGNER SPACING	INDOOR	FOR WIND AND RAIN
In line at standard spacing	200 ft	150 ft
(Returns removed to obtain maximum training)	150 ft	75-100 ft

BELT CARRYING CAPACITY

The carrying capacity of a belt conveyor depends upon belt width, belt speed, and idler troughing configuration. The following information and charts will help you in selecting the proper size and style of idler.

A. Define the material and its characteristics: Refer to chart in following pages for weights in lbs per cu ft and surcharge angles for some bulk materials.

B. Select belt speed: Refer to chart in following pages for maximum recommended belt speeds. The most economical selection usually dictates the use of maximum belt speeds.

C. Select required belt width: Using chart in following pages and the correct surcharge angle for the material being handled, select a belt width. Chart gives theoretical carrying capacities with various belt widths and idler troughing angles. Chart is based on a belt speed of 100 FPM and a material weight of 100 lbs per cu ft. Footnote (1) tells how to calculate the capacities for other belt speeds and material weights. When determining belt width, belt speed, and troughing configuration, select the narrowest belt that will handle the largest material lumps and transport the required capacity without exceeding the maximum recommended belt speed.

CONVEYOR BELT TROUBLESHOOTING GUIDE

PROBLEM	PROBABLE CAUSES (FROM MOST LIKELY TO LEAST)							
Belt runs off at tail pulley	7	14	15	17	20	-	-	-
Belt runs off at all points of the line	25	17	14	20	3	16	-	-
One belt section runs off at all points of the line	2	11	1	-	-	-	-	-
Belt runs off the head pulley	14	22	20	16	-	-		-
Belts runs to one side throughout the entire length at specific idlers	14	16	20	-	-	-	-	-
Belts slips	19	7	20	15	22	-	-	-
Belt slips on starting	19	7	22	10	-	-	-	-
Excessive belt stretch	13	10	20	6	8	9	-	-
Belt breaks at or behind fasteners, or fasteners tear loose	2	23	13	22	21	10	6	8
Vulcanized splice separation	23	10	20	14	19	2	-	-
Excessive bottom cover wear	20	15	5	19	21	22	9	-
Excessive edge wear, broken edges	25	3	17	9	1	20	2	-
Excessive top over wear, gouges, rips, ruptures, and tears	12	24	17	15	9	5	-	-
Cover swells or softens in spots	9	-	-	-	-	-	-	-
Longitudinal grooving or cracking of top cover	26	15	20	12	-	-	-	-
Cover checked or brittled	9	-	-	-	-	-	-	-
Belt hardens or cracks	9	23	22	-	-	-	-	-
Longitudinal grooving or cracking of bottom cover	15	20	22	-	-	-	-	-
Fabric decay, carcass cracks, gouges, ruptures, soft spots	12	21	5	10	9	-	-	-
Ply separation	13	23	11	9	4	-	-	-

CONVEYOR BELT TROUBLESHOOTING GUIDE

PROBABLE CAUSES LIST

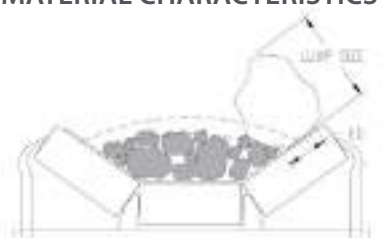
1. BELT BOWED: Avoid telescoping belt rolls or storing them in damp locations. A new belt should straighten out when "broken in" or complete system must be reinspected.
2. BELT IMPROPERLY SPLICED OR WRONG FASTENERS: Use fasteners recommended by the manufacturer. Retighten after running for a short while. If improperly spliced remove old splice and resplice. Set up regular inspection schedule.
3. BELT STRAINED (or elongated on one side): Allow enough time for new belt to "break in". If belt does not break in properly or is not new, remove strained section and splice in new piece.
4. BELT SPEED TOO FAST: Reduce speed.
5. BREAKER STRIP MISSING OR INADEQUATE: When service is lost, install belt with proper breaker strip.
6. COUNTERWEIGHT TOO HEAVY: Recalculate weight and adjust counterweight accordingly. Reduce take-up tension to point of slippage; retighten slightly.
7. COUNTERWEIGHT TOO LIGHT: Recalculate weight and adjust counter weight or screw take-up accordingly.
8. DIFFERENTIAL SPEED WRONG ON DUAL PULLEYS: Make necessary adjustment and observe operation closely.
9. DAMAGE BY ACIDS, CHEMICALS, OILS, OR DETERIORATION BY ABRASIVES, HEAT OR MILDEW: Use belt designed for specific condition. For abrasive materials working into cuts and piles, repair with cold pack or with permanent repair patch. Seal metal fasteners or replace with vulcanized step splice. Enclose belt line for protection against rain, snow, or sun. Do not over-lubricate idlers.
10. DRIVE UNDERBELTED: Recalculate maximum belt tensions and select correct belt. If line is over-extended, consider using two flight system with transfer point. If carcass is not rigid enough for load, install belt with proper flexibility when service is lost.
11. EDGE WORN OR BROKEN: (permitting moisture penetration and belt shrinkage on one side): Repair belt edge. Remove badly worn or out-of-square section and splice in new piece of belt.
12. EXCESSIVE IMPACT OF MATERIAL ON BELT OR FASTENERS: Use correctly designed chutes and baffles. Make vulcanized splices. Install impact idlers. Where possible, load fines first. Where material is trapped under skirts, adjust skirtboards to minimum clearance or install cushioning idlers to hold belt against skirts.
13. EXCESSIVE TENSION: Recalculate and adjust tension. Use vulcanized splice with recommended limits.
14. IDLERS OR PULLEY SHAFT OUT OF SQUARE WITH CENTER LINE OF CONVEYOR: Realign and install limit switches for greater safety. Check conveyor manufacturer's manual or guide.
15. IDLERS FROZEN: Free the idlers; then lubricate, but don't overdo it.
16. IMPROPERLY PLACED IDLERS: Relocate idlers or insert additional idlers spaced to support belt.
17. IMPROPER LOADING: Feed should be in direction of belt travel and at belt speed, centered on the belt. Control flow with feeders, chutes and skirtboards.
18. IMPROPER STORAGE OR HANDLING: Contact your representative for storage and handling tips.
19. INSUFFICIENT TRACTION BETWEEN BELT AND PULLEY: Increase wrap with snub pulleys. Lag drive pulley. In wet conditions use grooved lagging. Install correct cleaning devices on belt and centrifugal switch for safety.
20. MATERIAL BUILD-UP (on pulleys and idlers): Remove accumulation and install cleaning devices, scrapers, and inverted "V" decking.
21. MATERIAL FALLING BETWEEN BELT AND PULLEY: Use skirtboards properly. Remove accumulation.
22. PULLEY LAGGING WORN: Replace worn pulley lagging. Use grooved lagging for wet conditions. Repair loose bolts protruding.
23. PULLEYS TOO SMALL: Go to a larger diameter.
24. RELATIVE LOADING VELOCITY TOO HIGH OR TOO LOW: Adjust chutes or belt speed. Consider use of impact idlers. Observe operation closely.
25. SIDE LOADING: Load in direction of belt travel.
26. SKIRTS INCORRECTLY PLACED: Install skirtboards so that they do not rub against belt.

BELT SPEEDS

MAXIMUM RECOMMENDED BELT SPEEDS

MATERIAL BEING CONVEYED	BELT SPEEDS (FPM)	BELT WIDTH (IN)
Grain or other free-flowing, nonabrasive material	400	18"
	600	24"-30"
	800	36"-42"
	1000	48"-96"
Coal, damp clay, soft ores, overburden and earth, fine-crushed stone	600	18"
	800	24"-36'
	1000	42"-60"
	1200	72'-96"
Heavy, hard, sharp-edged ore, coarse-crushed stone	400	18"
	600	24'-36"
	800	Over 36"
Foundry sand, prepared or damp; shakeout sand with small cores, with or without small castings (not hot enough to harm belting)	350	Any Width
Prepared foundry sand and similar damp (or dry abrasive) materials discharged from belt by rubber-edged plows	200	Any Width
Nonabrasive materials discharged from belt by means of plows - except wood pulp, where 300 to 400 preferable	200	Any Width
Feeder belts, flat or troughed, for feeding fine, nonabrasive, or mildly abrasive materials from hoppers and bins.	50 to 100	Any Width

MATERIAL CHARACTERISTICS

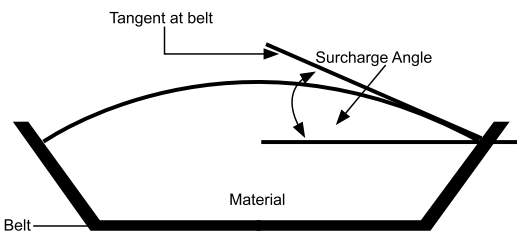


Large Material Size Effects	Falling Rock Concerns
• Belt capacity • Hopper and chute design • Rock containment	• Safety • Equipment damage • Plugging of chutes and hoppers

BELT CAPACITY

MAXIMUM BELT CAPACITIES

BW (IN)	Troughed Angle	MAX BELT CAPACITY (TPH)					MAX. MATERIAL (IN) FOR 20° SURCHARGE	
		Surcharge Angle					All lumps uniform size	Mixed 10% lumps 90% fines
		5°	10°	20°	25°	30°		
18"	20°	-	-	50	56	63	4	4
	35°	Not Recommended						
	45°	Not Recommended						
24"	20°	-	-	96	108	120	5	7
	35°	-	102	122	132	142	5	7
	45°	106	115	132	140	170	5	7
30"	20°	-	-	157	175	195	6	10
	35°	-	167	200	215	232	6	10
	45°	175	187	215	230	244	6	10
36"	20°	-	-	230	260	290	7	12
	35°	-	248	295	318	343	7	12
	45°	258	278	318	340	360	7	12
42"	20°	-	-	320	360	400	8	14
	35°	-	344	408	442	475	8	14
	45°	358	386	440	470	500	8	14
48"	20°	-	-	430	480	530	10	16
	35°	-	457	540	645	630	10	16
	45°	475	510	584	623	660	10	16



1. All capacities shown are for material weighing 100 lbs per cu ft and moving on belt 100fpm. For other weights, capacity equals table capacity.

$$X \frac{\text{Wt/Cu Ft}}{100}$$

For other belt speeds, capacity equals table capacity (or calculated capacity).

$$X \frac{\text{fpm}}{100}$$

2. The surcharge angle is the angle formed between a horizontal line and a tangent to the material slope, both of which pass through the point where the slope meets the belt. Usually the surcharge angle is 10°-15° less than the angle of repose.

3. "Mixed with 50% fines" means at least half of the material must be less than one half the maximum material size.

MAX. BELT CAPACITY

MAXIMUM BELT CAPACITIES

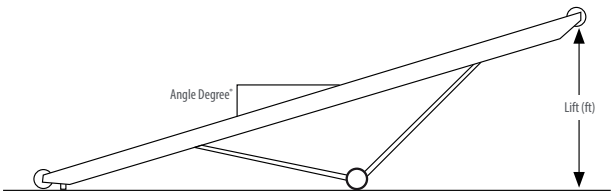
BELT WIDTH (IN)	TROUGH ANGLE	MAX. BELT CAPACITY (TPH) SURCHARGE ANGLE					MAX. MATERIAL (IN) FOR 20° SURCHARGE	
		5°	10°	20°	25°	30°	All Lumps Uniform Size	Mixed 10% lumps 90% fines
18"	20°	-	-	50	56	63	4"	4"
	35°	Not Recommended						
	45°	Not Recommended						
24"	20°	-	-	96	108	120	5"	7"
	35°	-	102	122	132	142	5"	7"
	45°	106	115	132	140	170	5"	7"
30"	20°	-	-	157	175	195	6"	10"
	35°	-	167	200	215	232	6"	10"
	45°	175	187	215	230	244	6"	10"
36"	20°	-	-	230	260	290	7"	12"
	35°	-	248	295	318	343	7"	12"
	45°	258	278	318	340	360	7"	12"
42"	20°	-	-	320	360	400	8"	14"
	35°	-	344	408	442	475	8"	14"
	45°	358	386	440	470	500	8"	14"
48"	20°	-	-	430	480	530	10"	16"
	35°	-	457	540	645	630	10"	16"
	45°	475	510	584	623	660	10"	16"

SUGGESTED NORMAL SPACING OF BELT IDLERS

BELT WIDTH (IN)	WEIGHT OF MATERIAL HANDLED (LBS/FT^3)						RETURN IDLERS
	30	50	75	100	150	200	
18"	5.5	5.0	5.0	5.0	4.5	4.5	10.0
24"	5.0	4.5	4.5	4.0	4.0	4.0	10.0
30"	5.0	4.5	4.5	4.0	4.0	4.0	10.0
36"	5.0	4.5	4.0	4.0	3.5	3.5	10.0
42"	4.5	4.5	4.0	3.5	3.0	3.0	10.0
48"	4.5	4.0	4.0	3.5	3.0	3.0	10.0
54"	4.5	4.0	3.5	3.5	3.0	3.0	10.0
60"	4.0	4.0	3.5	3.0	3.0	3.0	10.0
72"	4.0	3.5	3.5	3.0	2.5	2.5	8.0
84"	3.5	3.5	3.0	2.5	2.5	2.0	8.0
96"	3.5	3.5	3.0	2.5	2.0	2.0	8.0

CONVEYOR LIFT

BASED ON ACTUAL PULLEY CENTER TO CENTER DISTANCE



Hard time understanding this chart? Take the angle degrees on the left-hand side and line it up with the length of conveyor on top to get your lift in feet measurement.

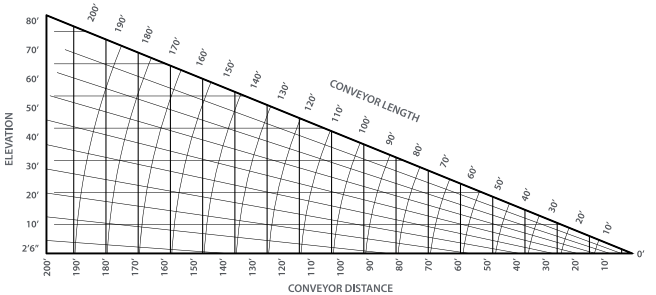
ANGLE DEGREES	LENGTH OF CONVEYOR (FT)													
	10	20	30	40	50	60	70	80	90	100	120	140	160	180
2					2	2	2	3	3	4	4	5	6	6
4			2	3	4	4	5	6	6	7	8	10	12	13
6		2	3	4	5	6	7	8	9	11	13	15	17	19
8		3	4	5	7	8	9	10	12	14	17	19	22	25
10	2	3	5	7	9	10	12	14	16	17	21	24	28	31
12	2	4	6	8	10	12	15	17	19	21	25	29	33	37
14	2	5	7	10	12	15	17	19	22	24	29	34	39	44
16	3	6	8	11	14	17	19	22	25	28	33	39	44	50
18	3	6	9	12	15	19	22	25	28	31	37	43	49	56
20	3	7	10	14	17	21	24	27	31	34	41	48	55	62
22	4	7	11	15	19	22	26	30	34	37	45	52	60	67
24	4	8	12	16	20	24	28	33	37	41	49	57	65	73

LIFT (ft)

ANGLE DEGREES	LENGTH OF CONVEYOR (FT)													
	200	225	250	275	300	350	400	450	500	600	700	800	900	1000
2	7	8	9	10	11	12	14	16	18	21	25	28	32	35
4	14	16	18	19	21	25	28	32	35	42	49	56	63	70
6	21	24	26	29	32	37	42	47	53	63	74	84	95	105
8	28	31	35	38	42	49	56	63	70	83	97	111	125	139
10	35	39	43	48	52	61	70	78	87	104	121	139	157	174
12	42	47	52	57	62	73	83	94	104	125	146	166	187	208
14	48	54	61	67	73	85	97	109	121	145	169	194	218	-
16	55	62	69	76	83	97	110	124	138	166	193	221	-	-
18	62	69	77	85	93	108	124	139	155	185	216	-	-	-
20	68	77	86	94	103	120	137	154	171	205	-	-	-	-
22	75	84	94	103	113	131	150	169	188	225	-	-	-	-
24	81	92	102	122	142	142	163	183	203	-	-	-	-	-

LIFT (ft)

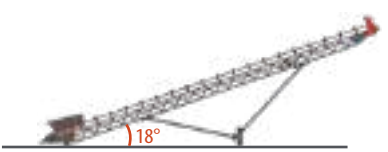
CONVEYOR INCLINE CHART



MAXIMUM BELT CAPACITIES - TPH (MT)

TROUGH ANGLE	SURCHARGE ANGLE	BELT WIDTH					
		18″(m)	24″(m)	30″(m)	36″(m)	42″(m)	48″(m)
20°	20°	50 (45)	90 (87)	157(142)	230 (209)	320 (290)	430 (390)
	25°	56 (51)	108 (98)	175 (159)	260 (236)	360 (327)	480 (435)
	30°	63 (57)	120 (109)	195 (177)	290 (263)	400 (363)	530 (481)
35°	10°		102 (93)	167 (151)	248 (225)	344 (312)	457 (415)
	20°		122 (111)	200 (181)	295 (268)	408 (370)	540 (490)
	25°		132 (120)	215 (195)	318 (288)	442 (401)	645 (585)
	30°		142 (129)	232 (210)	343 (311)	475 (431)	630 (572)
45°	5°		106 (96)	175 (159)	258 (234)	358 (325)	475 (431)
	10°		115 (104)	187 (170)	278 (252)	386 (350)	510 (463)
	20°		132 (120)	215 (195)	318 (288)	440 (399)	584 (530)
	25°		140 (127)	230 (209)	340 (308)	470 (426)	623 (565)
	30°		170 (154)	244 (221)	360 (327)	500 (454)	660 (599)

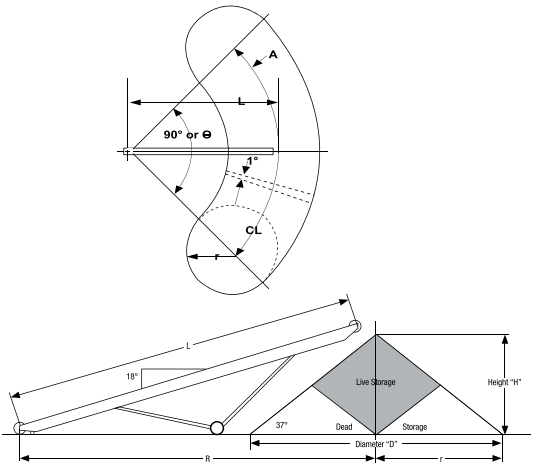
Based on 100 PCF (1.6 t/m^3) material density. 100 FPM belt speed, 100% full belt



Maximum conveying angle of the troughed flat belt, measured from horizon. 18° is typical stacking angle.

CALCULATING STOCKPILE VOLUME

CONICAL AND CIRCULAR SHAPED STOCKPILES

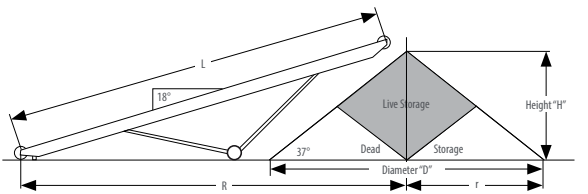


Dimensions in Feet				Conical Pile Volume		Volume For One Degree Arc		90° Stockpile Volume	
L	R	H	r	CY	Tons	CY	Tons	CY	Tons
40	39	14	19	196	265	6.5	8.8	781	1,057
50	48.5	17.5	23	359	485	12.8	17.3	1,511	2,042
60	58	20.5	27	580	783	21	28.4	2,470	3,339
70	67.5	24.5	32.5	1,004	1,355	35	47	4,154	5,585
80	77	27.5	36.5	1,421	1,918	50.2	67.8	5,939	8,020
90	87.5	30	40	1,872	2,527	68	91.6	1,992	10,771
100	96.5	32.5	43	2,331	3,145	87.8	118.6	10,233	13,819
110	105.5	35.5	47	2,058	4,128	114.6	154.7	13,372	18,051
120	115.5	38.5	51	3,884	5,243	147.6	199.2	17,168	23,171
130	125	41.5	55	4,896	6,610	185.6	250.5	21,600	29,155
140	134.5	44.5	59	6,041	8,156	229.6	310	26,705	36,056
150	144	47.5	63	7,312	9,871	280	378	32,512	43,891
170	162	54	72	10,670	14,400	400	540	46,820	63,210
190	181	60	80	14,800	20,000	560	760	65,000	87,800

Calculated volumes are in cubic yards.
Tons are based on 100 lbs per cu ft material, conveyor incline 18 stockpile angle of repose 37. Live storage at center of pile is theoretically 25% of the total volume.

CALCULATING STOCKPILE VOLUME

CONICAL AND CIRCULAR SHAPED STOCKPILES



1. Volume of conical pile $= V_1$

   Where radius of pile (r) and height of pile (H) are known: $V_1 = r^2H\ (.039)$

   Where height of pile (H) and slant length of side of pile (s) are known: $V_1 = H\ (S^2 - H^2)\ (.039)$

   Where slant length of side of pile (s) and angle of repose Ø are known: $V_1 = S_3\ (\cos Ø) 2\ \sqrt{1 - (\cos Ø)^2}\ (.039)$

   Where height of pile (H) and angle of repose (Ø) are known: $V_1 = \frac{H^3\ (.039)}{\tan(Ø)^2}$

2. Volume of a 1° arc segment of stockpile $= V_2$

   a. Where height of pile (H), distance between center line of pile and center line of conveyor pivot (R) are known, and angle of repose Ø is equal to 37° $V_2 = \frac{H^2R}{1160}$

   b. For other angles of repose $V_2 = \frac{H^2R}{(1547)(\tan Ø)}$

3. Degrees of arc of stockpile with known arc lengths $= \Theta$ Where diameter of stockpile (D) and arc length (A) are known: $\Theta = \frac{(114.6)\ A}{D}$

CONVEYOR BELTING
USEFUL CALCULATIONS

KEY TO SYMBOLS

C - Center to center distance (in)
D - Diameter of drive pulley (in)
d - Diameter of tail pulley (in)
G2 - Load per hour (lbs)
L - Belt length (in)
P - Product weight (lbs)
RPM - Revolutions per minute
S - Speed, ft per min (FPM)

Belt Length	Belt Speed in FPM	Max product weight on Belt at any one time
For a pulley system with no snub pulley: $L = \left(\frac{D+d}{2} \times 3.1416\right) + 2C$	$S = D \times RPM \times .2618 \times 1.021$	*When load is known by pounds per hour or tons per hour:* $P = \frac{G2 \times C\ (Ft)}{S \times 60\ min}$

FABRIC DESIGNATION

Carcass	Imperial	Metric
Poly/Nylon	PN	EP
Nylon/Nylon	NN	PP
Poly/Poly	PP	EE

Coefficient of Friction (Belt to Slider Bed or Rollers)

Belt	Steel or Aluminum Slider Bed	Metal Rollers
PS Pulley Side	.30 to .35	.05 to .10
Bare Duck or BB Side	.20 to .25	.05 to .10
Cover on Pulley Side	.50 to .55	.05 to .10

Calculating Length of a Roll of Belting

Add together the diameter of the roll and diameter of the hole in inches and divide the result by 2. Multiply by 3.14 and by the number of coils in the roll. This gives the length in inches. Divide by 12, and you will have the approximate number of feet in the roll.

Figuring Belt Length When Snub or Takeup Pulleys are Present

Steel Tape Measurement (STM), also known as the Inside Circumference (IC), is a common method where the take-up is placed in a position that allows for easy installation and adequate take-up. The steel tape is run through the system on the same track the belt would run. Care must be taken to make sure the tape touches all pulleys. The belt may be tracked to one side or removed to accommodate this method as the tape must touch only the pulleys and not the belt for an accurate STM measurement.

Calculating Length of a Roll of Endless Belting

Net Endless Length (NEL): From an existing belt, this measurement is made by placing the endless belt to be measured on a table or floor. A mark is made on the cover and corresponding mark on the table or floor. The belt is rolled forward until the mark comes back. Place another corresponding mark on the table or floor. Move the belt aside and measure the distance between the two marks. This measurement represents the NEL or Net Endless Length.

CONVEYOR DESIGN INFORMATION

ELECTRICAL FORMULAS

TO FIND	ALTERNATING CURRENT	
	SINGLE-PHASE	THREE-PHASE
Amperes when horsepower is known	$\frac{Hp \times 746}{E \times Eff \times pf}$	$\frac{Hp \times 746}{1.73 \times E \times Eff \times pf}$
Amperes when kilowatts are known	$\frac{Kw \times 1000}{E \times pf}$	$\frac{Kw \times 1000}{1.73 \times E \times pf}$
Amperes when Kva are known	$\frac{Kva \times 1000}{E}$	$\frac{Kva \times 1000}{1.73 \times E}$
Kilowatts	$\frac{1 \times E \times pf}{1000}$	$\frac{1.73 \times 1 \times E \times pf}{1000}$
Kva	$\frac{1 \times E}{1000}$	$\frac{1.73 \times 1 \times E}{1000}$
Horsepower = (Output)	$\frac{1 \times E \times Eff \times pf}{746}$	$\frac{1.73 \times 1 \times E \times Eff \times pf}{746}$

TO FIND	ALTERNATING OR DIRECT CURRENT
Amperes when voltage and resistance are known	$\frac{E}{R}$
Voltage when resistance and current are known	IR
Resistance when voltage and current are known	$\frac{E}{I}$

All Values At 100% Load

GENERAL INFORMATION (Approximation)

At 1800 rpm, a motor develops 36 lb-in per hp
At 1200 rpm, a motor develops 54 lb-in per hp
At 575 volts, a 3-phase motor draws 1 amp per hp
At 460 volts, a 3-phase motor draws 1.25 amp per hp
At 230 volts, a 3-phase motor draws 2.5 amp per hp
At 230 volts, a single-phase motor draws 5 amp per hp
At 115 volts, a single-phase motor draws 10 amp per hp

TEMPERATURE CONVERSION:

Deg C = (Deg F − 32) x 5/9 Deg F = (Deg C x 9/5) + 32

I = Amperes; E = Volts; Eff = Efficiency; pf = power factor; Kva = Kilovolt amperes; Kw = Kilowatts; R = Ohms.

AC MOTOR RECOMMENDED WIRE SIZE

VOLTS	MOTOR HORSEPOWER																						
	1-3	5	7.5	10	15	20	25	30	40	50	60	75	100	125	150	200	250	300	350	400	450	500
230	14	12	10	8	6	4	3	1	0	0	0	300	500	0	300	500	700	900	1500	600*	750*	900*
460	14	14	14	12	10	8	6	6	4	3	2	0	0	0	0	250	500	600	800	1000	1500	600*
575	14	14	14	14	12	10	8	6	6	4	3	2	0									
2300																	6	4	3	2	1	1

*Parallel, use high voltage cable

CONVEYOR DESIGN INFORMATION

MOTOR AMPS (A FULL LOAD †)

HP	ALTERNATING CURRENT		DC
	SINGLE PHASE	THREE PHASE	
1/2	4.9	2	2.7
1	8	3.4	4.8
1-1/2	10.1	4.8	6.6
2	12	6.2	8.5
3	17	8.6	12.5
5	28	14.4	20
7-1/2	40	21	29
10	50	26	38
15		38	56
20		50	74
25		60	92
30		75	110
40		100	146
50		120	180
60		150	215
75		180	268
100		240	355
125		300	443
150		360	534
200		480	712

† Values are for all speeds and frequencies (at 230 volts)
Amperage at voltages other than 230 volts can be figured:

$$V = \frac{230 \times \text{Amp from table}}{\text{New voltage}}$$

Example: For 60 hp, 3 phases, 550 volts $\frac{230 \times 150}{550}$ 62 Amps

Power factor estimated (80% for most motors) Efficiency is usually 80-90%.

CONVEYOR DESIGN INFORMATION

NEMA ELECTRICAL ENCLOSURE TYPES

TYPE	DESCRIPTION
NEMA Type 1 (General Purpose)	For indoor use wherever oil, dust or water is not a problem.
NEMA Type 2 (Driptight)	Used indoors to exclude falling moisture and dust.
NEMA Type 3 (Weatherproof)	Provides protection against rain, sleet and snow.
NEMA Type 4 (Watertight) †	Needed when subject to great amounts of water from any angle (such as areas which are repeatedly hosed down).
NEMA Type 5 Dust Tight (Non-Hazardous)	Used for excluding dust. (All NEMA 12 and JIC enclosures are usually suitable for NEMA 5 use.)
NEMA Type 9 Dust Tight (Hazardous) ‡	For locations where combustible dusts are present.
NEMA Type 12 (Industrial Use)	Used for excluding oil, coolant, flying dust, lint, etc.

Note: Joint Industry Conference (JIC) enclosures are similar in design to NEMA 12's.
For complete details see NEMA or JIC Standards for enclosures.

† Not designed to be submerged.
‡ Class II Groups E,F, and G.

AGGREGATE GENERAL INFO

MATERIAL DEFINITIONS

AGGREGATE is made up of inert material such as sand and gravel, crushed stone or slag, which when bound together into a conglomerated mass by a matrix forms concretes, mortars, plaster and mastics such as black top or macadam roads and asphalt road surfaces.

SAND is a finer granular material (usually lass than 1/4" in diameter) resulting from the natural disintegration of rock or from the crushing of friable sandstone rock or other suitable rocks.

GRAVEL is a coarse granular material (usually larger than 1/4" in diameter) resulting from the natural erosion and disintegration of rock.

CRUSHED GRAVEL is the product resulting from the mechanical crushing of gravel with most all fragments having at least one face resulting from fracture.

CRUSHED STONE is the product resulting from the mechanical crushing of rocks, boulders or large cobblestones with the fragments having all faces resulting from the crushing operation.

ROCK, from which crushed stone, sand and gravel are made and the rock most suitable for making good aggregates is formed all over the world. See physical properties table for the various kinds of rocks and their physical properties.

SLAG is the air-cooled, non-metallic by-product of a blast furnace operation consisting essentially of silicates and alumina-silicates of lime and other bases which is developed simultaneously with iron in a blast furnace.

The value of rock for road building depends largely upon the extent to which it will resist the destructive influences of traffic and the weather. The most important physical properties are hardness, toughness and soundness.

HARDNESS is the resistance which the rock offers to the displacement of its surface particles by abrasion.

TOUGHNESS is the resistance which it offers to fracture under impact, and soundness is the resistance offered to the effects of weathering.

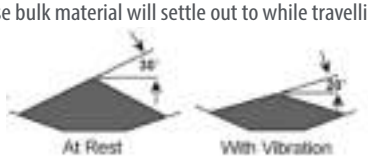
The hardness of a rock is determined by the Los Angeles Abrasion test, the Dorry hardness test and the Deval Abrasion test. The abrasion tests are also a measure of the toughness of rock and supplement in this respect the impact test for toughness.

COMMON BULK MATERIAL CLASSIFICATION

MATERIAL	WEIGHT (LBS/FT^3)	SURCHARGE ANGLE°	MAX. CONVEYING ANGLE°
Ashes, Coal, Dry, - 3"	35-40	25-30	22
Cement, Portland	90-100	25	20
Cement, Clinker	75-80	20	18
Coal, Arthracite, Sized, 3/8"- 6"	55	12	16
Coal, Bitum., Slack	50	22	22
Coal, Bitum., ROM	50	20	18
Coke, Loose	25-30	15	20
Earth, Common, Loam, Dry	70-80	15-30	20
Earth, Clay, Dry	100-120	10-30	20
Earth, Moist	80-100	30	22
Gravel, Average, Blended	90-100	15-20	18
Gravel, Sharp	90-100	25	20
Gravel, Rounded	90-100	15	15
Iron Ore	135	20	22
Limestone, Crushed	85-90	25-30	20
Phosphate Rock	75-85	25	20
Salt, Coarse, Dry	40-45	10	20
Salt, Fine, Dry	70-80	15	22
Sand, Bank, Damp	110-120	20-30	22
Sand, Bank, Dry	90-110	10-20	15
Sand, Foundry, Shakeout	90	25	20
Sand, Silica, Dry	90-100	10-20	15
Sand, Saterated	110-130	0-15	15
Shale, Crushed	85-90	25	20
Slag, Furnace, Crushed	85-90	12	18
Slate, Crushed, - 1/2"	80-90	15	20
Soda Ash, Light	25-35	22	20
Soda Ash, Heavy	55-65	17	20
Sulphur, Crushed, - 1/2"	50-65	20	20
Sulphur, Lumpy, - 3"	80-85	25	20
Wheat	45-48	8-15	16
Wood Chips	15-25	30	25

SURCHARGE ANGLE

Angle which loose bulk material will settle out to while travelling on the conveyor belt.



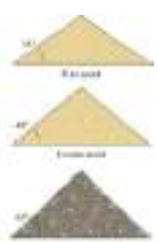
CHARACTERISTICS OF COMMON ROCKS

Name of Rock	Type of rock	Bond Work Index WI	Bulk Density lb/ft3 (MT/m3)	Abrasion Index AI	Grain Size	Color	Notes
Amphilbolite	Metamorphic	13-19	105 (1.7)	0.2-0.45	Medium to coarse	Dark green or black	Falls into flaky pieces
Andesite	Igneous	14-18	100 (1.6)	0.5	Fine (0.1mm)	Black/gray	
Basalt	Igneous	16-24	110 (1.8)	0.1-0.3	Fine (0.1mm)	Black	
Diabase	Igneous	15-23	105 (1.7)	0.2-0.4	Medium (0.1-2mm)	Black to gray	
Diorite	Igneous	15-23	100 (1.6)	0.4	Coarse (>2mm)	Speckled black and white or gray	Darker than granite
Dolomite	Sedimentary	9-15	100 (1.6)	0.01-0.05	Fine to coarse	White or gray	Can be brown or reddish in weathered condition
Gabbro	Igneous	17-23	110 (1.8)	0.4	Coarse (>2mm)	Dark gray to black	
Gneiss	Metamorphic	12-20	100 (1.6)	0.4-0.6	Medium to coarse	Gray or pink with dark streaks	
Granite	Igneous	10-22	100 (1.6)	0.45-0.65	Coarse (>2mm)	Colorless through white/gray	
Greywackle (Sandstone)	Sedimentary	15-21	100 (1.6)	0.3	Fine to medium	Gray/gray-black	
Gritstone	Sedimentary	See Sandstone					
Hornfels	Metamorphic	15-21	100 (1.6)	0.7	Fine (0.1mm)	Gray, blue, green or black	
Limestone	Sedimentary	9-15	100 (1.6)	0.001-0.03	Fine to coarse	White to black	
Marble	Metamorphic	9-15	100 (1.6)	0.001-0.03	Medium to coarse	White, yellow, red, green or black	
Porphyry	Igneous	18	100 (1.6)	0.1-0.9	Coarse (>2mm)	Dark gray to black, red brown violet	
Quartzite	Metamorphic	13-19	100 (1.6)	0.65-0.85	Medium (0.1-2mm)	White, gray or reddish	
Sandstone (excl. Greywackle)	Sedimentary	7-13	100 (1.6)	0.1-0.9	Medium (0.1-2mm)	Variable (white to gray)	-1
Syenite	Igneous	15-23	100 (1.6)	0.4	Coarse (>2mm)	Red or greenish black-gray	
Iron Ore (Magnetite)		6-12	150-195 (2.4-3.1)	0.1-0.3		Black	Gives black line on porcelain- magnetic
Iron Ore (Hematite)		8-14	150-195 (2.4-3.1)	0.2-0.8		Steel-gray black to black	Gives red or red-brownish line on porcelain- non-magnetic

ANGLE OF REPOSE

The angle a loose bulk material will stack up to when poured or heaped onto a horizontal surface.

Dry sand cannot support an angle of >35° from horizontal. Coarser grains, and more angular materials, support steeper angles of repose.



QUARRY SHOT GRADATIONS

TYPICAL QUARRY SHOT ROCK				
in	mm	% Passing		
		Coarse	Medium	Fine
42.00"	1067	100		
36.00"	914	85	100	
30.00"	762			
24.00"	610	75	80	100
20.00"	508			
12.00"	305	52	58	74
8.00"	203	42	46	56
6.00"	152	34	35	42
4.00"	102	25	27	34
3.00"	76	20	22	28
2.00"	51	15	17	20
1.50"	38	13	15	17
1.00"	25	10	12	14
0.75"	19	9	10	12
0.50"	13	7	8	10
0.38"	10	6	7	9
0.25"	6	5	5	7
0.19"	5	3	4	6

MINERAL TYPES & USE

MINERALS

INDUSTRIAL MINERALS

Abrasives
- Corundum
- Quartz
- Diamond

Glass
- Quartz
- Feldspar
- Calcite
- Dolomite

Plastic
- Calcite
- Kaolin
- Talc
- Wollastonite
- Mica

Ceramics
- Quartz
- Kaolin
- Feldspar

Fertilizers
- Phosphate
- Potash
- Calcite
- Dolomite

Fillers & Pigment
- Barite
- Bentonite
- Calcite
- Dolomite
- Feldspar
- Talc

Refractories
- Wollastonite
- Calcite
- Dolomite
- Corundum

MINERAL FUELS

- Coals
- Oil Shale
- (Oil Sand)

ROCK

Aggregate, Sand & Gravel
- Concrete Ballast
- Asphalt Ballast
- Rock Fill
- Industrial Sand

ORES

NON-FERROUS

Base Metals
- Copper
- Lead
- Zinc

Light Metals
- Aluminum
- Magnesium
- Titanium

Precious Metals
- Gold
- Silver
- Platinum

Rare Metals
- Uranium
- Radium
- Beryllium

FERROUS ALLOY

Alloying Metals
- Chromium
- Vanadium
- Molybdenum
- Tungsten

FERROUS

Iron

MATERIAL SPECIFICATIONS

Lightweight Aggregates // Structural Concrete [ASTM Designation C330-53T]
Concrete Aggregates [ASTM Designation C33-55T]
Coarse Aggregate // Highway Construction [ASTM Designation D448-54]
Crushed Slag and Gravel // Bituminous Concrete Base and Surface Courses [ASTM Designation D629-54]
Crushed Slag and Gravel // Waterbound Macadam Base and Surface Courses [ASTM Designation D694-55]
SPR=Simplified Practice Recommendation

Total % Passing	Screen Size (Square Opening)														
	4"	3 ½"	3"	2 ½"	2"	1 ½"	1"	¾"	½"	⅜"	No. 4	No. 8	No. 16	No. 50	No. 100
SPR No. 1	100	90-100	-	25-60	-	0-15	-	0-5							
SPR No. 2			100	90-100	35-70	0-15	-	0-5							
SPR No.24			100	90-100	-	25-60	-	0-10	0-5						
SPR No. 3				100	95-100	35-70	0-15	-	0-5						
SPR No. 357				100	95-100	-	35-70	-	10-30	-	0-5				
SPR No.4					100	90-100	20-55	0-15	-	0-5					
SPR No. 467					100	95-100	-	35-70	-	10-30	0-5				
SPR No. 5						100	90-100	20-55	0-10	0-5					
SPR No. 56						100	90-100	40-75	15-35	0-15	0-5				
SPR No. 57						100	95-100	-	25-60	-	0-10	0-5			
SPR No. 6							100	90-100	20-55	0-15	0-5				
SPR No. 67							100	90-100	-	20-55	0-10	0-5			
SPR No. 68							100	90-100	-	30-65	5-25	0-10	0-5		
SPR No. 7								100	90-100	40-70	0-15	0-5			
SPR No. 78								100	90-100	70-75	5-25	0-10	0-5		
SPR No. 8									100	85-100	10-30	0-10	0-5		
SPR No. 89									100	90-100	20-55	5-30	0-10	0-5	
SPR No. 9										100	85-100	10-40	0-10	0-5	
SPR No. 10										100	85-100	-	-	-	10-30

FINISHED PRODUCT SPECIFICATIONS

ASTM C33 SAND - Fine AGG Grading	
Sieve	**% Passing**
3/8"	100
#4M	95-100
#8M	80-100
#16M	50-85
#30M	25-60
#50M	10-30
#100M	2-10

Not more than 45% shall be retained between any two consecutive sieves.

Fineness Modulus (FM) shall not be less than 2.3 or more than 3.1.

For specific data see ASTM Book of Standards.

The **Fineness Modulus** is a measurement of the coarseness or fineness of a given aggregate.

The **Fineness Modulus** is an empirical factor obtained by adding the total percentages of a sample of aggregate retained on each of a specified series of sieves and dividing the sum by 100.

It is a definite indication of the surface area of the aggregate and relates to the workability of the mixture.

Sieve sizes used are

No. 100 (149 micron)

No. 50 (297 micron)

No. 30 (596 micron)

No. 16 (1.19 mm)

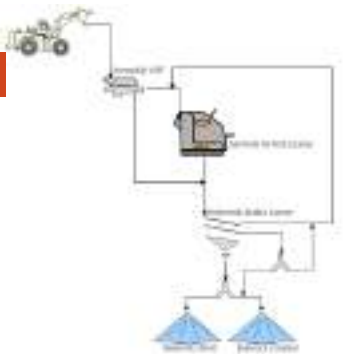
No. 8 (2.38 mm)

No. 4 (4.76 mm) and

3⁄8", 3⁄4", 1-1⁄2" and larger, increasing in the ratio of 2 to 1.

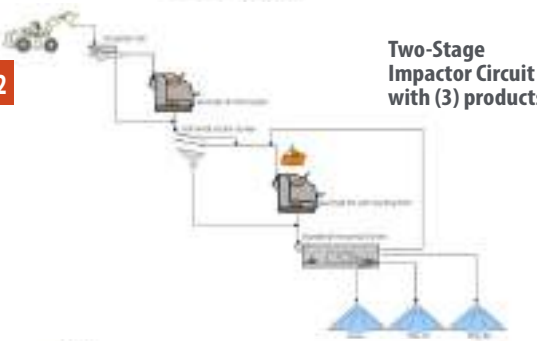
PROCESSING OF AGGREGATES
TYPICAL FLOWS

Fig.1



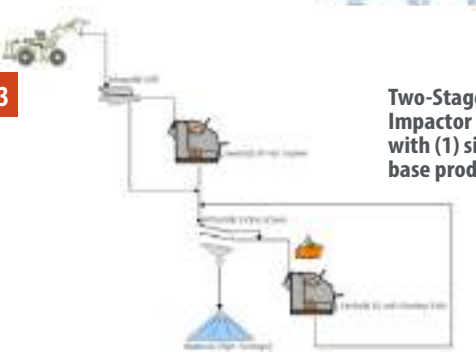
Single-Stage Impactor Circuit with (2) products.

Fig. 2



Two-Stage Impactor Circuit with (3) products.

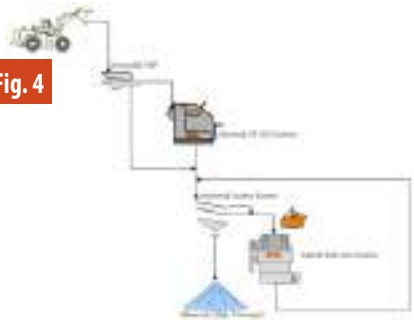
Fig. 3



Two-Stage Impactor Circuit with (1) single base product.

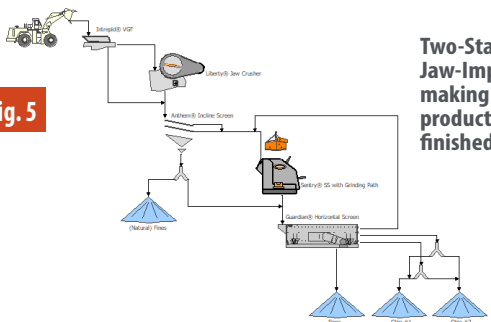
PROCESSING OF AGGREGATES
TYPICAL FLOWS

Fig. 4



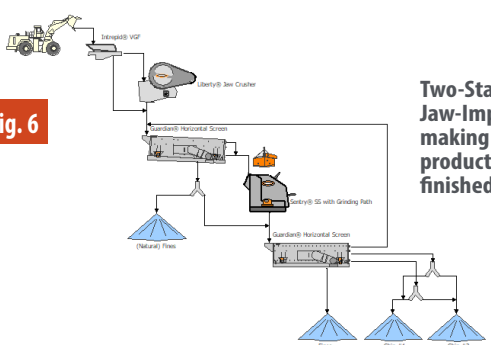
Two-Stage Impact Circuit with VSI Secondary making (1) base product.

Fig. 5



Two-Stage Jaw-Impact Circuit making a base product and (3) finished products.

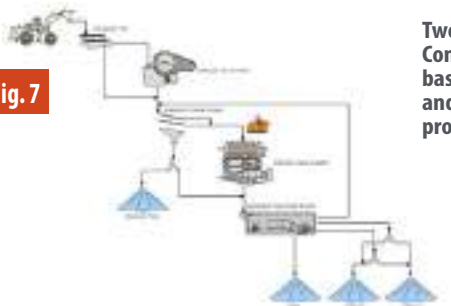
Fig. 6



Two-Stage Jaw-Impact Circuit making a base product and (3) finished products.

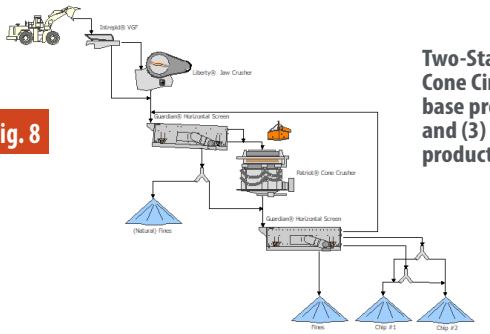
PROCESSING OF AGGREGATES
TYPICAL FLOWS

Fig. 7



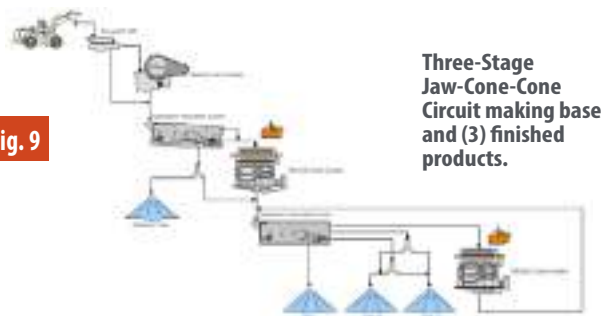
Two-Stage Jaw-Cone Circuit making base product and (3) finished products.

Fig. 8



Two-Stage Jaw-Cone Circuit making base product and (3) finished products.

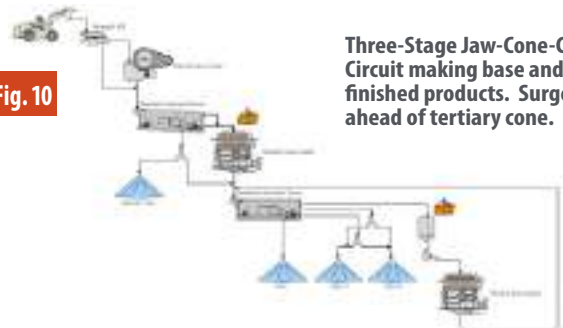
Fig. 9



Three-Stage Jaw-Cone-Cone Circuit making base and (3) finished products.

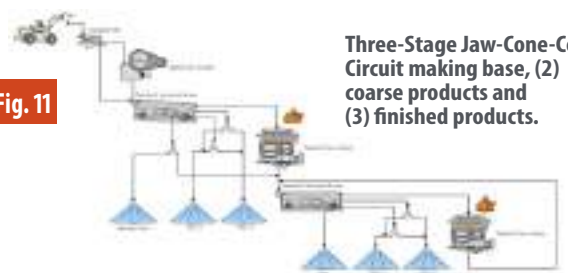
PROCESSING OF AGGREGATES
TYPICAL FLOWS

Fig. 10



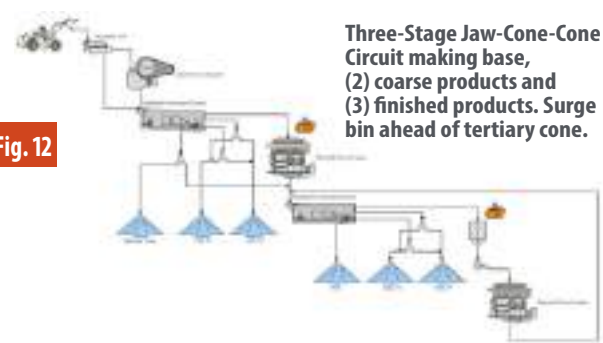
Three-Stage Jaw-Cone-Cone Circuit making base and (3) finished products. Surge bin ahead of tertiary cone.

Fig. 11



Three-Stage Jaw-Cone-Cone Circuit making base, (2) coarse products and (3) finished products.

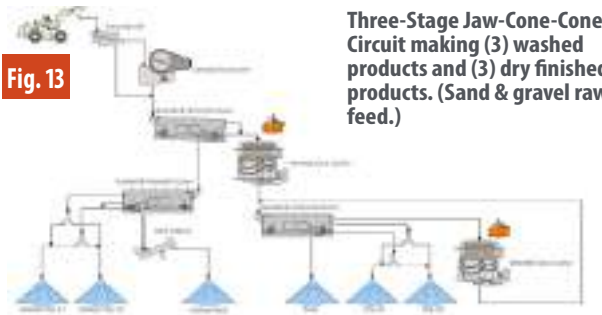
Fig. 12



Three-Stage Jaw-Cone-Cone Circuit making base, (2) coarse products and (3) finished products. Surge bin ahead of tertiary cone.

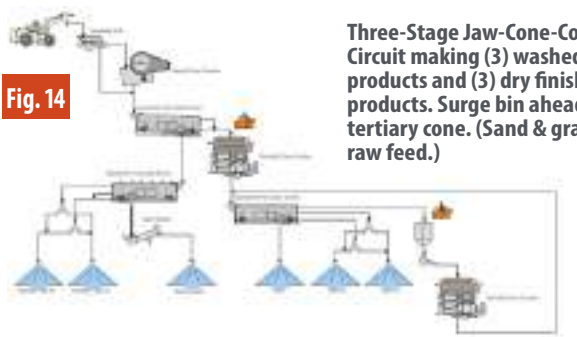
PROCESSING OF AGGREGATES
TYPICAL FLOWS

Fig. 13



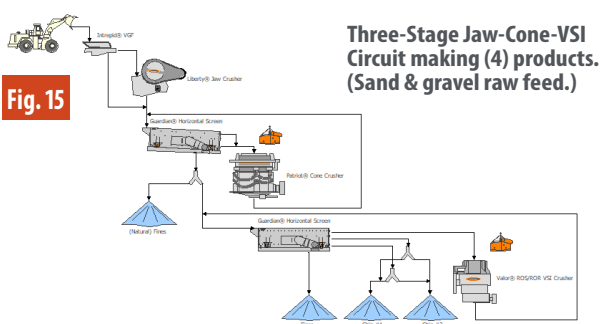
Three-Stage Jaw-Cone-Cone Circuit making (3) washed products and (3) dry finished products. (Sand & gravel raw feed.)

Fig. 14



Three-Stage Jaw-Cone-Cone Circuit making (3) washed products and (3) dry finished products. Surge bin ahead of tertiary cone. (Sand & gravel raw feed.)

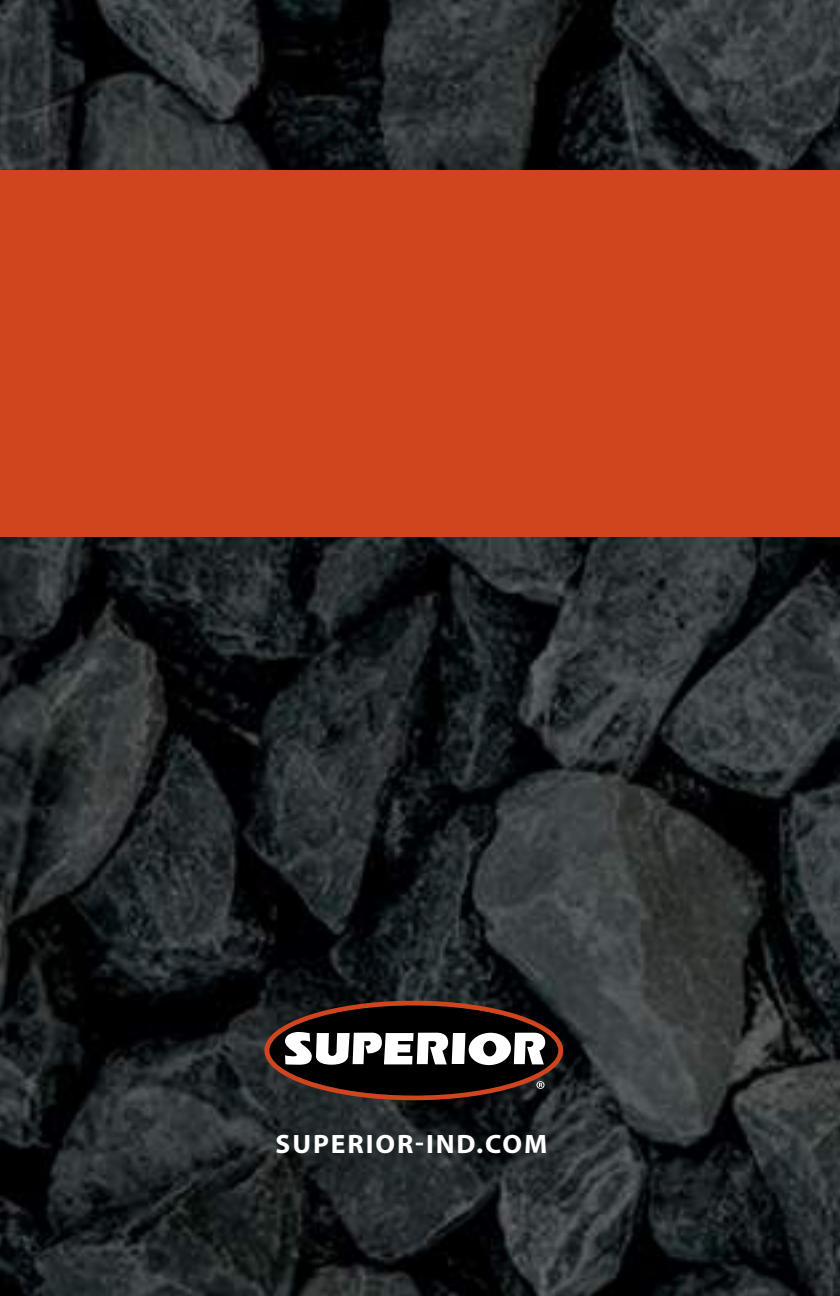
Fig. 15



Three-Stage Jaw-Cone-VSI Circuit making (4) products. (Sand & gravel raw feed.)

NOTES

NOTES


SUPERIOR
SUPERIOR-IND.COM