

# **NORSTONE**® *Inc.*



MAIN LINE: (484) 684-6986

MOLLY STEINBERG HOWARD  
CHRISTOPHER HOWARD

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## FINENESS OF GRIND CONVERSION SCALE

Gauge Depth				U.S. Sieve		
NPR	PC	Heaman	Mg	Microns(um)	Mesh	
	0	0	4.0	100	105	=140
	1	1	3.5	90	88	=170
	2	2	3.0	80	74	=200
	3	3	2.5	70	63	=230
	4	4	2.0	60	53	=270
	5	5	1.5	50	44	=325
	6	6	1.0	40	37	=400
	7	7	0.5	30	25	=550
	8	8	0.25	20	20	=635
	9	9	0.15	10	15	=800
	10	10	0.075	5	10	
			0	0	5	special screens

1. Blades = 33-1/3% tank dia;  
Polyblades & Type 11/ITT = 25-28%
2. Tip speed = 5,000 fpm;  
Polyblades & Type 11/ITT = 4,000-4,500 fpm;  
Type 25/D Blade = 5,800-6,000 fpm.  
Tip Speed (fpm) = blade dia / 12 x 3.14 x Shaft RPM
3. Blade position = 1-1/2 blade dia off the bottom;  
Type 1 & 6 = 1/2-1 blade dia (poor pumper)
4. Height of liquid level = dia of tank
5. Dish Bottom is best choice followed by modified cone
6. Shaft placement = close to tank center in vertical position

### **VERTICAL ROUND TANK CAPACITY**

Per foot of depth

<b>Diam.</b>	<b>Gals.</b>	<b>Diam.</b>	<b>Gals.</b>
1'	5.87	4'3"	106.12
1'3"	9.18	4'6"	118.97
1'6"	13.22	4'9"	132.56
1'9"	17.99	5'	146.88
2'	23.50	5'6"	177.72
2'3"	29.74	6'	211.51
2'6"	36.72	6'6"	248.23
2'9"	44.43	7'	287.88
3'	52.88	7'6"	330.48
3'3"	62.06	8'	376.01
3'6"	71.97	8'6"	424.48
3'9"	82.62	9'	475.89
4'	94.00	9'6"	530.24
		10'	587.52

### **METRIC/ENGLISH CONVERSIONS**

<b>To Convert</b>	<b>Multiply By</b>	<b>To Obtain</b>
Bars	14.5	psi (#/in <sup>2</sup> )
Centigrade	(C° x 1.8)+32	Fahrenheit
Centimeters	0.3937	Inches
Centipoise	0.01	Poise
Fahrenheit	(F°-32)x0.556	Centigrade
Feet/Min.	0.00508	Meters/Sec.
Gallon	3.785	Liters
Horsepower	0.7457	KiloWatt
Inches	25.4	Millimeters
Kilograms	2.2046	Pounds
Liters	0.2641	Gallons
Pounds	0.4536	Kilograms

## CONVERSION FROM FRACTIONS TO DECIMALS & INCHES TO MILLIMETERS

INCHES	MM	INCHES	MM	INCHES	MM
1/64 – 0.015625	0.396875	23/64 – 0.359375	9.128125	45/64 – 0.703125	17.859375
1/32 – 0.031250	0.793750	3/8 – 0.375000	9.525000	23/32 – 0.718750	18.256250
3/64 – 0.046875	1.190625	25/64 – 0.390625	9.921875	47/64 – 0.734375	18.653125
1/16 – 0.062500	1.587500	13/32 – 0.406250	10.318750	3/4 – 0.750000	19.050000
5/64 – 0.078125	1.984375	27/64 – 0.421875	10.715625	49/64 – 0.765625	19.446875
3/32 – 0.093750	2.381250	7/16 – 0.437500	11.112500	25/32 – 0.781250	19.843750
7/64 – 0.109375	2.778125	29/64 – 0.453125	11.509375	51/64 – 0.796875	20.240625
1/8 – 0.125000	3.175000	15/32 – 0.468750	11.906250	13/16 – 0.812500	20.637500
9/64 – 0.140625	3.571875	31/64 – 0.484375	12.303125	53/64 – 0.828125	21.034375
5/32 – 0.156250	3.968750	1/2 – 0.500000	12.700000	27/32 – 0.843750	21.431250
11/64 – 0.171875	4.365625	33/64 – 0.515625	13.096875	55/64 – 0.859375	21.828125
3/16 – 0.187500	4.762500	17/32 – 0.531250	13.493750	7/8 – 0.875000	22.225000
13/64 – 0.203125	5.159375	35/64 – 0.546875	13.890625	57/64 – 0.890625	22.621875
7/32 – 0.218750	5.556250	9/16 – 0.562500	14.287500	29/32 – 0.906250	23.018750
15/64 – 0.234375	5.953125	37/64 – 0.578125	14.684375	59/64 – 0.921875	23.415625
1/4 – 0.250000	6.350000	19/32 – 0.593750	15.081250	15/16 – 0.937500	23.812500
17/64 – 0.265625	6.746875	39/64 – 0.609375	15.478125	61/64 – 0.953125	24.209375
9/32 – 0.281250	7.143750	5/8 – 0.625000	15.875000	31/32 – 0.968750	24.606250
19/64 – 0.296875	7.540625	41/64 – 0.640625	16.271875	63/64 – 0.984750	25.003125
5/16 – 0.312500	7.937500	21/32 – 0.656250	16.668750	1 – 1.000000	25.400000
21/64 – 0.328125	8.334375	43/64 – 0.671875	17.065625		
11/32 – 0.343750	8.731250	11/16 – 0.687500	17.462500		

**PARTICLE SIZE**

**VISCOSITY REFERENCE**

U.S.		MILLI-	
MESH	INCHES	MICRONS	METERS
4	.187	4760	4.76
5	.157	4000	4.00
6	.132	3360	3.36
7	.111	2830	2.83
8	.0937	2380	2.38
10	.0787	2000	2.00
12	.0661	1680	1.68
14	.0555	1410	1.41
16	.0469	1190	1.19
18	.0394	1000	1.00
20	.0331	841	.84
25	.0280	707	.71
30	.0232	595	.59
35	.0197	500	.50
40	.0167	420	.42
45	.0138	354	.35
50	.0117	297	.297
60	.0098	250	.250
70	.0083	210	.210
80	.0070	177	.177
100	.0059	149	.149
120	.0049	125	.125
140	.0041	105	.105
170	.0035	88	.088
200	.0029	74	.074
230	.0024	63	.063
270	.0021	53	.053
325	.0017	44	.044
400	.0015	37	.037
500	.0010	25	.025
600	.0008	20	.020
800	.0006	15	.015
1250	.0004	10	.010
2500	.0002	5	.005
12000	.00004	1	.001

POISES	.10	.20	.50	1	2	5	10	20	50	100	200	500	1000	2000	5000
ASTM.07 - SEC. XD XD				72	143	357	715	1430	3570	7150	14,300	35,700			
ASTM.10 - SEC. XD XD					42	104	208	417	1041	2080	4170	10,410			
ASTM.15 - SEC. XD XD						24	48	95	238	476	953	2380	4760	9530	23,800
ASTM.20 - SEC. XD XD						8	16	33	82	164	328	820	1640	3280	8200
ASTM.25 - SEC. XD XD							7	14	36	72	143	357	715	1430	3570
BROOKFIELD - CPS	10	20	50	100	200	500	1000	2000	5000	10,000	20,000	50,000	100,000	200,000	500,000
FENSKE - SEC. XD X FACTOR, D 10	20	50	100	200	500	1000	2000	5000	10,000	20,000	50,000	100,000	200,000		
FORD #3 - SEC. XD				42	84	208	416	834	2081	4160	8340	20,810	41,600	83,400	
FORD #4 - SEC. XD				30	55	135	270	540	1350	2700	5400	13,500	27,000	54,000	
FISHER #1 - SEC. XD	20	30													
FISHER #2 - SEC. XD		15	24	50											
FISHER ELECTRO - CPS	10	20	50	100	200	500	1000	2000	5000	10,000	20,000	50,000			
GARDNER HOLDT - UNITS XD	A-3	A-2	A	D	H	S	W	Y-Z	Z3	Z5	Z6-27	Z7-28	Z10		
GARDNER HOLDT - SEC. XD						5	10	20	50	100	200	500	1000		
GARDNER HOLDT - SEC. XD						5	10	20	50	100	200	500	1000	2000	5000
HERCULES - SEC. X FACTOR, D							3	5	13	27	53	133	265	530	1330
KREBS-STORMER - UNITS (KU)						67	85	105	140						
LITHO VAR - UNITS XD				000	00	0	2-	3-4	5-	6			8-		
MAC MICHAEL (ASTM) - DEGREE #30							18	36	89						
SAYBOLT FUROL - SEC. XD			24	48	96	238	476	954	2380	4760	9540	23,800	47,600	95,400	
SAYBOLT UNIVERSAL (SUS) - SEC. XD		96	238	476	954	2380	4760	9540	23,800	47,600	95,400				
STORMER, CYL (150 GR.) - SEC.		10	16	27	49	114	223	440	1090	2180					
ZAHN G 1 - SEC. XD		38	60	100	267	667	1332	2670	6670	13,320	26,700	66,700			
ZAHN G 2 - SEC. XD		16	24	42	82	161	323	645	1610	3230	6450	16,100	32,300	64,500	
ZAHN G 3 - SEC. XD					27	58	113	204	510	1020	2040	5100	10,200	20,400	51,000
ZAHN G 4 - SEC. XD					19	38	71	160	400	800	1600	4000	8000	16,000	40,000
ZAHN G 5 - SEC. XD					13	27	50	97	212	424	848	2120	4240	8480	21,200

- |                            |                          |                                   |
|----------------------------|--------------------------|-----------------------------------|
| <b>1.0: Water</b>          | <b>176: Tomato Juice</b> | <b>3000: Glue</b>                 |
| <b>3.2: Milk</b>           | <b>352: SAE30 Oil</b>    | <b>5000: Mayonnaise</b>           |
| <b>12.6: #4 Fuel Oil</b>   | <b>880: Glycerin</b>     | <b>8640: Molasses B</b>           |
| <b>16.5: Cream</b>         | <b>1561: SAE50 Oil</b>   | <b>15200: Sour Cream</b>          |
| <b>34.6: Vegetable Oil</b> | <b>1760: Honey</b>       | <b>17640: SAE70 Oil</b>           |
| <b>88.0: SAE10 Oil</b>     |                          | <b>1 Pascal Second = 10 Poise</b> |

# GRINDING MEDIA CHART

Media	Density		Bulk Density			Hardness Moh/Vickers
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	
<b>Plastic</b>						
Polystyrene	1.05	0.63	2.39	5.26	1.39	NA/NA
Polyamide	1.13	0.68	2.58	5.68	1.50	NA/NA
Polycarbonate	1.20	0.72	2.73	6.01	1.59	NA/NA
Polyurethane	1.20	0.72	2.73	6.01	1.59	NA/NA
PU w/steel core	4.00	2.40	9.09	20.03	5.30	NA/NA
PTFE w/steel core	7.60	4.50	17.04	37.56	9.92	50HRC

Media	Density		Bulk Density			Hardness Moh/Vickers
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	
<b>Silica</b>						
Sand	2.50	1.50	5.68	12.52	3.31	6/550
Soda Lime Glass	2.50	1.50	5.68	12.52	3.31	6/650
BoroSilicate Glass	2.60	1.60	6.06	13.36	3.53	6.6/700
Steatite	2.60	1.60	6.06	13.36	3.53	7/520
Flint Pebbles	2.60	1.60	6.06	13.36	3.53	8

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Alumina Silicate (Mullite)</b>						
<b>Med-Dark Color</b>						
LCEP	2.70	1.56	5.91	13.02	3.44	6+/742
LCLT	2.71	1.57	5.95	13.11	3.46	7+/816
ICP	3.27	1.88	7.12	15.69	4.15	8+/1120
HHS	3.60	2.10	7.95	17.53	4.63	8+/1278
VHD	3.61	2.14	8.11	17.86	4.72	8+/1431

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Light-White Color</b>						
STA26	2.60	1.56	5.91	13.02	3.44	7+/800
KAO28	2.80	1.60	6.06	13.36	3.53	7/700
STA28	2.80	1.72	6.51	14.36	3.80	7+/960
STA50	2.81	1.74	6.59	14.52	3.84	7+/1065
STA30	3.00	1.90	7.20	15.86	4.19	7+/1125

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Alumina</b>						
70%	2.35	1.47	5.57	12.27	3.24	8/590
80%	3.20	1.80	6.82	15.02	3.97	8/800
87%	3.50	2.19	8.29	18.28	4.83	8+/1190
90%	3.60	2.24	8.48	18.70	4.94	8+/1136
92%	3.60	2.10	7.95	17.53	4.63	8+/1300
93%	3.62	2.21	8.37	18.45	4.88	8+/1275
93.50%	3.75	2.33	8.82	19.45	5.14	8+/1200
96%	3.77	2.35	8.90	19.62	5.18	8+/1400

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Alumina - High Purity</b>						
99%	3.94	2.46	9.32	20.53	5.43	8+/1848
99.5% LowHrd	3.80	2.40	9.09	20.03	5.30	8/800
99.5% HiHrd	3.80	2.40	9.09	20.03	5.30	8+/1300
99.90%	3.90	2.42	9.16	20.20	5.34	8+/1500
99.99%	3.98	2.48	9.39	20.71	5.47	8+/1980

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Alumina Zirconia</b>						
60%:5%	2.80	1.70	6.44	14.19	3.75	8/1000
70%:5%	3.20	2.00	7.58	16.69	4.41	8+/1100
90%:3%	3.65	2.25	8.52	18.78	4.96	8+/1150
87%:5%	3.70	2.30	8.71	19.20	5.08	8+/1250
80%:13%	3.75	2.35	8.90	19.62	5.18	9+/1200
66%:18%	3.80	2.40	9.09	20.03	5.30	9/1150
ZTA 70%:25%	4.10	2.50	9.47	20.87	5.52	9/1050
15%:60%	4.50	2.80	10.60	23.37	6.18	9/1100
25%:75%	5.10	3.20	12.12	26.71	7.06	9/1300
10%:85%	6.10	3.80	14.39	31.72	8.38	9/1150

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Zirconia Silicate</b>						
Silica -Fused	3.84	2.44	9.24	20.37	5.38	7.5/690
Silicate - Sintered	4.08	2.47	9.35	20.62	5.45	8.5/962
Large Silicate	4.00	2.51	9.50	20.95	5.54	8/800
Silicate - Hi Density	4.60	2.75	10.41	22.95	6.07	9/1050
Silicate - Max Density	4.70	2.80	10.60	23.37	6.18	9/1100

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Zirconia Oxide</b>						
MgO Zirconia	5.50	1.68	6.36	14.02	3.71	9/1050
Yttria Zirconia	6.00	3.60	13.63	30.05	7.94	9+/1300
Cerium Zirconia	6.20	3.80	14.39	31.72	8.38	9+/1250

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Steel</b>						
Carbon Shot	7.60	4.50	17.03	37.56	9.93	55HRC
Stainless Shot	7.60	4.50	17.03	37.56	9.93	40HRC
Carbon Balls	7.60	4.50	17.03	37.56	9.93	55HRC
Stainless Balls	7.60	4.50	17.03	37.56	9.93	45HRC
HiChrome Balls	7.60	4.50	17.03	37.56	9.93	60HRC
52100 Chrome	7.60	4.50	17.03	37.56	9.93	63HRC

Media	Density		Bulk Density		Hardness	
	gm/cc	kg/liter	kg/gal	#/gal	#/liter	Moh/Vickers
<b>Exotics</b>						
Tungsten Carbide	17.20	10.20	38.62	85.13	22.49	74 HRC
Silicon Carbide	3.10	1.95	7.39	16.28	4.30	2400
Silicon Nitride	3.25	2.10	7.95	17.53	3.79	1300

# **NORSTONE**® *Inc.*



**TANK PROVIDER**®  
*A Norstone Company*

**POLYBLADE**®



**BLADE DEPOT**®  
*A Norstone Company*



**GRINDING MEDIA DEPOT**®  
*A Norstone Company*

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