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WET GRINDING MILLS

CEMTEC

Cement & Mining Technology

CEMTEC – your partner for success.

CEMTEC operates on the basis of individual responsibility. Every member of our team has the right to make high-level decisions. The entire responsibility for a project – from planning to commissioning – rests with a single person. This means that you have the same, competent contact partner for all your queries, wishes and suggestions, without exception. In addition to standard orders, your individual requirements are also fulfilled rapidly and without complications.

CEMTEC HEADQUARTERS IN ENNS AUSTRIA

CEMTEC manages projects throughout the world for the cement and processing industry.

CEMTEC manages every project from start to finish. From planning to commissioning. Our product spectrum includes tube mills for grinding a wide range of bulk materials and minerals, as well as rotating drums for thermal treatment (calcination, drying, cooling) and mechanical processing (mixing, washing, conditioning, etc.) of different bulk materials. We also offer erection supervision, commissioning and technical support. Successful projects all over the world attest to the competence of CEMTEC.

WET GRINDING MILLS

CEMTEC wet grinding mills for every requirement.

Wet grinding ball mills for the treatment of minerals, ores and other bulk materials for the wet grinding process. A large number of these mills are used for grinding silica sand for producing aerated concrete or fibre cement. The mills are also used for treating iron and various other ores. These mills are also available in different designs. Smaller mill sizes can largely be delivered in a pre-assembled state, which in turn means a great saving in terms of time and installation costs.

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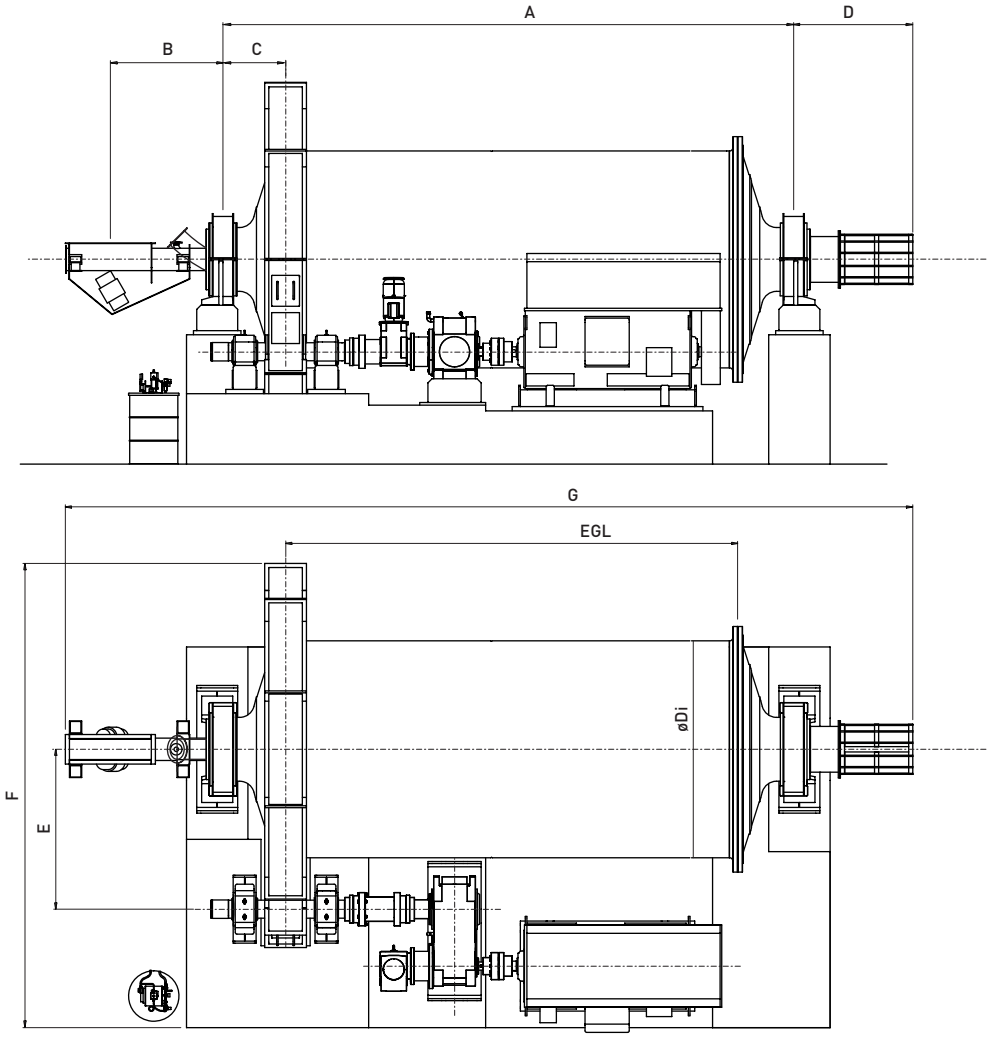
STANDARD SIZES AND DIMENSIONS

DIMENSION DIA x EGL	DRIVE POWER	GRINDING MEDIA WEIGHT	WEIGHT RUBBER LINING	WEIGHT STEEL LINING	WEIGHT OF MILL without lining	DIMENSIONS ACC. TO SKETCH [mm]						
[m]	[kW]	[kg]	[kg]	[kg]	[kg]	A	B	C	D	E	F	G
1.80 x 2.75	90	10,000	3,670	8,230	16,770	3,835	1,375	530	1,450	1,320	3,565	5,230
2.00 x 3.00	132	14,800	4,785	10,735	19,265	4,120	1,375	555	1,450	1,426	3,740	6,187
2.20 x 3.25	160	19,500	5,670	12,780	25,220	4,660	1,375	585	1,450	1,538	4,150	6,730
2.40 x 3.50	250	23,500	6,300	14,125	30,875	4,764	1,375	650	1,450	1,705	4,645	7,250
2.60 x 4.00	355	31,780	7,760	17,410	46,950	5,265	1,375	650	1,450	1,781	4,880	7,860
2.80 x 4.25	450	38,970	8,830	19,800	57,700	5,505	1,375	670	1,450	1,838	5,075	8,190
3.00 x 4.50	630	48,220	10,120	22,700	71,300	6,020	1,375	780	1,450	2,029	5,655	9,220
3.20 x 4.75	710	58,200	11,440	25,650	74,350	6,270	1,600	785	1,800	5,985	5,985	9,690
3.40 x 5.25	900	72,970	13,380	30,015	84,985	6,970	1,600	900	1,800	2,298	6,350	10,520
3.60 x 5.50	1,120	86,050	14,890	33,395	91,605	7,240	1,600	900	1,800	2,342	6,455	10,860
3.80 x 5.75	1,400	100,600	16,475	36,950	95,050	7,470	1,600	910	1,800	2,496	6,925	11,235
4.00 x 6.00	1,600	116,700	18,100	40,600	114,400	7,760	1,600	920	1,800	2,661	7,050	11,765
4.20 x 6.25	1,890	134,400	19,850	44,512	150,490	8,110	1,600	980	1,800	2,727	7,195	13,020
4.40 x 6.50	2,200	153,800	21,670	48,600	156,400	8,560	1,600	1,080	1,800	2,805	7,385	12,720
4.60 x 6.75	2,580	175,030	23,570	52,870	177,130	8,810	1,600	1,080	1,800	3,112	8,025	13,290

WET GRINDING MILLS



STANDARD SIZES AND DIMENSIONS FOR SILICA SAND GRINDING APPLICATIONS

DIMENSION DIA x EGL	DRIVE POWER	GRINDING MEDIA WEIGHT	WEIGHT RUBBER LINING	WEIGHT STEEL LINING	WEIGHT OF MILL without lining	DIMENSIONS ACC. TO SKETCH [mm]						
[m]	[kW]	[kg]	[kg]	[kg]	[kg]	A	B	C	D	E	F	G
2.10 x 5.50	355	25,000	3,500		7,400	7,000	1,375	750	1,450	1,515	4,800	10,350
2.40 x 4.50	400	26,000	3,800		8,700	6,500	1,375	740	1,450	1,725	5,100	9,850
2.40 x 6.50	400	42,000	4,000		13,000	8,000	1,375	740	1,450	1,725	5,100	11,200
2.60 x 5.75	500	45,000	4,000		10,900	7,300	1,375	765	1,450	1,953	5,700	10,650
2.60 x 7.00	600	49,000	4,800		13,100	8,500	1,375	765	1,450	1,953	5,700	11,850
2.60 x 7.50	630	53,000	5,400		13,900	9,000	1,375	765	1,450	1,953	5,700	12,350
2.60 x 8.00	710	56,000	6,000		14,800	9,500	1,375	765	1,450	1,953	5,700	12,850
2.80 x 7.50	710	58,000	8,500		16,000	9,000	1,600	770	1,800	2,233	5,900	13,000
3.00 x 8.50	1,000	79,000	10,000		21,100	10,000	1,600	790	1,800	2,125	6,200	14,000

Note: additional sizes on request

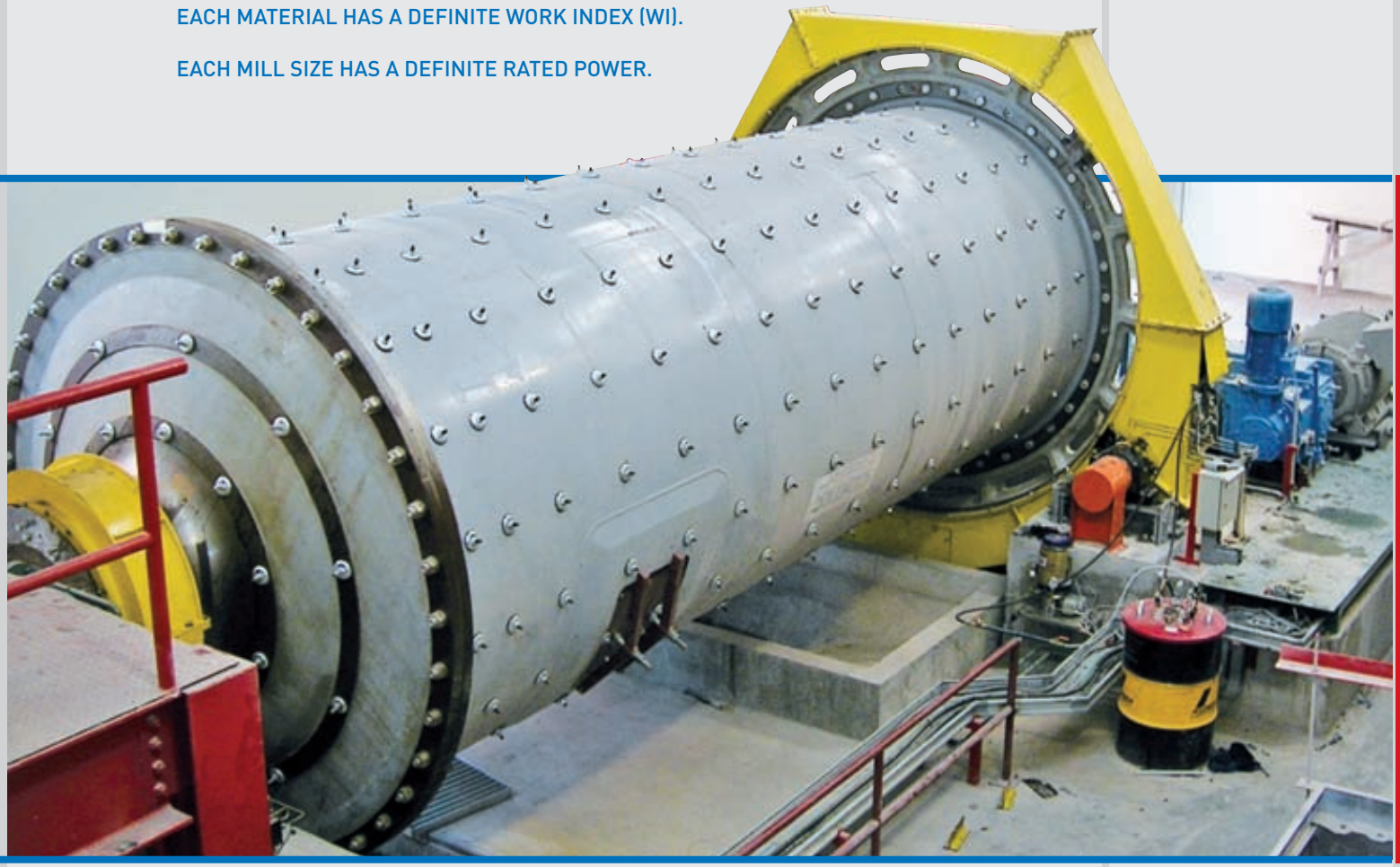
GRINDABILITY - HOW TO DETERMINE AND USE IT

The Bond formular permits rapid, accurate power calculation and selection of the most economically sized machines. The theory was based upon factual data compiled and correlated from several thousand laboratory tests and was confirmed in the field from actual operating data.

THE QUANTITY OF SIZE REDUCTION IS PROPORTIONAL TO THE WORK REQUIRED TO ACCOMPLISH THAT REDCTION.

EACH MATERIAL HAS A DEFINITE WORK INDEX (WI).

EACH MILL SIZE HAS A DEFINITE RATED POWER.



The Bond formular yields the work required to reduce a material, of known WI, from an infinitely large size to the desired product size, less the work required to reduce the same material to its present feed size from an infinite size. The resulting work (W) measured in kWh/t indicates the overall energy requirement to reduce the material, of known WI, from present feed size to the desired product size.

MILL POWER CAN BE ESTIMATED FROM THE FOLLOWING BASIC INFORMATION:

1. Material name
2. Work index (kWh/t)
3. Feed size (microns)
4. Product size (microns)
5. Capacity (tons/hour)
6. Is mill feed crushed in open or closed circuit?
7. Is mill feed prescreened or classified to remove product size material?
8. Type of mill and type of circuit desired

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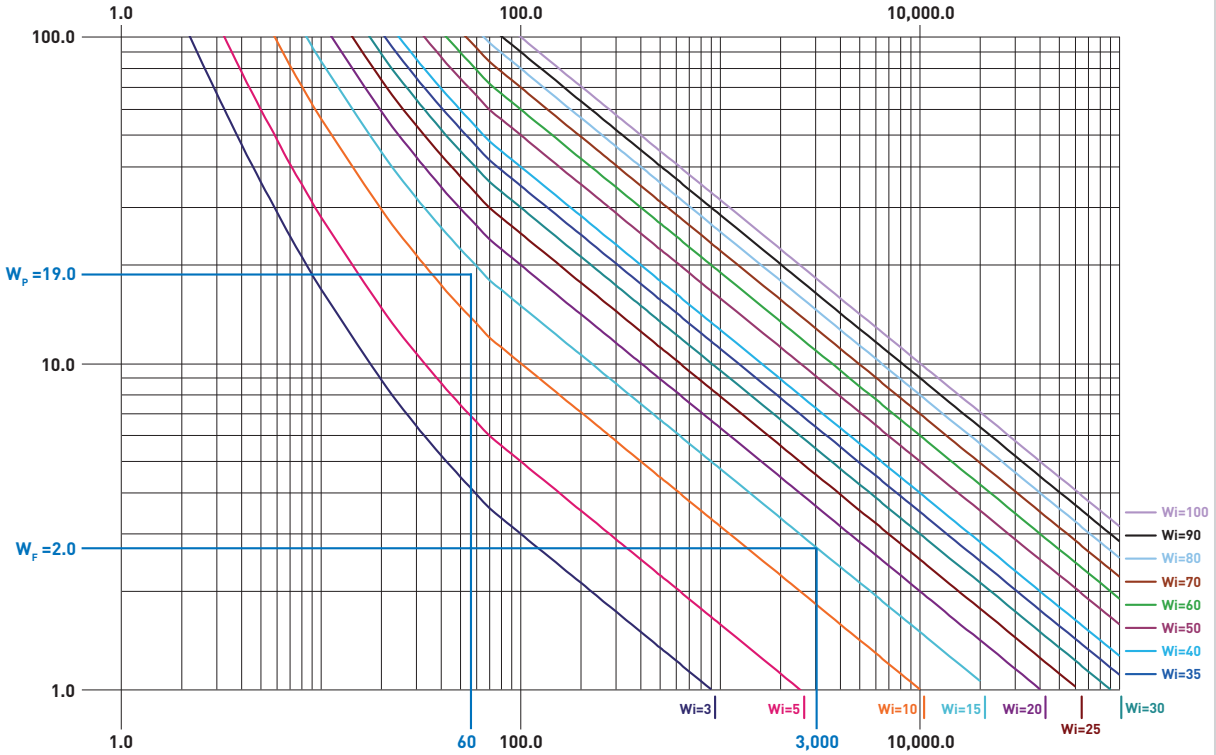
WORK INDEX CURVES (FEED OR PRODUCT), 80% PASSING



WORK INDEX FOR VARIOUS MATERIALS (AVERAGE)

MATERIAL	"Wi" {kWh/t}	MATERIAL	"Wi" {kWh/t}
Bauxite	13,88	Magnetite	13,78
Cement clinker	14,77	Taconite	18,31
Cement raw material	11,78	Lead ore	12,71
Chrome ore	10,58	Lead-zinc ore	13,73
Clay	7,83	Limestone	12,27
Coal	14,45	Manganese ore	14,21
Coke	23,66	Magnesite	16,28
Coke, petroleum	58,38	Molybdenum ore	12,86
Copper ore	14,70	Nickel ore	14,66
Diorite	21,38	Oil shale	37,92
Dolomite	15,56	Phosphate rock	14,89
Feldspar	12,48	Quarz	15,82
Ferroalloys	16,49	Shale	12,01
Fluorspar	13,45	Silica sand	23,42
Gold ore	16,20	Silver ore	18,88
Granite	14,84	Slag	18,25
Gravel	17,45	Tin ore	13,61
Gypsum rock	8,99	Titanium ore	12,46
Iron ore	14,02	Uranium ore	15,44
Hematite	12,82	Zink ore	12,87
Limonite	10,07		

DIAMETER FACTORS

DIAMETER	EF3	DIAMETER	EF3
0,8	1,250	2,9	0,966
0,9	1,221	3,0	0,960
1,0	1,195	3,1	0,947
1,1	1,173	3,2	0,936
1,2	1,153	3,3	0,925
1,3	1,134	3,4	0,914
1,4	1,118	3,5	0,914
1,5	1,102	3,6	0,914
1,6	1,088	3,7	0,914
1,7	1,075	3,8	0,914
1,8	1,063	3,9	0,914
1,9	1,051	4,0	0,914
2,0	1,041	4,1	0,914
2,1	1,030	4,2	0,914
2,2	1,021	4,3	0,914
2,3	1,012	4,4	0,914
2,4	1,003	4,5	0,914
2,5	0,995	4,6	0,914
2,6	0,987	4,7	0,914
2,7	0,980	4,8	0,914
2,8	0,973		

$W = W_P - W_F$

W = Work in kWh/t
Wi = Work index of material as derived from laboratory tests or empirical data
P = 80 % passing point of product screen analysis in microns
F = 80 % passing point of feed screen analysis in microns

$P = W \times Q \times EF_T$

P = Actual grinding power in kW
W = Work in kWh/t
Q = Quantity in metric tons per hour
EF_T = Efficiency factor total (acc. to EF factors below)

EXAMPLE

Feed material: Iron ore
Feed quantity: 50 t/h
Work Index acc. to Bond: 14.02 kWh/t
Feed size F_{80}: 3,000 µm
Product size P_{80}: 60 µm

Dry grinding in closed circuit

Values from table:

W_F = 2.8 kWh/t
W_P = 19.0 kWh/t
$W = W_P - W_F$ = 19.0 – 2.8 = 16.2 kWh/t

Ball mill power requirement

$P = W \times Q \times EF_T$
P = 16.2 x 50 x 1.3 = 1,053 kW

Therefore a ball mill ø 3.6 x 5.5 m can be selected.

EFFICIENCY CORRECTION FACTORS (EF)

EF1 – Dry grinding	1.3
EF2 – Open circuit	1.04-1.07 (ø1,2)
EF3 – Diameter factor	acc. to table
EF4 – Oversize feed	1.0 except when Wi exceeds 14,0 and/or F exceeds 16 mm (rod) or 4 mm (ball)*
EF6 – Reduction ratio (rod mill)	1.0 when 20 > Rr < 10*
EF7 – Reduction ratio (ball mill)	1.0 when Rr > 5.0*
EF8 – Feed preparation	
Open circuit crusher (rod mill only)	1.4
Open circuit crusher (rod/ball circuit)	1.2
Closed circuit crusher (rod mill only)	1.2
Closed circuit crusher (rod/ball circuit)	1.0

* Note: if outside above limitations or if rod mill (only) feed are scalped, please consult CEMTEC

WORLDWIDE

TYPICAL MILL SELECTIONS

PRODUCT REQUIREMENT	FINENESS MESH	FINENESS MICRONS	TYPE OF MILL
Very coarse	4-8	4.750-2.360	Peripheral discharge, rod
Coarse	10-20	1.700-850	Overflow, rod, wet
Medium	35-200	425-75	Diaphragm, ball
Fine	100-325	150-45	Overflow, ball (Diaphragm ball for single stage or dry grinding)
Very fine	-325	-45	Overflow, ball (Diaphragm ball for single stage or dry grinding)

BALL DOSING DEVICE ON REQUEST

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EACH PROJECT STARTS IN OUR **LABORATORY!**

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