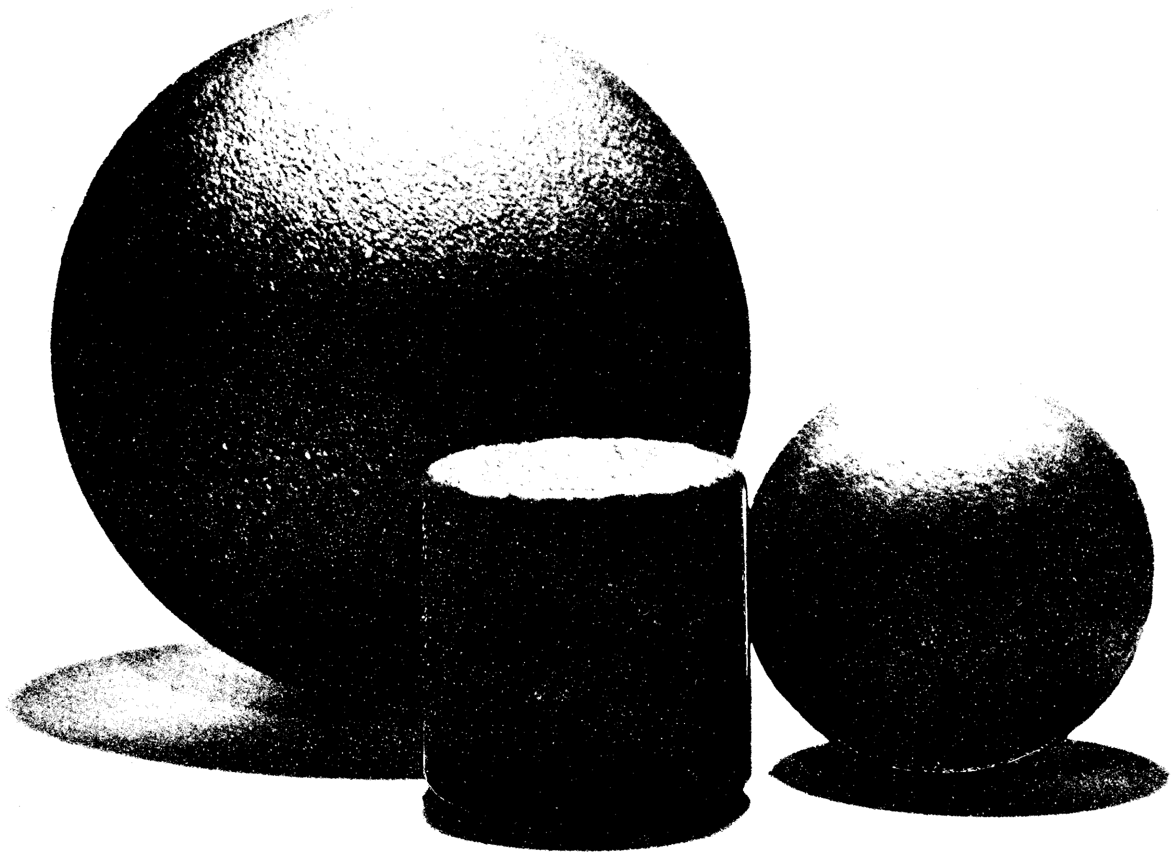
BALLS & CYLPEBS
with high chromium content



The media are manufactured in special **MAXI-RESIST** alloys, the most current containing 12% chromium, the rest have a higher chromium content.

The hardness of these media is at present determined at Rockwell C 60 for balls of a diameter of 60 mm upwards and at Rockwell C 63 for smaller diameter balls and cylpebs, the stresses to which they are submitted varying according to their wiegght.

The hardness is even throughout the mass, and corresponds to about 650/700 Brinell

We are able to supply the following most often required compositions austenitic steel with 12/14% and 16/18% MN content.

CR 26%	Ni 9%
CR 25%	Ni 12%
CR 25%	Ni 20%
CR 15%	Ni 35%

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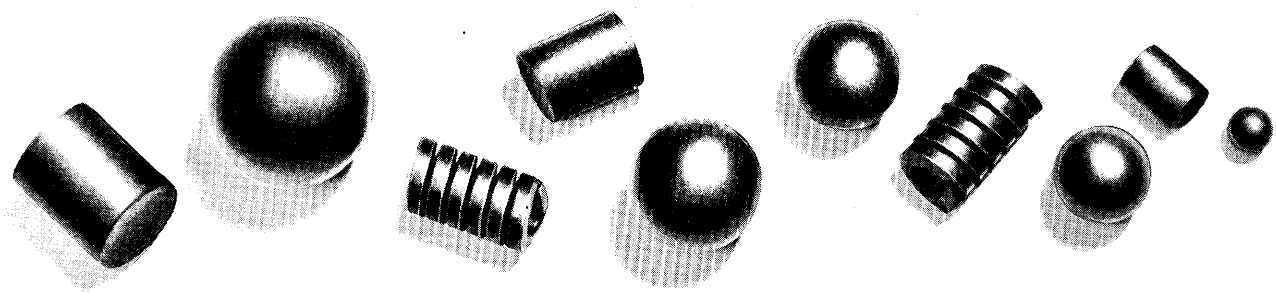

ROLLED STEEL BALLS

In 1965 we introduced ROLLED STEEL GRINDING BALLS in the size range 1in to 2in (25mm to 50mm). They are produced by a new process where the ball is rolled direct from bar, followed by in line heat treatment giving a uniform hardness throughout.

This process has great technical advantages over conventional forging methods, the most important being the continuous grain flow produced by rolling compared with the somewhat uneven effect of hammer forging. This type of ball has proved so successful that further rolling equipment has recently been commissioned.

We can now supply ROLLED BALLS in two qualities, i.e. from .7/.9% carbon steel giving a final hardness figure of 600 BHN and from .6/1% carbon steel with a minimum hardness of 350 BHN and in sizes from 12mm up to 50mm.

We can also supply high chrome steel balls. Send us your specifications.

FORGED STEEL BALLS

For sizes 2½in (60mm) and over, where grinding is by impact rather than abrasion, we offer balls forged by traditional methods. This means that manufacture can be from billet rather than rolled bar, allowing prices to be maintained at a very competitive level.

Size (in. dia.)	Approx. Weight	Average No. per ton (2.240 lbs.)	Surface Area in sq. in.
6	32 lb.	69	113.00
5½	22 lb.	102	85.15
5	18½ lb.	121	78.50
4½	13½ lb.	165	63.65
4	9½ lb.	233	50.30
3½	6½ lb.	350	38.50
3	4 lb.	560	28.27
2½	2⅓ lb.	972	19.64
2	1¼ lb.	1866	12.57
1½	8 oz.	4480	7.07
1¼	4½ oz.	7500	5.00
1	2½ oz.	14900	3.14
¾	1 oz.	35840	1.77

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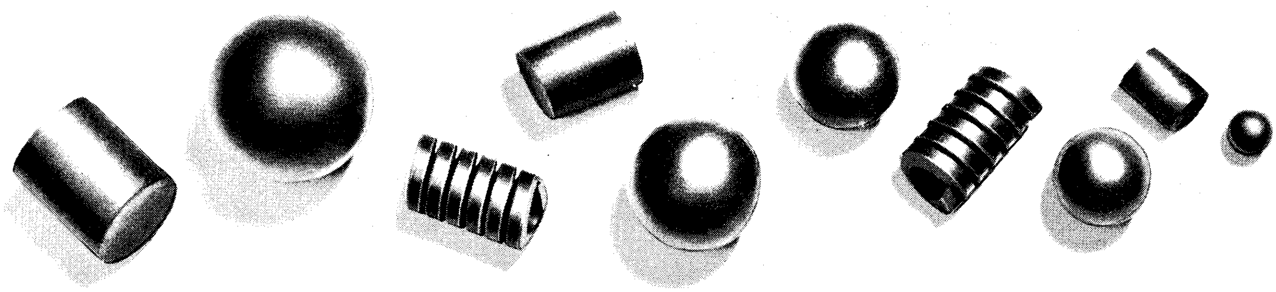

SLUGOIDS CYLPEBS

The success which SLUGOIDS has attained could not have been foreseen when they were first put to use, but we are proud of the fact that today we supply them in large quantities in this country and overseas.

This company was the first to introduce steel cylindrical grinding media of equal length with diameter.

SLUGOIDS were introduced to meet the needs of one of our oldest customers as an alternative to steel balls in the smaller sizes.

Being equi-dimensional, SLUGOIDS in use have the action of balls — in contrast to the performance of the original CYLPEB.

SLUGOIDS are manufactured in all sizes from ½in x ½in (12mm x 12mm) to 1¼in x 1¼in (30mm x 30mm).

For works where CYLPEBS are still used, we can supply these in diameters from ½in (12mm) up to 1¼in (30mm) made to any required length.

Both SLUGOIDS and CYLPEBS are manufactured from special carbon/manganese steel of our own proved analysis and heat treated by a unique method which imparts a high degree of uniformity throughout with a standard Brinell figure of approximately 500.

HELIPEBS

REGD. Nos. 329131/470553

For many years now "Helipebs" have remained the considered choice of the expert in fine cement production.

"Helipebs" are made from round- or square-section steel wire coiled spirally. A special hardening process gives them the maximum resistance to abrasion. The reduction in bulk weight given by using these hollow-centred media makes it possible to charge the mill to a working level of 40%. This alone ensures greater efficiency for less power consumption.

In action, the grinding surfaces of "Helipebs" are continually in contact with the material under process, some of which is carried through the media's hollow centres and redistributed among them. Obviously this increase in the abrasive area will grind the material more evenly in less time.

"Helipebs" are not cheap; you would not expect to buy a pedigree article at bargain prices; but their initial cost is repaid in better results. Tests made by some users have shown output increased by as much as 50%, with improved fineness of the finished product.

weights and properties of grinding media

The degree of hardness is one of the most important properties of grinding media influencing their resistance to wear.

May we draw your attention to the fact that the comparison of the hardness of the alloys offered and above all, the control of these, cannot be carried out by the system BRINELL.

The BRINELL test consists of submitting the metal to a determined pressure by means of a hard steel ball also of a determined diameter. The diameter of the impression left by the ball is then measured.

Thus, the result may be falsified by the deformation of the ball itself when it contacts a very hard metal.

On the other hand, the ROCKWELL C hardness test is carried out by means of an indeformable diamond cone of 120° and the hardness is determined by the difference in penetration under a light initial load, and under a test load of 150 kg

Thus, above a certain degree of hardness, only the ROCKWELL C test is valid, and a **corresponding** BRINELL hardness may only be **estimated** (notably graphically).

Moreover, the comparison between the hardness of materials and their tensile strength expressed in kg/mm² is usually unreliable. It is only valid for ordinary annealed steel, having a C content of less than 0.5 %, i.e., a Brinell hardness of less than 175.

DIMENSIONS in mm	DIMENSIONS in inches	UNITARY VOLUME in dm³	UNITARY WEIGHT in kg	NUMBER OF MEDIA per m. tonne	WEIGHT PER M³ in m. tonne	UNITARY SURFACE in dm²	EXPOSED SURFACE in m² per m. tonne
BALLS							
Ø 17	5/8	0,003	0,020	51.179		0,09	46,4
Ø 20	3/4	0,004	0,032	31.434		0,13	39,5
Ø 23	7/8	0,006	0,048	20.666		0,17	34,3
Ø 25	1	0,008	0,062	16.091		0,20	31,6
Ø 30	1 1/4	0,014	0,107	9.312		0,28	26,3
Ø 40	1 1/2	0,033	0,255	3.929		0,50	19,7
Ø 50	2	0,065	0,497	2.011	± 5 T.	0,79	15,8
Ø 60	2 1/2	0,113	0,859	1.164		1,13	13,2
Ø 70	2 3/4	0,180	1,364	733		1,54	11,3
Ø 80	3 1/4	0,268	2,036	491		2,01	9,9
Ø 90	3 1/2	0,382	2,899	345		2,54	8,8
Ø 100	4	0,523	3,977	251		3,14	7,9
Ø 110	4 1/2	0,697	5,294	189		3,80	7,2
Ø 125	5	1,022	7,768	129		4,91	6,3
CYLPEBS							
12 × 12	1/2	0,001	0,010	97.000		0,07	65,8
13 × 13	1/2	0,002	0,013	76.294		0,08	60,7
16 × 16	5/8	0,003	0,024	40.922		0,12	49,3
20 × 20	3/4	0,006	0,048	20.956	± 4 T.	0,19	39,5
22 × 22	7/8	0,008	0,064	15.742		0,23	35,9
25 × 25	1	0,012	0,093	10.727		0,29	31,6
32 × 32	1 1/4	0,026	0,195	5.115		0,48	24,7

Balls and cylpebs of the same dimensions are in the relation 3 to 2, with regard both to their surface and volume. The exposed surface is thus the same, per ton, in the two cases.

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Metric-English Conversion Table

mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
.01	.00039	.41	.01614	.81	.03189	21	.82677	61	2.40157
.02	.00079	.42	.01654	.82	.03228	22	.86614	62	2.44094
.03	.00118	.43	.01693	.83	.03268	23	.90551	63	2.48031
.04	.00157	.44	.01732	.84	.03307	24	.94488	64	2.51968
.05	.00197	.45	.01772	.85	.03346	25	.98425	65	2.55905
.06	.00236	.46	.01811	.86	.03386	26	1.02362	66	2.59842
.07	.00276	.47	.01850	.87	.03425	27	1.06299	67	2.63779
.08	.00315	.48	.01890	.88	.03465	28	1.10236	68	2.67716
.09	.00354	.49	.01929	.89	.03504	29	1.14173	69	2.71653
.10	.00394	.50	.01969	.90	.03543	30	1.18110	70	2.75590
.11	.00433	.51	.02008	.91	.03583	31	1.22047	71	2.79527
.12	.00472	.52	.02047	.92	.03622	32	1.25984	72	2.83464
.13	.00512	.53	.02087	.93	.03661	33	1.29921	73	2.87401
.14	.00551	.54	.02126	.94	.03701	34	1.33858	74	2.91338
.15	.00591	.55	.02165	.95	.03740	35	1.37795	75	2.95275
.16	.00630	.56	.02205	.96	.03780	36	1.41732	76	2.99212
.17	.00669	.57	.02244	.97	.03819	37	1.45669	77	3.03149
.18	.00709	.58	.02283	.98	.03858	38	1.49606	78	3.07086
.19	.00748	.59	.02323	.99	.03898	39	1.53543	79	3.11023
.20	.00787	.60	.02362	1.00	.03937	40	1.57480	80	3.14960
.21	.00827	.61	.02402	1	.03937	41	1.61417	81	3.18897
.22	.00866	.62	.02441	2	.07874	42	1.65354	82	3.22834
.23	.00906	.63	.02480	3	.11811	43	1.69291	83	3.26771
.24	.00945	.64	.02520	4	.15748	44	1.73228	84	3.30708
.25	.00984	.65	.02559	5	.19685	45	1.77165	85	3.34645
.26	.01024	.66	.02598	6	.23622	46	1.81102	86	3.38582
.27	.01063	.67	.02638	7	.27559	47	1.85039	87	3.42519
.28	.01102	.68	.02677	8	.31496	48	1.88976	88	3.46456
.29	.01142	.69	.02717	9	.35433	49	1.92913	89	3.50393
.30	.01181	.70	.02756	10	.39370	50	1.96850	90	3.54330
.31	.01220	.71	.02795	11	.43307	51	2.00787	91	3.58267
.32	.01260	.72	.02835	12	.47244	52	2.04724	92	3.62204
.33	.01299	.73	.02874	13	.51181	53	2.08661	93	3.66141
.34	.01339	.74	.02913	14	.55118	54	2.12598	94	3.70078
.35	.01378	.75	.02953	15	.59055	55	2.16535	95	3.74015
.36	.01417	.76	.02992	16	.62992	56	2.20472	96	3.77952
.37	.01457	.77	.03032	17	.66929	57	2.24409	97	3.81889
.38	.01496	.78	.03071	18	.70866	58	2.28346	98	3.85826
.39	.01535	.79	.03110	19	.74803	59	2.32283	99	3.89763
.40	.01575	.80	.03150	20	.78740	60	2.36220	100	3.93700

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English-Metric Conversion Table

Inch Frac.	Inch Decimal	Millimeter	Inch Frac.	Inch Decimal	Millimeter	Inch Frac.	Inch Decimal	Millimeter
.....	.003937	.1	9/32	.28125	7.1438	21/32	.65625	16.668
.....	.007874	.2	19/64	.29685	7.5406	.....	.669291	17.
.....	.011811	.3	5/16	.3125	7.9375	43/64	.671871	17.0656
1/64	.015625	.3969	.....	.314961	8.	11/16	.6875	17.4625
.....	.015748	.4	21/64	.328125	8.3344	45/64	.703125	17.8594
.....	.019685	.5	11/32	.34375	8.7313	.....	.708661	18.
.....	.023622	.6	.....	.354331	9.	23/32	.718175	18.2563
.....	.027559	.7	23/64	.359375	9.1281	47/64	.734375	18.6531
1/32	.03125	.7938	3/8	.375	9.525	.....	.748031	19.
.....	.031496	.8	25/64	.390625	9.9219	3/4	.750	19.050
.....	.03543	.9	.....	.393701	10.	49/64	.765625	19.4469
.....	.03937	1.	13/32	.40625	10.3188	25/32	.78125	19.8438
3/64	.046875	1.1906	27/64	.421875	10.7156	.....	.787402	20.
1/16	.0625	1.5875	.....	.433871	11.	51/64	.796875	20.2406
5/64	.078125	1.9844	7/16	.4375	11.1125	13/16	.8125	20.6375
.....	.07874	2.	29/64	.453125	11.5094	.....	.826772	21.
3/32	.09375	2.3813	15/32	.46875	11.9063	53/64	.828125	21.0344
7/64	.109375	2.7781	.....	.472441	12.	27/32	.84375	21.4314
.....	.11811	3.	31/64	.484375	12.3031	55/64	.859375	21.8281
1/8	.125	3.175	1/2	.500	12.700	.....	.866142	22.
9/64	.140625	3.5719	.....	.511811	13.	7/8	.875	22.225
5/32	.15625	3.9688	33/64	.515825	13.0969	57/64	.890625	22.6219
.....	.15748	4.	17/32	.53125	13.4938	.....	.905512	23.
11/64	.171875	4.3656	35/64	.546875	13.8906	29/32	.90625	23.0188
3/16	.1875	4.7625	.....	.5511811	14.	59/64	.921875	23.4156
.....	.19685	5.	9/16	.5625	14.2875	15/16	.9375	23.8125
13/64	.203125	5.1594	37/64	.578125	14.6844	.....	.944882	24.
7/32	.21875	5.5563	.....	.590511	15.	61/64	.953125	24.2094
15/64	.234375	5.9531	19/32	.59375	15.0813	31/32	.96875	24.6063
.....	.23622	6.	39/64	.609375	15.4781	.....	.984252	25.
1/4	.250	6.350	5/8	.625	15.875	63/64	.984375	25.0031
17/64	.265625	6.7469	.....	.629921	16.	1″	1.0000	25.400
.....	.275591	7.	41/64	.640625	16.2719			