



**INA - WGTR
Bearings**

January 1986



Sendzimir Inc. USA

Paris: Office for Europe

Licensees:	Demag	West Germany
	FCB	France
	Innocenti	Italy
	Loewy - Robertson (Davy McKee)	Great Britain
	Waterbury - Fenn	USA
	Skoda	Czechoslovakia (license RWG expired)
	Hitachi	Japan





WGTR

Customers:

Skoda

SEH

Demag



OEM

Users : see list



WGTR

most common sizes supplied (OD):

Ø 160 mm (6.3")

Ø 225 mm (8.9")

Ø 300.02 mm (11.8")

Ø 406.4 mm (16")

in: West Germany, Czechoslovakia, France,
Finland, Spain, Sweden, Austria

as well as special sizes for Sundwig
and Fröhling

(Fröhling - South Africa 1100 m/min
[3609 ft/min] !)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100



WGTR 130 x 300.07 x172.65 2Z

Rolling Mill: ZR 22 B - 42

User: Giebel - Lothmate

Manufacturer: Demag

Rolling Speed: 900 m/min (2953ft/min)

Most modern rolling mill of this size !

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

Aftermarket WGTR/year

(estimate based on list from Sendzimir)

	Mil. DM	\$ Mil. ^①
Europe	7.5 - 10	2.7 - 3.6
Japan	5.5 - 8	2.0 - 2.9
USA	4.0 - 6	1.4 - 2.2
Asia (↑ Tendency)	1.2 - 1.6	0.4 - 0.6
South America	0.8 - 1.6	0.3 - 0.6
USSR (Skōda ?)	≈ 2.0 (?)	≈ 0.7 (?)
Total / year	20 - 30	7.2 - 10.8

① exchange rate: 1 DM = \$.3599 (Aug. 30, 1985)

#

Ø WGTR

Europe , Japan and South Amerika

120mm(4.7") , 160mm (6.3") , 225mm (8.9") , 300mm(11.8") ,
406mm (16")

America

120mm(4.7") , 160mm (6.3") , 225mm (8.9") , 300mm(11.8") ,
406mm (16")

General

160mm(6.3") , 225mm(8.9") , 300mm(11.8") , 406mm (16")

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

Competition

SKF FAG	}	West Germany, France, Italy, Sweden, Czechoslovakia
Torrington Timken	}	USA
RHP		Great Britain
NTN NSK	}	Japan, not so much in Europe

MEMBER

Reference Material

Publication WGS , WWH

Questionair WGT

Grinding Instructions

Assembly Instructions

List for Grinding Arbors

Work Sheet A263 Lubrication

INA Service

IWS Assembly assistance during
 original installation
 Application/design assistance

HMF Service offer for repairs and
 regrinding

11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000

Possible Applications For



WGTR

1. Sendzimir Rolling Mill
but also as
2. Support Rollers for steady rests
3. Support Rollers for precise controls
(accuracy better than P4)

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

Assignment of WGTR to Sendzimir Rolling Mill

ZR ... / ZS ...	WGTR	
ZR 16, 24	55 x 120	x 52
	55 x 120	x 64
ZR 33	70 x 160	x 75
	70 x 160	x 90
ZR 23	100 x 225	x 96
	100 x 225	x 120
ZR 22	130 x 300.02	x 150
	130 x 300.02	x 172.65
ZR 21	180 x 406.4	x 171.04
	180 x 406.4	x 224
ZS 06	130 x 300.02	x 150
	130 x 300.02	x 172.65
ZS 07	180 x 406.4	x 171.04
	180 x 406.4	x 224

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

April 74

Revision: September 1975

SENDZIMIR MILL LIST

MEMBER

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
1	ATLAS STEELS LTD. WELLAND, ONTARIO CANADA	Zs 06-50	BERTRAM	STAINLESS	.250"	150FPM	-----	SHEETS	-----	500HP 600/700RPM	-----	MINERAL OIL	100GPM	1949
2	ESPERANCE-LONGDOZ LIEGE, BELGIUM	ZR 22-48	FARREL BIRMINGHAM	LOW CARBON	.125" .010"	750/1500MPM	COLLAPSIBLE	LD. 20" O.D. 60" 20,000LBS	53,000LBS UP TO 750FPM	2500HP 400/600RPM 250/870RPM	2000-HP (2x1000HP) 250/870RPM	MINERAL OIL	500GPM	1949
3	C.-C.N.M. ISBERGUES, FRANCE	ZR 22-80	FOUNDERES DE RUELLE	LOW CARBON SILICON	3MM 0.4MM	164/328MPM	SOLID BLOCK	LD. 24" O.D. 48" 25,000LBS	66,000LBS UP TO 250MPM	2500HP 300/600RPM 400/1000RPM	1600HP (2x800HP) 400/1000RPM	MINERAL OIL	750GPM	1952
4	FORGES DE GUEUGNON GUEUGNON, FRANCE	ZR 23-43	DEMAG	STAINLESS	3MM 0.127MM	60/120MPM	COLLAPSIBLE	LD. 610MM O.D. 1220MM	22,000KG UP TO 102MPM	500HP 500/1000RPM	500HP 500/1200RPM	MINERAL OIL	1500LPM	1955
5	BROD. EDSTRAND NYBY BRUCKS, SWEDEN	ZR 23-56	DEMAG	STAINLESS LOW CARBON	5MM 0.1MM	107/214MPM	SOLID BLOCK	LD. 600MM O.D. 1420MM	28,500KG	1000HP (2x500HP) 750/1315RPM	1000HP (2x500HP) 750/1315RPM	MINERAL OIL	600GPM	1955
6	TELCON, ENGLAND	ZR 15-8 1/2	LOEWY ROBERTSON	NICKEL IRON ALLOYS	.045" .0005"	75/150FPM	COLLAPSIBLE	LD. 10" O.D. 20"	1680LBS	10HP 850/1700RPM	7.5HP 750/1500RPM	MINERAL OIL	75GPM	1953
7	U.S. STEEL CORP. VANDERGRIFT WORKS	ZR 22-49	FARREL BIRMINGHAM	STAINLESS	.250" .015"	350/650FPM	COLLAPSIBLE	LD. 24" O.D. 48"	65,000LBS UP TO 650FPM	1250HP 200/356RPM 250/750RPM	1250HP 250/750RPM	MINERAL OIL	750GPM	1954
8	REPUBLIC STEEL CORP. MASSILON, OHIO	ZR 22-49	FARREL BIRMINGHAM	STAINLESS	.200" .015"	400/712FPM	COLLAPSIBLE	LD. 20" O.D. 48"	66,000LBS	1500HP 225/400RPM	1500HP 225/562RPM	MINERAL OIL	750GPM	1955
9	BIDAULT-ELLION FRANCE	ZR 19-32	FIVES-CAIL BABCOCK	BRASS COPPER	6MM 0.15MM	90/180MPM	SOLID BLOCK	LD. 500MM O.D. 800MM	12,000KG UP TO 90MPM	500HP 600/1200RPM	250HP 500/1180RPM	MINERAL OIL	1000LPM	1956
10	FIAT TORINO, ITALY	ZR 22-49	INNOCENTI	STAINLESS LOW CARBON	.200" .015"	163/288MPM	COLLAPSIBLE	LD. 24" O.D. 62"	66,000LBS UP TO 190MPM	2200HP 300/530RPM	1250HP 200/600RPM	MINERAL OIL	750GPM	1956
11	DEUTSCHE EDELSTAHLWERKE GERMANY	ZR 23-43	DEMAG	STAINLESS	3MM 0.127MM	85/170MPM	COLLAPSIBLE	LD. 610MM O.D. 1410MM	27,000KG UP TO 120MPM	900HP 215/430RPM	740HP (2x370HP)	MINERAL OIL	475GPM	1954
12	LA GALVANISATION FRANCE	ZR 23-43	FIVES-CAIL BABCOCK	LOW CARBON	1.75MM 0.25MM	78/163MPM	SOLID BLOCK	LD. 700MM O.D. 1250MM	17,000KG UP TO 160MPM	600HP (2x300HP) 500/900RPM	600HP (2x300HP) 500/900RPM	MINERAL OIL	1000LPM	1956
13	BIACHE ST. VAAST FRANCE	ZR 23-43	FIVES-CAIL BABCOCK	BRASS LOW CARBON COPPER	5MM 0.1MM	200/400MPM	SOLID BLOCK	LD. 600MM O.D. 1300MM	15,000KG UP TO 378MPM	1500HP 625/1250RPM	1280HP (2x640HP) 500/1390RPM	SOLUBLE OIL	2350LPM	1956

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
14	ARTHUR LEE & SONS ENGLAND	ZR 23-19	LOEWY ROBERTSON	STAINLESS LOW CARBON	0.095" 0.0015"	250/900FPM	COLLAPSIBLE	I.D. 18" O.D. 52"	12,400LBS UP TO 800FPM	250HP 500/1000RPM	300HP 250/900RPM	MINERAL OIL	150GPM	1957
15	FIRTH VICKERS ENGLAND	ZR 33-13	LOEWY ROBERTSON	STAINLESS	0.080" 0.0015"	570/800FPM	SOLID BLOCK	I.D. 24" O.D. 50"	12,400LBS UP TO 800FPM	400HP 567/850RPM 350/1225RPM	200HP (2x100HP)	MINERAL OIL	200GPM	1957
16	NIHON TEPPAN JAPAN	ZR 22-50	HITACHI	STAINLESS LOW CARBON	2.0MM 0.13MM	120/240MPM	COLLAPSIBLE	I.D. 510MM O.D. 1350MM	27,000KG	1400HP 178/358RPM	1200HP (2x600HP) 150/480RPM	MINERAL OIL	3200GPM	1957
17	ATLAS STEELS CANADA	ZR 23-19	BERTRAM	STAINLESS	0.125" 0.003"	250/500FPM	COLLAPSIBLE	I.D. 22" O.D. 40"	20,000LBS	300HP	200HP	MINERAL OIL	250GPM	1957
18	HAYNES STELLITE U.S.A.	ZS 06-50	FARREL BIRMINGHAM	STAINLESS HAST ALLOYS	0.100"	40/120FPM	-----	SHEETS	-----	200HP 200/600RPM	-----	MINERAL OIL	180GPM	1958
19	BIRMETALS LTD. ENGLAND	ZR 23M-50	LOEWY ROBERTSON	ALUMINIUM ALLOYS	0.187" 0.003"	750/1600FPM	COLLAPSIBLE	I.D. 20" O.D. 52"	25,000LBS UP TO 1150FPM	1800HP (2x900HP) 500/1060RPM	900HP (3x300HP) 500/1060RPM	MINERAL OIL	800GPM	1958
20	FAGERSTA SWEDEN	ZR 22-32	INNOCENTI	STAINLESS HIGH CARBON	6.00MM 0.07MM	95/230MPM	SOLID BLOCK	I.D. 660MM O.D. 1250MM	23,000KG	900HP 400/1000RPM	1030HP (130x900HP) 400/1000RPM	MINERAL OIL	2200LPM	1958
21	LAVIMOIRS THONVILLE FRANCE	ZR 23-25	FIVES-CAIL BABCOCK	LOW CARBON	4.0MM 0.1MM	150/300MPM	COLLAPSIBLE	I.D. 598MM O.D. 1300MM	11,000KG	800HP (2x400HP) 620/1240RPM	800HP (2x400HP)	MINERAL OIL	1500LPM	1958
22	FIAT AVIGLIANA ITALY	ZR 23-25	INNOCENTI	STAINLESS HIGH CARBON LOW CARBON	3.0MM 0.1MM	230/400MPM	COLLAPSIBLE	I.D. 400MM O.D. 1250MM	10,600KG	1000HP 575/1000RPM	800HP 500/1000RPM	MINERAL OIL	1800LPM	1958
23	NIHON YAKIN JAPAN	ZR 22-50	DEMAG	STAINLESS	5.1MM 0.1MM	100/200MPM	COLLAPSIBLE	I.D. 610MM O.D. 1070MM	34,500KG	1500HP (2x750HP) 575/1150RPM	1500HP (2x750HP)	MINERAL OIL	850GPM	1958
24	NIHON YAKIN JAPAN	ZS 07-60	INNOCENTI	STAINLESS	20.0MM 5.0MM	38/76MPM	-----	SHEETS	-----	500HP 350/700RPM	-----	MINERAL OIL	480LPM	1959
25	YAWATA JAPAN	ZR 22B-40	INNOCENTI	SILICON	3.5MM 0.2MM	215/430MPM	COLLAPSIBLE	I.D. 508MM O.D. 1524MM	35,000LBS	2500HP (2x1250HP) 400/800RPM	1500HP (2x750HP) 250/750RPM	SOLUBLE OIL	850GPM	1959
26	COMMONWEALTH STEEL AUSTRALIA	ZR 22-42	LOEWY ROBERTSON	STAINLESS LOW CARBON	0.187" 0.012"	350/500FPM	SOLID BLOCK	I.D. 24" O.D. 72"	66,000LBS UP TO 350FPM	1000HP 700/1000RPM	700HP (2x350HP) 290/1000RPM	MINERAL OIL	625GPM	1959

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
27	ELECTROTUBE SOLESMES FRANCE	ZR 33-21	FIVES-CAIL BABCOCK	HIGH CARBON LOW CARBON	3.00MM 0.06MM	200/300MPM	COLLAPSIBLE	I.D. 508MM O.D. 1270MM	8500KG	600HP (2x300HP) 700/1050RPM	570HP (2x285HP) 500/1250RPM	MINERAL OIL	1150LPM	1959
28	NAKAYAMA SEIKO JAPAN	ZR 22B-40	DEMAG	LOW CARBON SILICON	3.2MM 0.1MM	315/620MPM	COLLAPSIBLE	I.D. 508MM O.D. 1500MM	34,500LBS	3500HP 450/760RPM	1800HP (2x900HP) 250/730RPM	SOLUBLE OIL	1075GPM	1959
29	C.C.A.N.M ISBERGUES FRANCE	ZR 22B-42	ROUELLE	SILICON	2.00MM 0.07MM	300/720MPM	COLLAPSIBLE	I.D. 508MM O.D. 1830MM	27,000KG	3500HP 250/750RPM	2250HP (2x1125HP) 150/540RPM	MINERAL OIL	5000LPM	1960
30	KAWASAKI STEEL JAPAN	ZR 22B-40	INNOCENTI	SILICON	3.5MM 0.2MM	217/434MPM	COLLAPSIBLE	I.D. 508MM O.D. 1524MM	34,800LBS	2500HP 400/800RPM	1500HP (2x750HP) 230/750RPM	SOLUBLE OIL	850GPM	1960
31	H. WIGGIN ENGLAND	ZS 06-50	LOEWY ROBERTSON	NIMONIC ALLOY	0.180" 0.0164"	50/150FPM	-----	SHEETS	-----	200HP 250/750RPM	-----	MINERAL OIL	100GPM	1960
32	FORGES DE GUEIGNON FRANCE	ZR 22-52	FIVES-CAIL BABCOCK	STAINLESS	5.0MM 0.1MM	150/300MPM	COLLAPSIBLE	I.D. 610MM O.D. 1300MM	30,000KG	2040HP (2x1020HP) 280/710RPM	2040HP (2x1020HP) 280/710RPM	MINERAL OIL	3200LPM	1960
33	RICHARD THOMAS & BALDWIN ENGLAND	ZR 22-50	LOEWY ROBERTSON	STAINLESS	0.200" 0.010"	300/600FPM	COLLAPSIBLE	I.D. 24" O.D. 57"	77,000LBS	1430HP (2x715HP) 400/800RPM	1250HP (2x625HP) 350/1050RPM	MINERAL OIL	650GPM	1960
34	NIPPON KINZOKU KOGYO JAPAN	ZR 22-50	HITACHI	STAINLESS LOW CARBON SILICON	4.5MM 0.10MM	122/274MPM	COLLAPSIBLE	I.D. 510MM O.D. 1420MM	30,000KG	1600HP 225/505RPM	1300HP (2x650HP) 180/610RPM	MINERAL OIL	700GPM	1960
35	NIPPON MINING JAPAN	ZR 36-12-1/2	HITACHI	STAINLESS	1.55MM 0.05MM	46/92MPM	SOLID BLOCK	I.D. 406MM O.D. 585MM	2,500KG	50HP 333/666RPM	50HP 1150/1800RPM	MINERAL OIL	114LPM	1960
36	LA GALVANIZATION SKIN PASS FRANCE	ZH 2-9-40	ONNAING	GALVANIZED STRIP	1.50MM 0.20MM	35/48MPM	SOLID BLOCK	CONTINUOUS	6,400KG	-----	12HP	-----	-----	1959
37	SCHOELLER-BLECKMANN AUSTRIA	ZS 06-50	LOEWY ROBERTSON	STAINLESS	5.00MM 0.50MM	54/85MPM	-----	SHEETS	-----	700HP 875/1370RPM	-----	MINERAL OIL	820LPM	1960
38	S. OSBORN ENGLAND	ZS 06-62 1/2	LOEWY ROBERTSON	STAINLESS	0.250" 0.015"	60/120FPM	-----	SHEETS	-----	250HP 300/600RPM	-----	MINERAL OIL	100GPM	1961
39	NORSK BLIKKVALSERVERK NORWAY	ZR 22B-50	LOEWY ROBERTSON	LOW CARBON STAINLESS SILICON	2.50MM 0.13MM	244/435MPM	SOLID BLOCK	I.D. 508MM O.D. 1638MM	18,900KG	3000HP (2x1500HP) 450/800RPM	1850HP (2x925HP) 285/920RPM	SOLUBLE OIL	700GPM	1959

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COL. SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
40	YAWATA #3 JAPAN	ZR 22BS-42	HITACHI	SILICON	3.5MM 0.2MM	260/434MPM	COLLAPSIBLE	I.D. 508MM O.D. 1520MM	21,000KG	3000HP 300/500RPM	2000HP (2x1000HP) 230/750RPM	SOLUBLE OIL	850GPM	1960
41	KOBE SEIKO JAPAN	ZR 23-25	HITACHI	ALUMINUM BRASS TITANIUM	3.00MM 0.10MM	92/275MPM	SOLID BLOCK	I.D. 610MM O.D. 1250MM	10,000KG	500HP 230/690RPM	350HP (2x175HP) 200/800RPM	MINERAL OIL	300GPM	1961
42	A. LEE & SONS #3 ENGLAND	ZR 23B-19	LOEWY ROBERTSON	STAINLESS LOW CARBON	0.200" 0.004"	225/450FPM	SOLID BLOCK	I.D. 24" O.D. 54"	33,000LBS	375HP 400/800RPM	300HP 400/1500RPM	MINERAL OIL	220GPM	1961
43	NISSHIN SEIKO #2 JAPAN	ZR 21-50	HITACHI	LOW CARBON TINPLATE	4.4MM 0.152MM	370/820MPM	COLLAPSIBLE	I.D. 510MM O.D. 1830MM	21,000KG	500HP (2x250HP) 250/550RPM	375HP (3x125HP) 150/560RPM	SOLUBLE OIL	6250LPM	1959
44	CRANES COPPER & ALUMINUM AUSTRALIA	ZR 16-18	LOEWY ROBERTSON	COPPER BRASS	0.060" 0.002"	382FPM	SOLID BLOCK	I.D. 15.25" O.D. 43.8"	4,300LBS	120HP 0/900RPM	50HP 400/1200RPM	MINERAL OIL	35GPM	1960
45	SHEPCOTE LANE #2 ENGLAND	ZR 22-40	LOEWY ROBERTSON	STAINLESS	0.250" 0.003"	400/710FPM	SOLID BLOCK	I.D. 26" O.D. 58"	66,000LBS	1250HP 450/800RPM	750HP (2x375HP) 250/860RPM	MINERAL OIL	600GPM	1960
46	PHENIX WORKS BELGIUM	ZR 22-50	INNOCENTI	STAINLESS LOW CARBON	2.50MM 0.10MM	260/520MPM	SOLID BLOCK	I.D. 508MM O.D. 1780MM	30,000KG	3,500HP (2x1750HP) 400/800RPM	2250HP (1500x750HP) 240/930RPM	SOLUBLE OIL	4100LPM	1960
47	NORRBOTTENS JARVERK SWEDEN	ZR 22B-42	INNOCENTI	LOW CARBON	5.00MM 0.10MM	315/524MPM	COLLAPSIBLE	I.D. 610MM O.D. 1840MM	19,300KG	3600HP (2x1800HP) 575/965RPM	1920HP (2x960HP) 290/875RPM	SOLUBLE OIL	3600LPM	1960
48	IMPERIAL CHEMICAL IND. ENGLAND	ZR 3A-10	LOEWY ROBERTSON	ZIRCONIUM	0.060" 0.0008"	300FPM	SOLID BLOCK	I.D. 14" O.D. 24"	4,000LBS	80HP 0/666RPM	67.5HP (60x7.5HP) 0/1800RPM	MINERAL OIL	20GPM	1960
49	UDDEHOLMS A.B. SWEDEN	ZR 16-8 1/2	LOEWY ROBERTSON	STAINLESS HIGH CARBON	0.90MM 0.20MM	128/185MPM	SOLID BLOCK	I.D. 355MM O.D. 1020MM	1,200KG	80HP 1000/1440RPM	120HP 550/1650RPM	MINERAL OIL	200RPM	1960
50	KAWASAKI #2 JAPAN	ZR 21B-44	HITACHI	SILICON	2.8MM 0.2MM	300/600MPM	COLLAPSIBLE	I.D. 510MM O.D. 1526MM	22,500KG	3500HP (2x1750HP) 410/820RPM	3000HP (4x750HP) 150/480RPM	MINERAL OIL	1200GPM	1961
51	S.C.O.W. ENGLAND	ZR 24-14	LOEWY ROBERTSON	SILICON	0.013" 0.001"	150/300FPM	SOLID BLOCK	I.D. 12" O.D. 27.5"	2200LBS	60HP 600/1200RPM	20HP 300/800RPM	SOLUBLE OIL	30GPM	1962
52	AUSTRALIAN ALUMINUM CO. AUSTRALIA	ZR 23M-50	LOEWY ROBERTSON	ALUMINUM	0.187" 0.008"	750/1000FPM	COLLAPSIBLE	I.D. 24" O.D. 52.5"	25,000LBS	1800HP 500/655RPM	750HP (2x375HP) 500/1210RPM	MINERAL OIL	750GPM	1962



ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
53	KAWASAKI #3 JAPAN	ZR 22-50	HITACHI	STAINLESS	3.5MM 0.2MM	122/230MPM	COLLAPSIBLE	I.D. 510MM O.D. 1626MM	30,000KG	1740HP (2x870HP) 225/425RPM	1600HP (2x800HP) 225/800RPM	MINERAL OIL	750GPM	1962
54	FABRIQUE DE MAUBEUGE FRANCE	ZR 22B-52	INNOCENTI	LOW CARBON	4.0MM 0.10MM	250/500MPM	SOLID BLOCK	I.D. 510MM O.D. 1500MM	22,500KG	3500HP (2x1750HP) 307/614RPM	2500HP (2x1250HP) 315/1000RPM	SOLUBLE OIL	4000LPM	1962
55	FORGES DE JEMAPPE BELGIUM	ZR 33-21	LOEWY ROBERTSON	LOW CARBON HIGH CARBON SILICON	4.0MM 0.1MM	180/300MPM	COLLAPSIBLE	I.D. 508MM O.D. 1250MM	9000KG	600HP 630/1050RPM	600HP (2x300HP) 625/1600RPM	MINERAL OIL	1500LPM	1962
56	HARLOW METAL CO. ENGLAND	ZR 16-8 1/2	LOEWY ROBERTSON	BERILLIUM COPPER	0.060" 0.001"	150/300FPM	SOLID BLOCK	I.D. 14" O.D. 22"	3,300LBS	80HP 0/700RPM	52HP 0/780RPM	MINERAL OIL	20GPM	1962
57	STE MARIE ET GRAVIGNY FRANCE	ZR 23-25	FIVES-CAIL BARCOCK	LOW CARBON	5.0MM 0.10MM	160/320MPM	SOLID BLOCK	I.D. 508MM O.D. 1375MM	11,250KG	800HP (2x400HP) 500/1000RPM	800HP (2x400HP) 500/1375RPM	SOLUBLE OIL	1500LPM	1962
58	FUJI IRON & STEEL JAPAN	ZR 22B-42	HITACHI	SILICON	3.5MM 0.20MM	260/434MPM	COLLAPSIBLE	I.D. 508MM O.D. 1520MM	21,000KG	3000HP 300/500RPM	2000HP (2x1000HP) 230/750RPM	SOLUBLE OIL	1000GPM	1962
59	HAKATA KOHAN JAPAN	ZR 22B-50	HITACHI	LOW CARBON	3.2MM 0.1MM	310/525MPM	COLLAPSIBLE	I.D. 510MM O.D. 1520MM	19,000KG	3500HP 570/965RPM	2200HP (2x1100HP) 275/900RPM	SOLUBLE OIL	1000GPM	1962
60	NIPPON STAINLESS #1 JAPAN	ZR 22-50	HITACHI	STAINLESS	4.5MM 0.1MM	110/190MPM	COLLAPSIBLE	I.D. 610MM O.D. 1320MM	37,000KG	1475HP 200/350RPM	1340HP (2x670HP) 225/560RPM	MINERAL OIL	750GPM	1962
61	YAWATA #4 JAPAN	ZR 22-50	HITACHI	STAINLESS SILICON	5.0MM 0.2MM	122/276MPM	COLLAPSIBLE	I.D. 510MM O.D. 1626	30,000KG	1740HP (2x870HP) 225/425RPM	1600HP (2x800HP) 225/800RPM	MINERAL OIL	1000GPM	1963
62	NISSHIN SEIKO #3 JAPAN	ZR 22-50	HITACHI	STAINLESS	5.5MM 0.127MM	140/360MPM	SOLID BLOCK	I.D. 610MM O.D. 1570MM	32,000KG	2000HP (2x1000HP) 260/670RPM	2000HP (2x1000HP) 240/800RPM	MINERAL OIL	4700GPM	1964
63	STE. METAL DE HOBOKEN BELGIUM	ZR 34-10	LOEWY ROBERTSON	COBALT TANTALUM	0.60" 0.0004"	300FPM	SOLID BLOCK	I.D. 14" O.D. 20"	4000LBS	80HP 0/666RPM	67.5HP (60x7.5HP) 0/1800RPM	MINERAL OIL	25GPM	1964
64	ESTEBAN ORBEGOZO SPAIN	ZR 23-25	INNOCENTI	LOW CARBON	3.0MM 0.1MM	230/400MPM	COLLAPSIBLE	I.D. 460MM O.D. 1480MM	9000KG	1000HP 575/1000RPM	800HP (2x400HP) 250/1050RPM	MINERAL OIL	1900LPM	1963

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
65	DEUTSCHE EDELSTAHLWERKE #2 GERMANY	ZR 22-52	DEMAG	STAINLESS	5.35MM 0.40MM	100/200MPM	COLLAPSIBLE	I.D. 610MM O.D. 1810MM	36,000KG	1800HP (2x900HP) 185/370RPM	1600HP (2x800HP) 185/380RPM	MINERAL OIL	4000LPM	1963
66	PEUGEOT #2 FRANCE	ZR 22-25	FIVES-CAIL BABCOCK	STAINLESS	6.00MM 0.08MM	120/275MM	COLLAPSIBLE	I.D. 480MM O.D. 1440MM	14,720KG	900HP (2x450HP) 430/995RPM	900HP (2x450HP) 430/1305RPM	MINERAL OIL	2200LPM	1963
67	FIAT FERRIERE #4 ITALY	ZR 22-42	INNOCENTI	STAINLESS	6.35MM 0.15MM	136/235MPM	COLLAPSIBLE	I.D. 610MM O.D. 1620MM	31,000KG	1800HP 250/430RPM	1600HP (2x800HP) 300/875RPM	MINERAL OIL	3400LPM	1963
68	IMPERIAL METAL INDUSTRY #2 ENGLAND	ZR 23M-26	LOEWY ROBERTSON	COPPER TITANIUM ZIRCONIUM	0.120" 0.003"	330/1000FPM	SOLID BLOCK	I.D. 20" O.D. 40"	14,800LBS	550HP 220/665RPM	535HP (450+85HP) 600/1350RPM	MINERAL OIL	300GPM	1963
69	TERNINOSS ITALY	ZR 22-50	INNOCENTI	STAINLESS	6.35MM 0.10MM	135/235MPM	COLLAPSIBLE	I.D. 610MM O.D. 1320MM	35,000KG	1800HP (2x900HP) 250/435RPM	1800HP (2x900HP) 250/590RPM	MINERAL OIL	4000LPM	1963
70	INAMOTO SHINDO JAPAN	ZR 16-8 1/2	HITACHI	BRASS	2.00MM 0.030MM	90/150MPM	SOLID BLOCK	I.D. 360MM O.D. 610MM	1,400KG	60HP 700/1170RPM	50HP 500/880RPM	MINERAL OIL	170LPM	1963
71	TURNILS A.B. SWEDEN	ZR 16-18	LOEWY ROBERTSON	ALUMINIUM BRASS	2.00MM 0.020MM	116MPM	SOLID BLOCK	I.D. 406MM O.D. 1120MM	1950KG	120HP 0/900RPM	50HP 550/1650RPM	MINERAL OIL	230LPM	196
72	P. ECHEVERRIA SPAIN	ZS 07-49	LOEWY ROBERTSON	STAINLESS	12.00MM 0.40MM	20/40MPM	-----	SHEETS	-----	200HP 500/1000RPM	-----	MINERAL OIL	100GPM	1963
73	LAMINATION Y DERIVADOS SPAIN	ZR 23-25	INNOCENTI	LOW CARBON BRASS ALUMINIUM	4.75MM 0.10MM	230/400MPM	COLLAPSIBLE	I.D. 400MM O.D. 1480MM	9000KG	1000HP 575/1000RPM	800HP (2x400HP) 250/1050RPM	MINERAL OIL	1900LPM	1964
74	C.C. & N.M. ISBERGUES #4 FRANCE	ZR 22B-52	FIVES-CAIL BABCOCK	STAINLESS LOW CARBON	6.50MM 0.10MM	100/300MPM	COLLAPSIBLE	I.D. 610MM O.D. 1830MM	43,000KG	1900HP 185/555RPM	2000HP (2x1000HP) 300/1200RPM	MINERAL OIL	4000LPM	196
75	BIACHE ST. VAAST #2 FRANCE	ZR 22B-52	FIVES-CAIL BABCOCK	LOW CARBON	4.5MM 0.4MM	200/400MPM	COLLAPSIBLE	I.D. 610MM O.D. 1677MM	25,000KG	2500HP (2x1250HP) 370/740RPM	2200HP (2x1100HP) 300/825RPM	SOLUBLE OIL	3400LPM	1964
76	NIPPON YAKIN #3 JAPAN	ZR 22-50	HITACHI	STAINLESS	6.35MM 0.10MM	100/200MPM	COLLAPSIBLE	I.D. 610MM O.D. 1300MM	36,000KG	1470HP 185/370RPM	1800HP (2x900HP) 260/600RPM	MINERAL OIL	3220LPM	1965
77	HINDUSTAN STEEL INDIA	ZC 07-63-1/2	HITACHI	STAINLESS	7.5MM 0.5MM	20/40MPM	-----	SHEETS	-----	325HP 325/650RPM	-----	O.M.L. BRGS NO COOLANT	-----	1966



ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
78	KRUPP #1 GERMANY	ZR 22-52	DEMAG	STAINLESS	5.00MM 0.30MM	125/250MPM	COLLAPSIBLE	LD. 610MM O.D. 1750MM	35,000KG	2040HP (2x1020HP) 230/460RPM	2080HP (2x1040HP)	MINERAL OIL	4000LPM	1965
79	SUDWESTFALEN GERMANY	ZR 22-52	DEMAG	STAINLESS	5.5MM 0.25MM	150/300MPM	COLLAPSIBLE	LD. 610MM O.D. 1750MM	35,000KG	2400HP (2x1200HP) 275/550RPM	2400HP (2x1200HP) 275/880RPM	MINERAL OIL	3000LPM	1965
80	BORIS KIDRIC YUGOSLAVIA	ZS 06-50	LOEWY ROBERTSON	STAINLESS	5.0MM 0.50MM	20/40MPM	-----	SHEETS	-----	280HP 300/600RPM	-----	MINERAL OIL	475LPM	1965
81	LA COMENTRYENNE FRANCE	ZS 07-50	FIVES-CAIL BABCOCK	ALLOY STEEL	20.0MM 0.25MM	20/60MPM	-----	SHEETS	-----	330HP 400/1320RPM	-----	MINERAL OIL	500LPM	1965
82	FORGES DE GUEUGNON #3 FRANCE	ZR 22-52	FIVES-CAIL BABCOCK	STAINLESS	6.5MM 0.12MM	150/350MPM	COLLAPSIBLE	LD. 610MM O.D. 1600MM	36,000KG	3000HP (3x1000HP) 280/650RPM	2800HP (2x1400HP) 385/870RPM	MINERAL OIL	6175LPM	1966
83	HITACHI METALS JAPAN	ZR 24-11 1/2	HITACHI	HIGH CARBON STAINLESS	1.2MM 0.10MM	100/200MPM	SOLID BLOCK	LD. 400MM O.D. 700MM	3,650KG	134HP 450/900RPM	94HP (2x47HP) 450/1400RPM	MINERAL OIL	450LPM	1966
84	TELCON METALS #3 ENGLAND	ZR 24-8 1/2	LOEWY ROBERTSON	NICKEL ALLOYS	.115" .004"	300/600FPM	SOLID BLOCK	LD. 12" O.D. 28"	8,000LBS	125HP 425/850RPM	150HP 500/1200RPM	MINERAL OIL	75GPM	1966
85	SAMUEL FOX ENGLAND	ZR 33W-13	LOEWY ROBERTSON	LOW CARBON HIGH CARBON STAINLESS	.130" .003"	650/1080FPM	SOLID BLOCK	LD. 16" O.D. 45"	12,200LBS	500HP 690/1150LPM	400HP (2x200HP) 450/1400RPM	MINERAL OIL	300GPM	1966
86	BASCONIA SPAIN	ZS 07-60	INNOCENTI	LOW CARBON STAINLESS	20.0MM 0.50MM	20/40MPM	-----	SHEETS	-----	320HP 325/650RPM	-----	MINERAL OIL	450LPM	1966
87	NIPPON STAINLESS #2 JAPAN	ZS 07-75	HITACHI	STAINLESS	19.0MM 1.20MM	37/74MPM	-----	SHEETS	-----	500HP 350/700RPM	-----	MINERAL OIL	500LPM	1966
88	MITSUBISHI METAL JAPAN	ZS 06-50	HITACHI	HASTELLOY	5.0MM 0.30MM	12.2/37MPM	-----	SHEETS	-----	200HP 200/600RPM	-----	MINERAL OIL	250LPM	1967
89	KAWASAKI #4 JAPAN	ZR 21A-44	HITACHI	SILICON	2.80MM 0.30MM	300/600MPM	COLLAPSIBLE	LD. 610MM O.D. 1700MM	25,000KG	3500HP (2x1750HP) 410/820RPM	3000HP (3x1000HP) 230/750RPM	SOLUBLE OIL	4550LPM	1967
90	FORGES DE GUEUGNON #4 FRANCE	ZR 21B-60	FIVES-CAIL BABCOCK	STAINLESS SILICON	8.00MM 0.20MM	200/500MPM	COLLAPSIBLE	LD. 610MM O.D. 1860MM	45,000KG	5300HP (2x2650HP) 270/680RPM	5120HP (4x1280HP) 210/530RPM	MINERAL OIL	12,000LPM	1968

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
91	NDWA HUTA POLAND	ZR 21MB-55	INNOCENTI	LOW CARBON	3.17MM 0.15MM	330/625MPM	COLLAPSIBLE	I.D. 610MM O.D. 1800MM	21,800KG	3500HP (2x1750HP) 450/850RPM	3000HP (2x1500HP) 390/1770RPM	SOLUBLE OIL	5,700LPM	1967
92	YAWATA #5 JAPAN	ZR 22-50	HITACHI	STAINLESS	6.00MM 0.20MM	163/350MPM	SOLID BLOCK	I.D. 610MM O.D. 1750MM	39,000KG	2400HP (2x1200HP) 300/645RPM	2140HP (2x1070HP) 125/520RPM*	MINERAL OIL	5000LPM	1968
93	KAWASAKI #5 JAPAN	ZR 22-50	HITACHI	STAINLESS	5.50MM 0.15MM	163/350MPM	SOLID BLOCK	I.D. 610MM O.D. 1700MM	40,000KG	2400HP 300/645RPM	2140HP (2x1070RPM) 125/520RPM	MINERAL OIL	5000LPM	1968
94	NIPPON MINING #2 JAPAN	ZR 23C-25	HITACHI	NL SILVER BRASS BRONZE	2.0MM 0.04MM	150/300MPM	SOLID BLOCK	I.D. 500MM O.D. 1000MM	1000KG	536HP 375/750RPM	300HP 350/700RPM	MINERAL OIL	3000LPM	1968
95	SHEPCOTE LANE #3 ENGLAND	ZR 22-52	LOEWY ROBERTSON	STAINLESS	0.3" 0.010"	500/810FPM	SOLID BLOCK	I.D. 26" O.D. 83"	87,500LBS	2500HP (2x1250HP) 280/455RPM	2240HP (2x1120HP) 290/930RPM	MINERAL OIL	1250GPM	1968
96	NIPPON STAINLESS #3 JAPAN	ZR 22B-50	HITACHI	STAINLESS	6.0MM 0.20MM	163/400MPM	SOLID BLOCK	I.D. 610MM O.D. 1500MM	40,000KG	2400HP (2x1200HP) 300/735RPM	2400HP (2x1200HP) 175/640RPM	MINERAL OIL	6000GPM	1967
97	NYBY BRUKS #2 SWEDEN	ZR 22-42	DEMAG	STAINLESS	6.0MM 0.20MM	150/300MPM	SOLID BLOCK	I.D. 610MM O.D. 1800MM	37,500KG	2500HP (2x1250HP) 276/828RPM	2500HP (2x1250HP) 276/828RPM	MINERAL OIL	5000LPM	1967
98	NIPPON METAL #2 JAPAN	ZR 22-50	HITACHI	STAINLESS	6.0MM 0.20MM	130/275MPM	COLLAPSIBLE	I.D. 508MM O.D. 1440MM	35,000KG	1740HP 240/510RPM	1810HP (2x905HP) 225/800RPM	MINERAL OIL	4400LPM	1968
99	D.E.W. #3 GERMANY	ZR 21BB-61	DEMAG	STAINLESS	7.0MM 0.50MM	250/400MPM	COLLAPSIBLE	I.D. 610MM O.D. 1800MM	45,000KG	6110HP (2x3055HP) 340/550RPM	4350HP (2x2175HP) 200/600RPM	MINERAL OIL	12,000LPM	1968
100	STAHLWERK SUDWESTFALEN #2 GERMANY	ZR 21BB-61	DEMAG	STAINLESS	7.5MM 0.50MM	300/450MPM	COLLAPSIBLE	I.D. 610MM O.D. 1800MM	45,000KG	7800HP (2x3900HP) 400/600RPM	4840HP (2x2420HP) 240/708RPM	MINERAL OIL	15,000LPM	1968
101	V.O.E.S.T. AUSTRIA	ZR 21BB-52	VOEST	LOW CARBON SILICON STAINLESS	5.5MM 0.35MM	250/750MPM	COLLAPSIBLE	I.D. 600MM O.D. 1750MM	35,000KG	4830HP (2x2415HP) 225/675RPM	4290HP (2x2145HP) 200/600RPM	SOLUBLE OIL	7500LPM	1968
102	STANKOIMPORT #1 U.S.S.R.	ZR 21MB-44	INNOCENTI	LOW CARBON	3.50MM 0.15MM	300/600MPM	COLLAPSIBLE	I.D. 500MM O.D. 1900MM	20,000KG	4200HP (2x2100HP) 250/500RPM	2800HP (2x1400HP) 250/960RPM	SOLUBLE OIL	5000LPM	1968

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
103	STANKOIMPORT #2 U.S.S.R.	ZR 21MB-60	INNOCENTI	LOW CARBON	5.0MM 0.20MM	375/750MPM	COLLAPSIBLE	L.D. 750MM O.D. 1800MM	26,500KG	4500HP (2x2250HP) 275/550RPM	4500HP (2x2250HP) 275/700RPM	SOLUBLE OIL	6500LPM	1968
104	TERNIKOSS #2 ITALY	ZR 22S-54	INNOCENTI	STAINLESS	6.35MM 0.25MM	175/330MPM	COLLAPSIBLE	L.D. 610MM O.D. 1500MM	41,000KG	3000HP (2x1500HP) 315/600RPM	3000HP (2x1500HP) 315/800RPM	MINERAL OIL	6000LPM	1968
105	ILSSA VIOLA ITALY	ZR 22-42	INNOCENTI	STAINLESS	6.35MM 0.15MM	135/235MPM	COLLAPSIBLE	L.D. 600MM O.D. 1450MM	31,000KG	1800HP 250/430RPM	1600HP (1200+400HP) 350/875RPM	MINERAL OIL	3800LPM	1968
106	NIPPON KINZOKU #3 JAPAN	ZR 23C-25	HITACHI	STAINLESS	4.30MM 0.20MM	150/300MPM	COLLAPSIBLE	L.D. 508MM O.D. 1500MM	15,000KG	1000HP 375/750RPM	1000HP 300/900RPM	MINERAL OIL	2800LPM	1968
107	HITACHI METALS #2 JAPAN	ZR 24-11 1/2	HITACHI	HIGH CARBON STAINLESS	1.20MM 0.03MM	100/145MPM	COLLAPSIBLE	L.D. 400MM O.D. 750MM	2,500KG	94HP	80HP (27+53HP)	MINERAL OIL	300LPM	1968
108	NISSHIN SEIKO #A (TANDEM) RESERVED FOR FUTURE STAND													
109	NISSHIN SEIKO #4 TANDEM ST. 1 JAPAN	TZR 22N-50	HITACHI	STAINLESS	6.5MM 3.8MM	110/330MPM	-----	L.D. 510MM O.D. 2200MM	-----	1800HP (2x940HP) 300/900RPM	335HP 250/1100RPM (PAY-OFF)	SOLUBLE OIL	8,000LPM	1969
110	NISSHIN SEIKO #4 TANDEM ST. 2 JAPAN	TZR 21B-50	HITACHI	STAINLESS	-----	147/400MPM	-----	-----	-----	3200HP (2x1600HP) 250/680RPM	-----	SOLUBLE OIL	8,000LPM	1969
111	NISSHIN SEIKO #4 TANDEM ST. 3 JAPAN	TZR 21B-50	HITACHI	STAINLESS	-----	186/500MPM	-----	-----	-----	3200HP (2x1600HP) 250/680RPM	-----	SOLUBLE OIL	11,000LPM	1969
112	NISSHIN SEIKO #4 TANDEM ST. 4 JAPAN	TZR 21B-50	HITACHI	STAINLESS	-----	225/600MPM	-----	-----	-----	3200HP (2x1600HP) 250/680RPM	-----	SOLUBLE OIL	11,000LPM	1969
113	NISSHIN SEIKO #4 TANDEM ST. 5 JAPAN	2-HIGH	HITACHI	STAINLESS	0.8MM 0.3MM	225/600MPM	COLLAPSIBLE	L.D. 510MM O.D. 2270MM	20,000KG	2000HP (2x1000HP) 300/800RPM	2680HP (2x1340HP) 100/450RPM	SOLUBLE OIL	100LPM	1969
114	LAMINA ITALY	ZR 24-14	INNOCENTI	LOW CARBON HIGH CARBON STAINLESS	3.0MM 0.10MM	100/200MPM	COLLAPSIBLE	L.D. 408MM O.D. 1250MM	4250KG	190HP 460/920RPM	150HP (2x75HP) 460/1840RPM	MINERAL OIL	500LPM	1970
115	G. BONAITI ITALY	ZR 24-14	INNOCENTI	LOW CARBON	2.0MM 0.15MM	100/250MPM	COLLAPSIBLE	L.D. 408MM O.D. 1150MM	3700KG	150HP (2x75HP) 460/1150RPM	150HP (2x75HP) 460/1800RPM	SOLUBLE OIL	500LPM	1970

E E

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
116	TELCON METALS #4 ENGLAND	ZR 24H-11	1/2 LOEWY ROBERTSON ALLOYS	NICKEL	3.25MM 0.127MM	91.4/183MPM	SOLID BLOCK	I.D. 305MM O.D. 730MM	5000KG	175HP 425/850RPM	200HP 550/1375RPM	MINERAL OIL	96LPM	1970
117	TANAGAWA JAPAN	ZR 33-18	HITACHI	BRASS COPPER	1.0MM 0.05MM	140/280MPM	SOLID BLOCK	I.D. 440MM O.D. 1100MM	3000KG	260HP 500/1000RPM	130HP (2x65HP) 300/1150RPM	MINERAL OIL	1000LPM	1970
118	ELECTROTUBE SOLESMES #2 FRANCE	ZR 33C-27	FIVES-CAIL BABCOCK	LOW CARBON HIGH CARBON	2.5MM 0.03MM	290/500MPM	COLLAPSIBLE	I.D. 508MM O.D. 1750MM	13,500KG	940HP 1000/1750RPM	790HP 235/650RPM	MINERAL OIL	1800LPM	1970
119	PEUGEOT #3 FRANCE	ZR 22S-26	FIVES-CAIL BABCOCK	STAINLESS	6.0MM 0.15MM	150/450MPM	COLLAPSIBLE	I.D. 408MM O.D. 1860MM	22,500KG	1500HP (2x750HP) 500/1500RPM	1500HP (3x500HP) 300/1500RPM	MINERAL OIL	4000LPM	1970
120	SUMITOMO METAL #2 JAPAN	ZR 33B-18	HITACHI	STAINLESS PERMALLOY	2.5MM 0.05MM	100/200MPM	SOLID BLOCK	I.D. 440MM O.D. 800MM	10,000KG	300HP 350/700RPM	228HP (2x114HP) 400/800RPM	MINERAL OIL	900LPM	1969
121	CREUSOT-LOIRE LE CREUSOT FRANCE	ZSC 07B-90	S.F.-A.C.	STAINLESS	20MM 2MM	30/40MPM	-----	SHEETS & PLATE	-----	200/400HP 420/840RPM	-----	MINERAL OIL	600LPM	1969
122	KAWASAKI FUKUI #4 JAPAN	ZR 21A-44	HITACHI	SILICON	2.8MM 0.2MM	300/600MPM	COLLAPSIBLE	I.D. 610MM O.D. 1750MM	25,000KG	3500HP (2x1750HP) 410/820RPM	3400HP (2x1700HP) 225/645RPM	SOLUBLE OIL	4550LPM	1969
123	CREUSOT-LOIRE FIRMINY FRANCE	ZR 22-26 1/2	FIVES-CAIL BABCOCK	STAINLESS	6.0MM 0.10MM	150/450MPM	COLLAPSIBLE	I.D. 508MM O.D. 1860MM	22,500KG	1480HP (2x740HP) 276/820RPM	1332HP (2x666HP) 197/1200RPM	MINERAL OIL	4000LPM	1969
124	FAGERSTA #2 SWEDEN	ZR 22S-32	INNOCENTI	STAINLESS HIGH CARBON	7.0MM 0.15MM	150/350MPM	SOLID BLOCK	I.D. 660MM O.D. 1650MM	24,000KG	2000HP (2x1000HP) 268/625RPM	2000HP (2x1000HP) 440/1100RPM	MINERAL OIL	5000LPM	1969
125	NIPPON YAKIN #4 JAPAN	ZR 21B-62	HITACHI	STAINLESS	8.0MM 0.5MM	260/450MPM	COLLAPSIBLE	I.D. 610MM O.D. 1800MM	45,000KG	5500HP (3x2750HP) 350/610RPM	3352HP (2x1676HP) 125/460RPM	MINERAL OIL	11,000LPM	1969
126	KAWASAKI NISHINOIYA #3 JAPAN	ZR 21A-62	HITACHI	STAINLESS	7.0MM 0.8MM	125/300MPM	SOLID BLOCK	I.D. 510MM O.D. 1700MM	60,000KG	3210HP 170/410RPM	3352HP (2x1676HP) 150/550RPM	MINERAL OIL	7000LPM	1969
127	NIPPON MINING KAWASKI #3 JAPAN	ZR 2A-19	HITACHI	STAINLESS	2.00MM 0.02MM	100/200MPM	SOLID BLOCK	I.D. 400MM O.D. 1200MM	4500KG	168HP 460/920RPM	154HP (100x54HP) 300/1200RPM	MINERAL OIL	700LPM	1969
128	KOVOKUTE POVRLY CZECHOSLOVAKIA	ZR 33CD-26	INNOCENTI	COPPER BRASS	2.5MM 0.05MM	120/300MPM	SOLID BLOCK	I.D. 508MM O.D. 1000MM	5250KG	500HP 415/1040RPM	70HP 900/1800RPM	MINERAL OIL	1000LPM	1970

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
129	NIPPON STAINLESS KASHIMA #2 JAPAN	ZR 21B-62	HITACHI	STAINLESS	8.0MM 0.8MM	250/350MPM	COLLAPSIBLE	LD. 610MM O.D. 2000MM	45,000KG	6436HP (2x3218HP) 340/473RPM	3486HP (2x1743HP) 150/300RPM	MINERAL OIL	6000LPM	1969
130	COMSTEEL #2 AUSTRALIA	ZR 21AA-66	HITACHI	STAINLESS	0.315" 0.018"	400/800MPM	SOLID BLOCK	LD. 26" O.D. 72"	126,000LBS	3000HP (2x1500HP) 400/800RPM	2000HP (2x1000HP) 200/870RPM	MINERAL OIL	1400GPM	1970
131	KAWASAKI FUKUI #5 JAPAN	ZR 21A-44	HITACHI	SILICON	2.8MM 0.2MM	400/800MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	25,000KG	3400KW (2x1700KW) 350/700RPM	3300KW (2x1650KW) 200/575RPM	SOLUBLE OIL	6000LPM	1973
132	GUEUGNON #5 FRANCE	ZR 21B-44	FIVES-CAIL BABCOCK	STAINLESS SILICON	6.0MM 0.3MM	320/800MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	36,000KG	4800KW (3x1600KW) 320/800RPM	4800KW (3x1600KW) 320/1000RPM	MINERAL OIL	11,500LPM	1970
133	NIKKIMKO #3 JAPAN	ZR 21B-62	HITACHI	STAINLESS	8.0MM 0.8MM	200/400MPM	COLLAPSIBLE	LD. 610MM O.D. 1800MM	45,000KG	4000KW (2x2000KW) 270/540RPM	2640KW (2x1320KW) 125/460RPM	MINERAL OIL	1500LPM	1970
134	YAWATA HIKARI #3 JAPAN	ZR 21B-63	HITACHI	STAINLESS	7.0MM 0.8MM	250/500MPM	COLLAPSIBLE	LD. 660MM O.D. 2300MM	50,000KG	4800KW (2x2400KW) 280/560RPM	3000KW (2x1500KW) 60/300RPM	MINERAL OIL	6000LPM	1970
135	SAM YANG KOREA	ZR 22-42	HITACHI	STAINLESS	4.0MM 0.4MM	95/160MPM	COLLAPSIBLE	LD. 510MM O.D. 1400MM	22,500KW	900KW 175/300RPM	1200KW (2x600KW) 300/825RPM	MINERAL OIL	2800LPM	1970
136	ACERINOX SPAIN	ZR 22B-50	HITACHI	STAINLESS	6.0MM 0.2MM	163/400MPM	COLLAPSIBLE	LD. 610MM O.D. 2000MM	40,000KG	1800KW (2x900KW) 300/675RPM	1800KW (2x900KW) 125/546RPM	MINERAL OIL	2250LPM	1971
137	NIPPON KINZOKU JAPAN	ZR 23C-25	HITACHI	STAINLESS	4.3MM 0.2MM	150/300MPM	COLLAPSIBLE	LD. 508MM O.D. 1550MM	15,000KG	750KW 375/750RPM	750KW 300/900RPM	MINERAL OIL	1300LPM	1971
138	STANKOIMPORT #3 U.S.S.R.	ZR 23M-25	FIVES-CAIL BABCOCK	COPPER BRASS BRONZE	1.00MM 0.05MM	250/500MPM	COLLAPSIBLE	LD. 505MM O.D. 1200MM	3600KG	450KW 550/1100RPM	225KW 500/1600RPM	MINERAL OIL	1420LPM	1972
139	HITACHI METAL #3 JAPAN	ZR 24-14	HITACHI	HIGH CARBON STAINLESS	2.0MM 0.08MM	100/200MPM	COLLAPSIBLE	LD. 508MM O.D. 1100MM	5000KG	125KW 460/920RPM	112KW (37+75KW) 300/1200RPM	MINERAL OIL	700LPM	1972
140	LA GALVANIZATION MOUZON #2 FRANCE	ZH 2-9-60	ZIEGLER	LOW CARBON GALVANIZED	2.0MM 0.4MM	10/60MPM	-----	CONTINUOUS	-----					1969

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
141	G. BONAITI #2 ITALY	ZR 24S-14	INNOCENTI	LOW CARBON STAINLESS	.160" .0315"	980FPM	COLLAPSIBLE	I.D. 22" O.D. 71"	13,200LBS	360HP 800/1340RPM	484HP (2x242HP) 560/1500RPM	SOLUBLE OIL	145GPM	1972
142	AHMEDABAD ADVANCE MILL LTD. #2 INDIA	ZR 33-19	HITACHI	STAINLESS	2.0MM 0.02MM	152.5/244MPM	SOLID BLOCK	I.D. 508MM O.D. 1118MM	8,800KG	500HP 530/850RPM	400HP (2x200HP) 650/1710RPM	SOLUBLE OIL	1050GPM	1972
143	ELECTROSTAL U.S.S.R.	ZR 21BB-60	FIVES-CAIL BABCOCK	STAINLESS	.25" .008"	1640FPM	COLLAPSIBLE	I.D. 29.5" O.D. 71"	110,000LBS	5000HP (2x2500HP) 340/680RPM	4700HP (2x2350HP) 320/780RPM	MINERAL OIL	2150GPM	1972
144	TCHEREPONCE U.S.S.R.	ZR 21BB-44	FIVES-CAIL BABCOCK	SILICON	.034" .008"	1970FPM	COLLAPSIBLE	I.D. 19.5" O.D. 71"	44,100LBS	3500HP (2x1750HP) 410/820RPM	2000HP (2x1000HP) 235/890RPM	MINERAL OIL	1870GPM	1972
145	TIRGOVISTE RUMANIA	ZR 21BB-52	DEMAG	SILICON	.100" .007"	2500FPM	COLLAPSIBLE	I.D. 24" O.D. 77"	78,000LBS	4080HP (2x2040HP) 340/1020RPM	3250HP (2x1625HP) 225/300RPM	SOLUBLE OIL O.M.L. BRGS.	6000LPM	1972
146	NIPPON MINING #4 JAPAN	ZR 235C-25	HITACHI	BRASS	2.0MM 0.2MM	200/400MPM	SOLID BLOCK	I.D. 500MM O.D. 1500MM	11,000KG	550KW 450/1350RPM	370KW 450/1350RPM	MINERAL OIL	4000LPM	1974
147	LAMINOIR FROID DE THIONVILLE #3 FRANCE	ZR 24-14	FIVES-CAIL BABCOCK	LOW CARBON	.138" .002"	1150FPM	COLLAPSIBLE	I.D. 22" O.D. 55"	12,000LBS	300HP 570/1640RPM	300HP 570/2000RPM	MINERAL OIL	145GPM	1972
148	ACERINOX #2 SPAIN	ZR 22-50	HITACHI	STAINLESS	6.0MM 0.2MM	160/400MPM	COLLAPSIBLE	I.D. 610MM O.D. 2000MM	40,000KG	1800KW (2x900KW) 290/735RPM	2000KW (2x1000KW) 137/600RPM	MINERAL OIL	5900LPM	1974
149	ACERINOX #3 SPAIN	ZS 07-62	HITACHI	STAINLESS	8.0MM 3.0MM	36MPM	-----	CONTINUOUS	-----	550KW 850/1080RPM	-----	MINERAL OIL	500LPM	1973
150	FABRIQUE DE FER HAUBECE FRANCE	ZH 2-9-52	FIVES-CAIL BABCOCK	LOW CARBON GALVANIZED	2.25MM	120MPM	-----	CONTINUOUS	-----	NON DRIVEN	-----	-----	-----	1973
151	FORGES DE GUEUGNON #6 FRANCE	ZR 21-62	FIVES-CAIL BABCOCK	STAINLESS SILICON	.315" .016"	3280FPM	COLLAPSIBLE	I.D. 24" O.D. 88"	132,280LBS	9600HP (3x3200HP) 253/850RPM	8310HP (3x2770HP) 204/930RPM	MINERAL OIL	3900GPM	1973
152	NISSHIN SHUMAN #1 JAPAN	ZR 21B-63	HITACHI	STAINLESS	9.0MM 0.7MM	250/400MPM	COLLAPSIBLE	I.D. 710MM O.D. 2400MM	60,000KG	4800KW (2x2400KW) 280/560RPM	3000KW (2x1500KW) 60/340RPM	MINERAL OIL	14,000LPM	1975
153	TAKASAGO #2 JAPAN	ZR 23CD-40	HITACHI	STAINLESS	4.0MM 0.2MM	125/250MPM	COLLAPSIBLE	I.D. 508MM O.D. 1420MM	27,000KG	950KW 285/570RPM	1100KW 300/840RPM	MINERAL OIL	3300LPM	1975

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

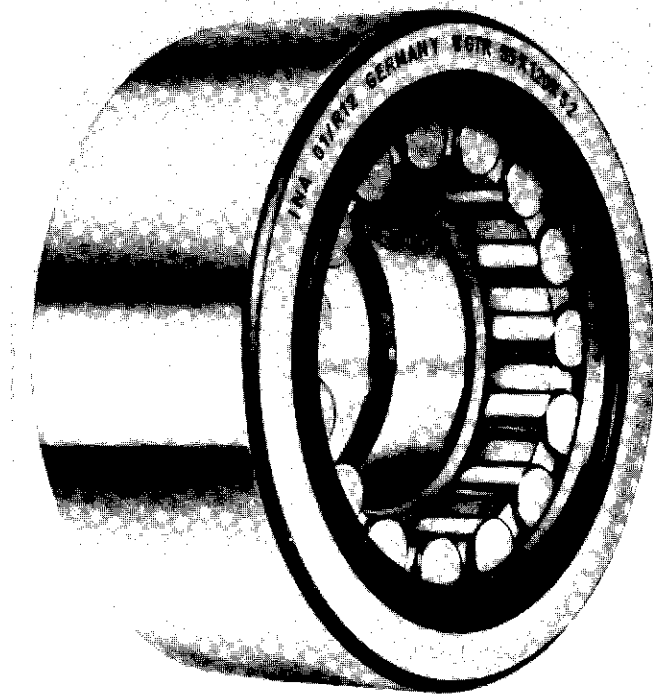
ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
154	DERIVADOS #2 SPAIN	ZR 23C-25	INNOCENTI	LOW CARBON HIGH CARBON	3.0MM 0.05MM	243/600MPM	SOLID BLOCK	LD. 500MM O.D. 1650MM	10,000KG	1500HP (2x750HP) 600/1500RPM	1020HP (2x510HP) 280/1220RPM	SOLUBLE OIL O.M.L. BRGS.	1600LPM	1975
155	FIAT #5 ITALY	ZR 21BB-62	INNOCENTI	STAINLESS	6.5MM 0.4MM	200/400MPM	COLLAPSIBLE	LD. 610MM O.D. 1930MM	50,000KG	6000HP (2x3000HP) 270/610RPM	4000HP (2x2000HP) 225/675RPM	MINERAL OIL	14,000LPM	1975
156	VALLOREC SOLESIMES #3 FRANCE	ZR 33C-32	FIVES-CAIL BABCOCK	LOW CARBON HIGH CARBON	3.0MM 0.03MM	250/500MPM	COLLAPSIBLE	LD. 508MM O.D. 1500MM	15,500KG	925HP 569/1130RPM	924HP (2x462HP) 280/1300RPM	MINERAL OIL	1500LPM	1975
157	CHINA #1 (NIPPON STEEL) PEOPLES REP. CHINA	ZR 22BS-42	HITACHI	SILICON	3.5MM 0.2MM	250/450MPM	COLLAPSIBLE	LD. 510MM O.D. 1900MM	21,000KG	2200KW (2x1100KW) 460/830RPM	1600KW (2x800KW) 300/1150RPM	SOLUBLE OIL O.M.L. BRGS.	4000LPM	1975
158	CHINA #2 (NIPPON STEEL) PEOPLES REP. CHINA	ZR 22BS-42	HITACHI	SILICON	3.5MM 0.2MM	250/450MPM	COLLAPSIBLE	LD. 510MM O.D. 1900MM	21,000KG	2200KW (2x1100KW) 460/830RPM	1600KW (2x800KW) 300/1150RPM	SOLUBLE OIL O.M.L. BRGS.	4000LPM	1975
159	KRUPP #2 GERMANY	ZR 21BB-63	DEMAG	STAINLESS	8.0MM 0.5MM	250/500MPM	COLLAPSIBLE	LD. 610MM O.D. 1950MM	60,000KG	8160HP 340/680RPM	6936HP 290/930RPM	MINERAL OIL	20,000LPM	1975
160	BRITISH STEEL #4 (SHEPCOTE LANE) ENGLAND	ZR 21BB-63	LOEY ROBERTSON	STAINLESS	8.0MM 0.35MM	244/500MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	54,500KG	6000KW (3x2000KW) 330/675RPM	4100KW (3x1367KW) 225/786RPM	MINERAL OIL	18,000LPM	197
161	TERNINDSS #4 ITALY	ZR 22-42	INNOCENTI	STAINLESS	6.35MM 0.30MM	170/330MPM	COLLAPSIBLE	LD. 610MM O.D. 1600MM	34,000KG	2500HP 315/600RPM	2500HP 315/600RPM	MINERAL OIL	4700LPM	197
162	OUTOKUMPU OY FINLAND	ZR 21BB-61	DEMAG	STAINLESS	8.0MM 0.5MM	250/500MPM	COLLAPSIBLE	LD. 610MM O.D. 1800MM	60,000KG	7752HP (2x3876HP) 340/680RPM	6936HP (2x3468HP) 300/900RPM	MINERAL OIL	18,000LPM	197
163	NIPPON KINZOKU #5 (NIPPON METAL) JAPAN	ZR 22-50	HITACHI	STAINLESS	6.0MM 0.3MM	160/320MPM	COLLAPSIBLE	LD. 508MM O.D. 1650MM	30,000KG	1800KW 295/590RPM	1200KW 150/ RPM	MINERAL OIL	5,000LPM	197
164	BRITISH STEEL #5 (SHEPCOTE LANE) ENGLAND	ZR 21BB-63	LOEY ROBERTSON	STAINLESS	8.0MM 0.35MM	244/500MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	54,500KG	6000KW (3x2000KW) 330/675RPM	4100KW (3x KW) 225/ RPM	MINERAL OIL	18,000LPM	19
165	MEXINOX FUNDIDORA #1 MEXICO	ZR 22B-52	FIVES-CAIL BABCOCK	STAINLESS	6.0MM 0.3MM	540MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	45,000KG	4500HP (2x2250HP) 370/1000RPM	4500HP (2x HP) 325/ RPM	MINERAL OIL	9500LPM	19
166	ACESITA #2 BRAZIL	ZR 21BB-44	HITACHI	STAINLESS SILICON	5.0MM 0.28MM	400/800MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	28,000KG	4950HP (3x1650HP) 345/690RPM	3300HP (2x16 HP) 345/1100RPM	SOLUBLE OIL O.M.L. BRGS.	6500LPM	19

ITEM	CUSTOMER	MILL TYPE	BUILDER	MATERIAL	THICK	MILL SPEED	WINDER	COIL SIZE	TENSION	MILL MOTOR	WINDER MOTOR	MILL LUBE	LUBE RATE	DATE
167	OTELINDX #1 RUMANIA	ZR 22B-52	HITACHI	STAINLESS	6.0MM 0.7MM	160/200MPM	COLLAPSIBLE	LD. 610MM O.D. 2000MM	40,000KG	1800KW 290/736RPM	2000KW (2x1000KW) 137/ RPM	MINERAL OIL	6000LPM	19
168	NATIONAL STD. ATHENIA U.S.A.	ZR 33C-18	FENN	CARBON STEELS	.065" .012"	375/750MPM	SOLID BLOCK	LD. 20" O.D. 52"	15,200LBS	300HP 850/1700RPM	300HP 650/ RPM	SOLUBLE OIL	125GPM	19
169	ELIGLOY U.S.A.	ZR 33C-13	FENN	STAINLESS	.125" .002"	200/400FPM	COLLAPSIBLE	LD. 20" O.D. 50"	16,500LBS	200HP 650/1300RPM	200HP 650/ RPM	MINERAL OIL	125GPM	19
170	HOOD U.S.A.	ZR 33C-13	FENN	CLAD METAL & NICKEL	.150" .003"	200/400FPM	COLLAPSIBLE	LD. 20" O.D. 52"	8,250LBS	100HP 850/1700RPM	100HP 650/ RPM	MINERAL OIL	125GPM	19
171	TEXAS INSTRUMENTS #1 U.S.A.	ZR 33C-13	FENN	CLAD METALS	.115" .010"	250/500FPM	SOLID BLOCK	LD. 20" O.D. 54"	9,900LBS	200HP 850/1700RPM	150HP 650/ RPM	MINERAL OIL	100GPM	19
172	TEXAS INSTRUMENTS #2 U.S.A.	ZR 235C-25	FENN	STAINLESS CLAD METALS	.090" .005"	400/800FPM	SOLID BLOCK	LD. 24" O.D. 60"	34,700LBS	700HP 300/600RPM	600HP 400/ RPM	MINERAL OIL	500GPM	19
173	STAHLWERKE WESTIG GERMANY	ZR 33C-13	FENN	HIGH CARBON STAINLESS	3.0MM 0.1MM	185/350MPM	SOLID BLOCK & COLLAPSIBLE	LD. 500MM O.D. 1350MM	12,000KG	500HP 670/1250RPM	500HP 670/ RPM	MINERAL OIL		19
174	TALLERES ADABOR ARGENTINA	ZR 335C-41	HITACHI	LOW CARBON	3.5MM 0.3MM	100/150MPM	SOLID BLOCK	LD. 610MM O.D. 1670MM	12,000KG	400HP 1150/1725RPM	300HP 500/ RPM	SOLUBLE OIL	1000LPM	19
175	ACESITA #3 BRAZIL	ZR 21BB-63	DEMAG	STAINLESS	8.0MM 0.38MM	250/500MPM	COLLAPSIBLE	LD. 610MM O.D. 2100MM	60,000KG	6000KW (3x2000KW) 340/660RPM	5300KW (3x1767KW) 220/ RPM	MINERAL OIL	20,000LPM	19
176	MISHRA DHATU INDIA	ZS 07-50	HITACHI	NICKEL COBALT TITANIUM	6.35M 0.58MM	20/50MPM	-----	SHEETS	-----	210KW 450/1125RPM	-----	MINERAL OIL	250LPM	19
177	POONG SANG METAL KOREA	ZR 23M-25	HITACHI	BRASS COPPER	1.50MM 0.03MM	450MPM	COLLAPSIBLE	LD. 508MM O.D. 1270MM	5000KG	1000HP 400/1000RPM	500HP (2x250HP) 400/1000RPM	MINERAL OIL	2270LPM	19
178	BRITISH STEEL #6 (STOCKSBRIDGE) ENGLAND	ZR 23CW-19	LOEWY ROBERTSON	CARBON STAINLESS	5.2MM 0.25MM	150/350MPM	SOLID BLOCK	LD. 508MM O.D. 1350MM	20,000KG	650KW 375/875RPM	820KW (2x410KW) 380/ RPM	SOLUBLE OIL	1400LPM	197
179	SALEM STEEL LTD. INDIA	ZR 22B-52	HITACHI	STAINLESS	6.0MM 0.3MM	200/600MPM	COLLAPSIBLE	LD. 610MM O.D. 1830MM	50,000KG	3100KW (2x1550KW) 333/1000RPM	3100KW (2x1550KW) 280/1000RPM	MINERAL OIL	9500LPM	197
180	SOUTHERN CROSS #2 SOUTH AFRICA	ZR 22B-52	LOEWY ROBERTSON	STAINLESS	6.0MM 0.5MM	100/200MPM	SOLID BLOCK & COLLAPSIBLE	LD. 610MM O.D. 1925MM	40,000KG	1500KW 184/368RPM	500KW 275/ RPM	MINERAL OIL	2650LPM	197

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100

<u>ITEM</u>	<u>CUSTOMER</u>	<u>MILL TYPE</u>	<u>BUILDER</u>	<u>MATERIAL</u>	<u>THICK</u>	<u>MILL SPEED</u>	<u>WINDER</u>	<u>COIL SIZE</u>	<u>TENSION</u>	<u>MILL MOTOR</u>	<u>WINDER MOTOR</u>	<u>MILL LUBE</u>	<u>LUBE RATE</u>	<u>DATE</u>
181	RIZZATO ITALY	ZR 24-14	INNOCENTI	CARBON STEELS	3.0MM 0.05MM	122/350MM	COLLAPSIBLE	L.D. 400MM O.D. 1250MM	3600KG	280HP (2x140HP) 570/1640RPM	280HP (2x140HP) 570/1640RPM	SOLUBLE OIL O.M.L. BRGS.	400LPM	19

Sendzimir Cold Strip Mills COMPANY	LOCATION	Rolling Speed (fpm)	Type and Stripe Width	METAL	Year Order
Centrozap (Huta Metali Niezaleznych)	Szopienice, Poland	1 200	ZR23M-31	Copper/Brass	1973
Acesita	Belo Horizonte, Brazil	1 500	ZR22S-52	Stainless Steel/Silicon Steel	1973
Zelezarne Jesenice	Jesenice, Yugoslavia	2 000	ZR21-44	Low Carbon/Stainless Steel Silicon Steel	1974
Pfizer Metals & Composite Products	Wallingford, Conn.	660	ZR24-14	Nickel Alloys	1974
Thinsheet Metals	Waterbury, Conn.	720	ZR23SC-26	Stainless Steel Nickel Alloys	1974
Teledyne Rodney Metals	New Bedford, Mass.	750	ZR22-42	Stainless Steel/Titanium High Temp. Alloys	1974
Sam Yang Special Steel Co.	Seoul, Korea	1 312	ZR22S-52	Stainless Steel	1974
Unis-Komerc	Sarajevo, Yugoslavia	2 500	ZR22B-52	Low Carbon	1975
Associated Spring Corp.	Bristol, Conn.	1 200	ZR33SC-13	Medium & High Carbon	1976
Cooper Stl.	Greenville, Miss.	?	ZR33C-18	High Carbon	1978
United Shelting Aluminum	New Haven, Conn.	1 500 ?	ZR23C-37	Aluminum	1978
Tang Eng.	Taiwan	(2 Mills)	ZR22B-50	S.S.	1979
Kisko	Korea		ZR22B-50	S.S.	1979
G.T.E. Sylvania	South Carolina, U.S.A.		ZR33C-13		1980
Indian Shelting & Refinwo	India				1981



Assembly Instructions for INA
Back-up Roller Bearings,
Series WGTR

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Assembly instructions for various series of INA WGTR bearings

1. BRIEF DESCRIPTION

INA Back-up Roller Bearings expand the product line of yoke type cam followers. They are used in multi-roll cage mills which produce metal strips and foils with very close thickness tolerances and superior surface quality.

The outer ring with three fixed shoulders is axially guided by the rolling elements. This eliminates the need for thrust washers between the flange and the outer ring for purposes of absorbing thrust forces. The same design has been successfully proven with INA cylindrical roller bearings.

The design of INA Back-up Roller Bearings permits them to take unusually high radial loads. Because of axial guidance via the rolling elements, thrust loads are also absorbed, even at high rolling speeds.

2. PREPARATIONS FOR ASSEMBLY

INA WGTR bearings are sorted by cross section height, groups A, B, or C. The height group is marked on the package and on the bearing outer ring.

All bearings mounted on one shaft must be of the same height group.

It is practical to first sort the bearings in their packaging per height group.

Unpack the bearings needed for one shaft and place them temporarily on a clean work surface.

On one side of the WGTR outer ring are reference numbers. These should be entered on a shaft log card (see shaft log card attached).

3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3



Fig. 1: Inner ring
and outer ring,
front view.

3. ASSEMBLY

Remove the side washer from the stamped side of the bearing which is listed at the top of the shaft log card. Roll the bearing into the assembly basket (see Drawing No. 1 attached) and transport it to shaft. On the stamped side of the bearing, the high point of the inner ring is marked by a line on the side surface of the inner ring.

All inner rings on a given shaft must always be mounted with this high point in the same position (see Fig. 1).

Enter the shaft marking or inner ring position on the shaft log card; during subsequent inspections, this will aid in ascertaining the load zone of the inner ring as well as operating time in this position.

Slide the bearing onto the shaft together with the assembly basket. This will prevent the inner ring from sliding out of the bearing. Once the bearing is in proper position, the assembly basket can be removed (see Fig. 2).

Slide the side washer, removed at the beginning of the assembly procedure, onto the shaft. Use the tapered auxiliary ring to insert it back into the bearing (see Drawing No. 2). The auxiliary ring permits a quick and easy installation of the washer without damaging the seal. (The auxiliary ring is only necessary with sealed bearings). Follow the same procedure to mount the remaining bearings for this shaft.

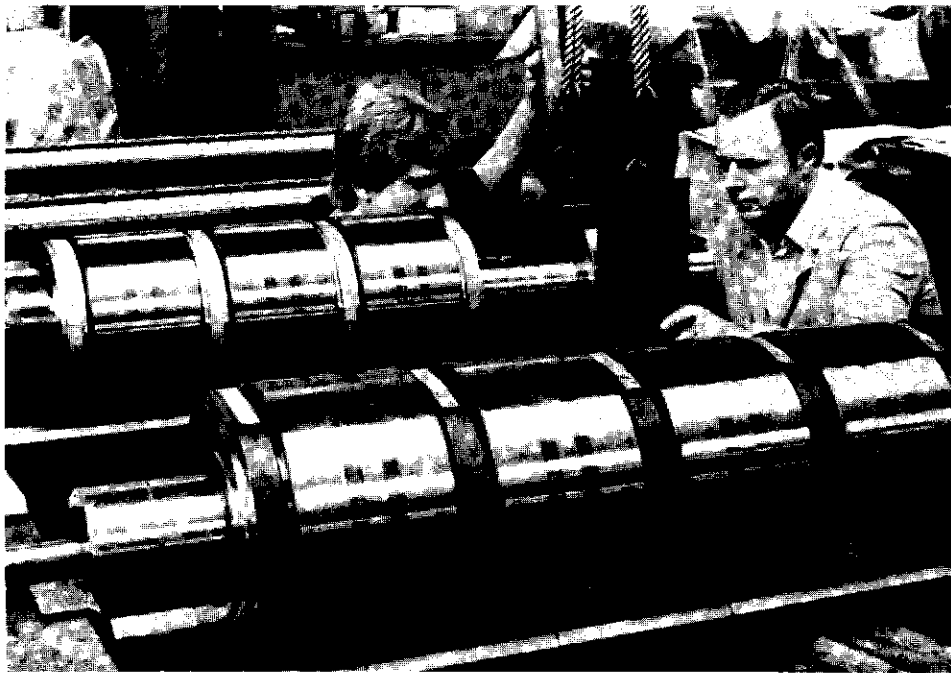


Fig. 2: INA Back-up Roller Bearing with assembly basket

4. DISASSEMBLY

During occasional inspections, slide the bearings only to the end of the shaft. This will prevent the inner ring from falling out and also keep the two side washers from skewing. In this position, place the assembly basket around the bearing and hook it to the hoist. Leave the cables loose, the bearing will be pulled from the shaft together with the assembly basket.

4.1 Disassembly of the bearing

Roll the bearing out of the assembly basket onto a clean work surface. Remove both washers and mark each row of rolling elements on the front. It is absolutely imperative that the rolling elements be marked in order to prevent mixup of the rows during assembly. A faultless operation, following interim inspections, can only be assured by obeying these instructions.

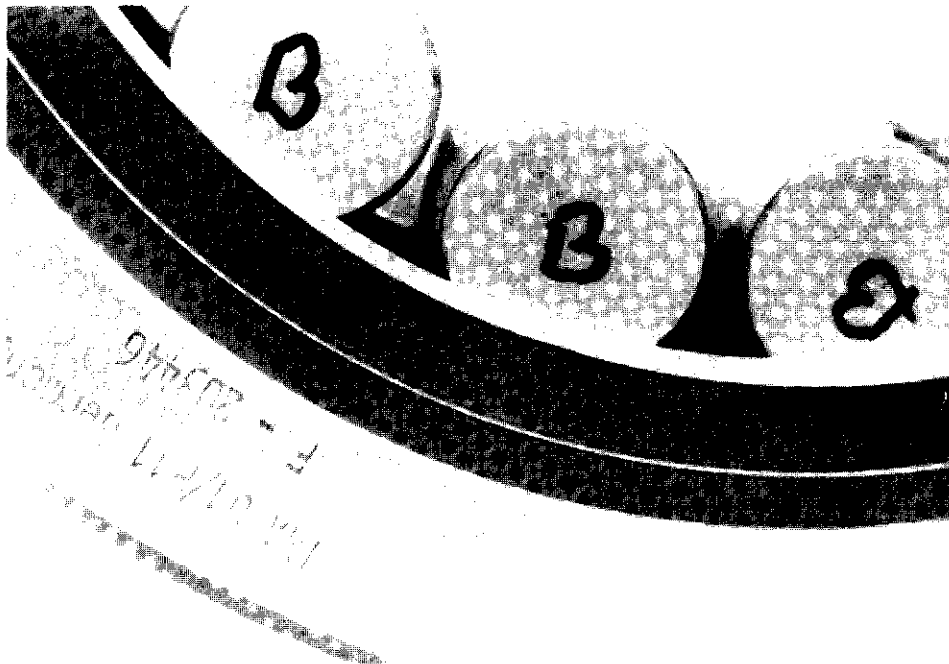


Fig. 3: marked rolling elements

E E

Now place the bearing with the inner ring, on its side (thinner cage bars at top) and remove the inner ring. Remove the top row of rolling elements, whose cage side has no inner guidance, from the cage pockets, and pull out the cage upward. After removal of the bottom row of rolling elements, visual inspection of raceways can be conducted.

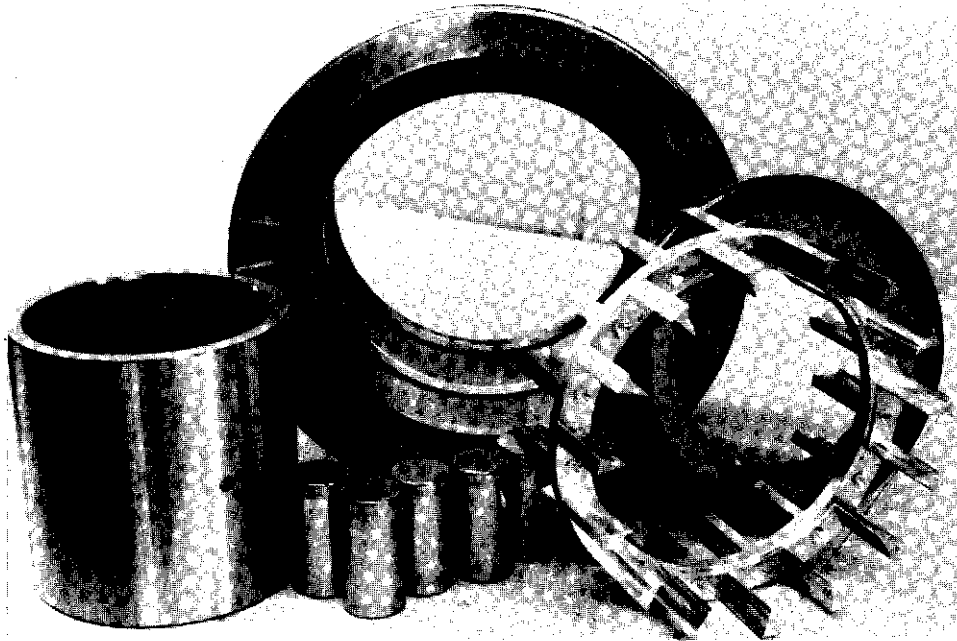


Fig. 4: All INA Back-up Roller Bearing components.

4.2 Bearing assembly

All bearing components require cleaning. Insert the rolling elements marked bottom row and install the cage carefully.

Slide the aluminum auxiliary inner ring (see drawing No. 3) into place and insert the top row rolling elements through the window into the cage pockets.

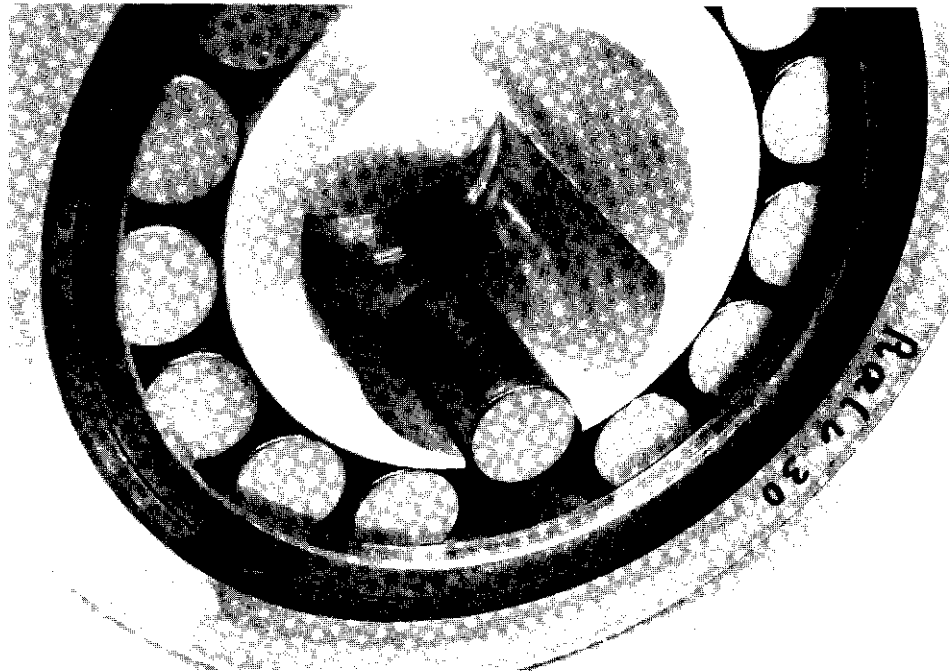


Fig. 5: Assembly procedure of rolling elements using auxiliary inner ring.

Place the bearing in an upright position after the assembly of the rolling elements and slide in the matching inner ring.

Once all rolling elements are in place, rotate the auxiliary inner ring to prevent any rolling elements from falling out (see Fig. 6). Insert the inner ring in this position while sliding out the auxiliary inner ring (see Fig. 7). Finally, install the washer of the unmarked side via the auxiliary inner ring (see Fig. 8).

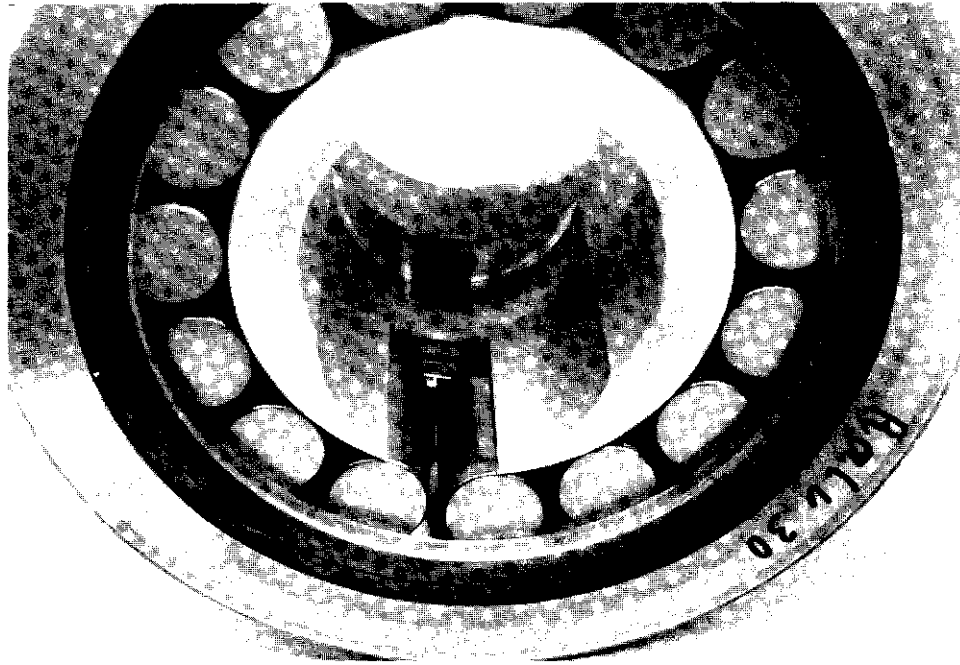


Fig. 6: Auxiliary inner ring, in rotated position.

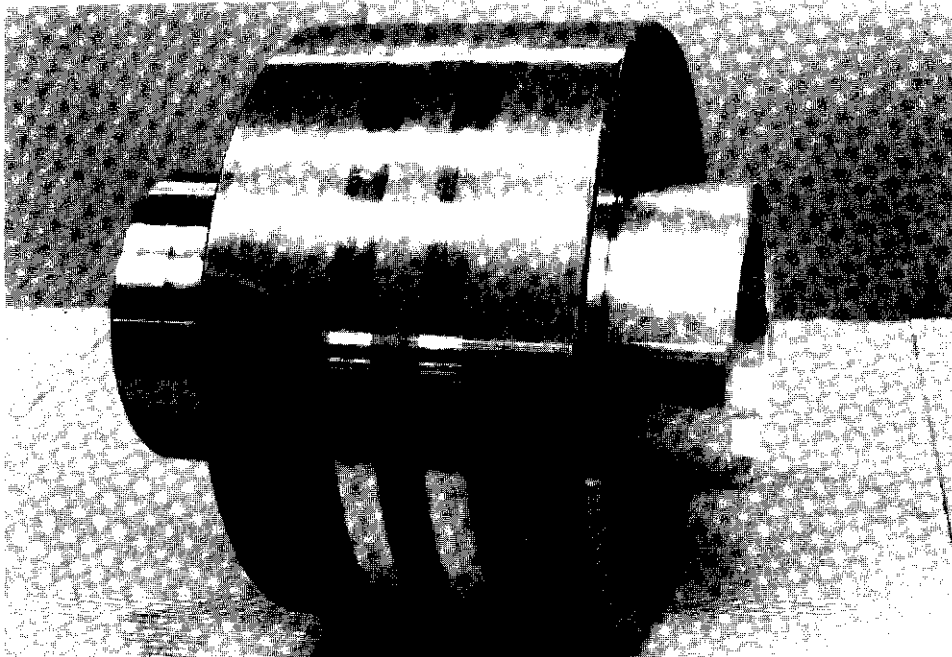


Fig. 7: Inner ring (on left) and auxiliary inner ring (on right).

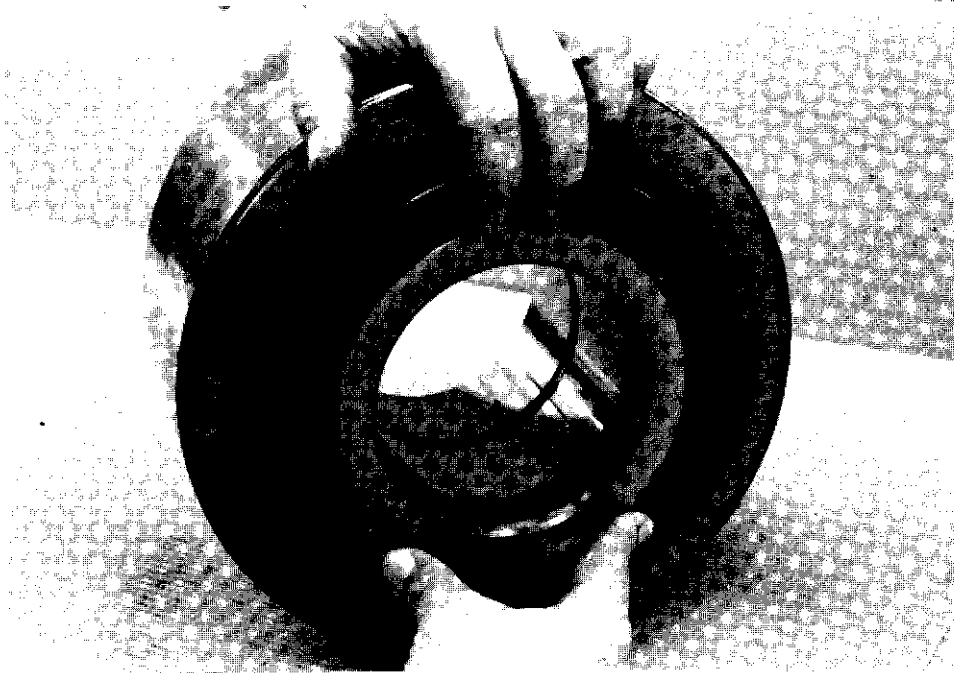


Fig. 8: Auxiliary inner ring with side washer.

Once this is accomplished, assembly of the shaft can begin as described under Item 3.

TPV 34
(Banhart)

Attachment: 1 table

SHAFT LOG CARD			MANUFACTURER		MODEL	SHAFT NO.	
installation date	bearing position	height group	bearing no.	inner ring position	inspection date	operating time	remarks

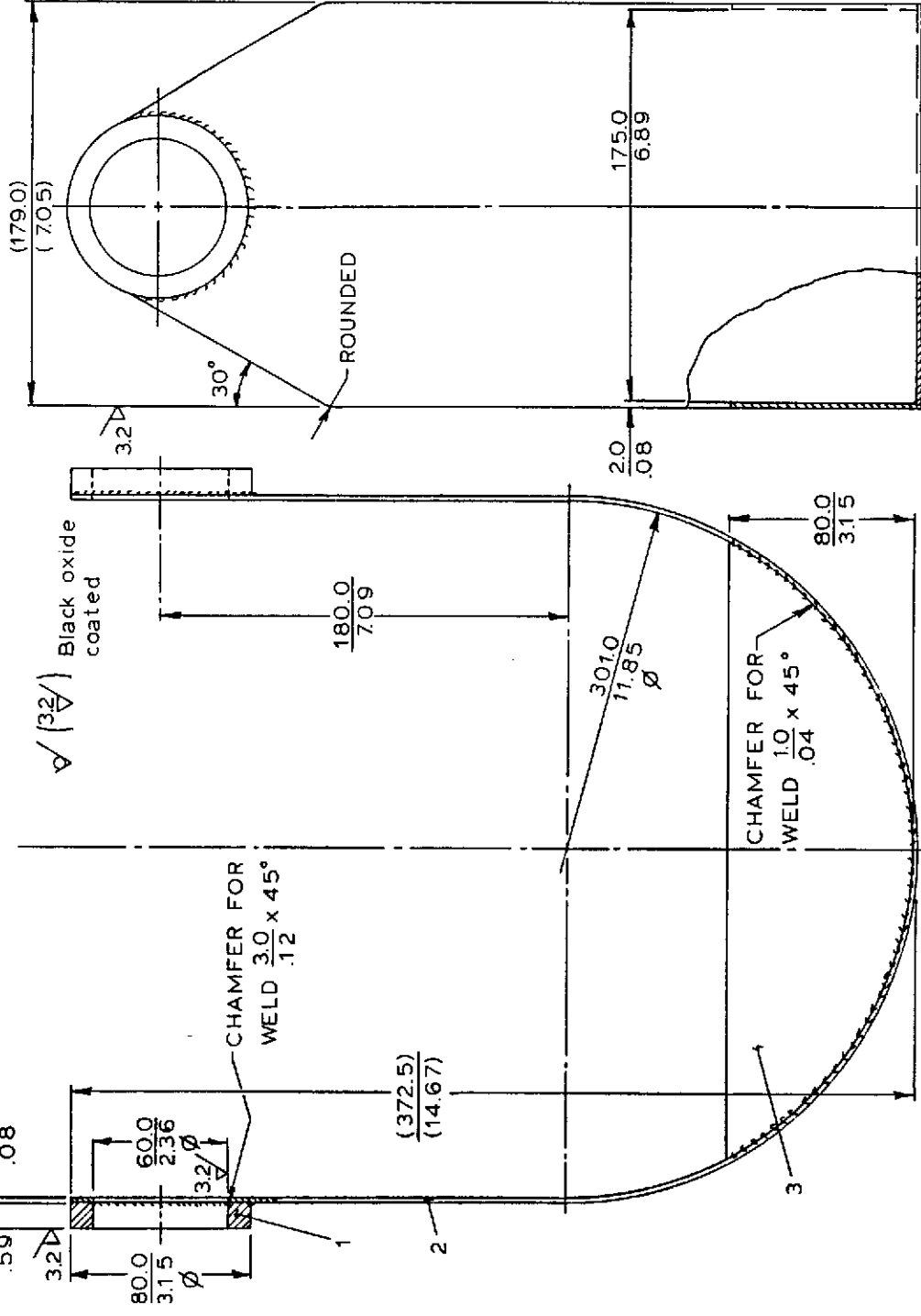
Explanation of suffixes:

2Z shields on each side of bearing (with seal)

R7 date of manufacture

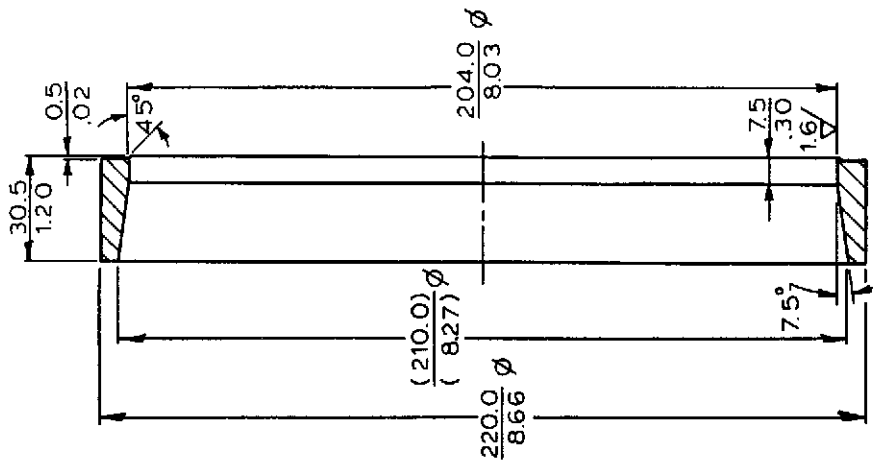
A, B, C height group

4b reference numbers



REV	CHANGE	DWN	CHK	DATE	ANGLES	MM	INCH	APPV	CHK	DWN	SCALE	TITLE
											None	ASSEMBLY BASKET
											10-17-85	SIZE B
												PART NO
												O1

BRUNING 40-22 35401



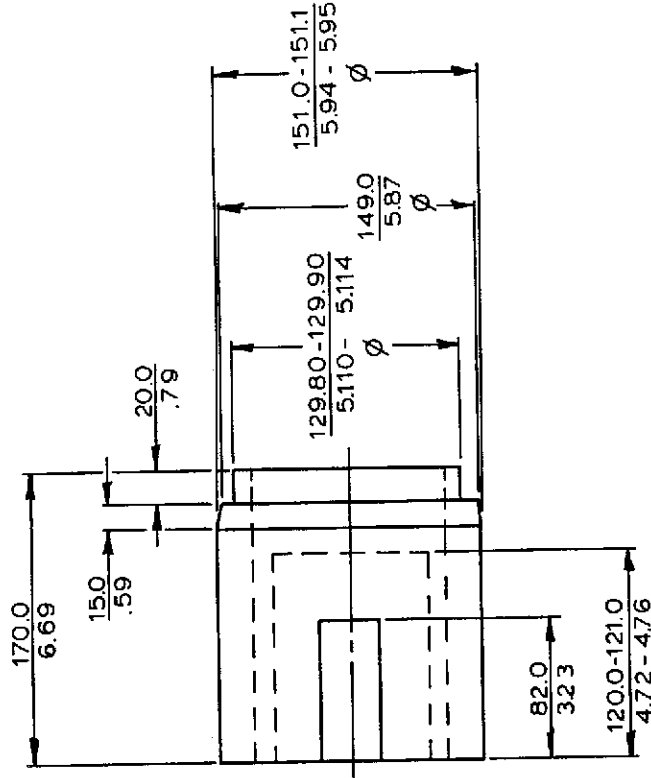
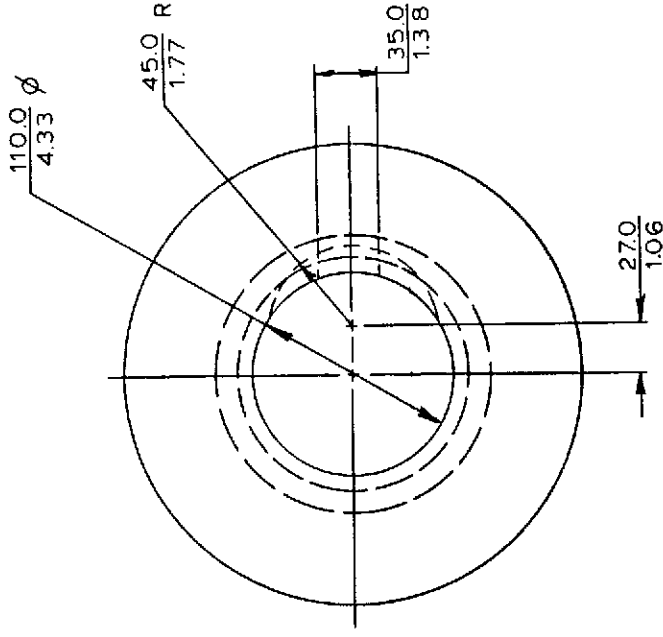
$32 \sqrt{1.6}$

Black oxide coated

REV	CHANGE	DWN	CHK	DATE	ANGLES ±	MIM	.XXX ±	.XX ±	INCH	UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS	DWN	CHK	APPV	G. Smith	10-14-85	SCALE: NONE	TITLE	SIZE	PART NO
																	ASSEMBLY RING FOR WASHER	B	02
INA BEARING COMPANY, INC.																			

RECEIVED

32

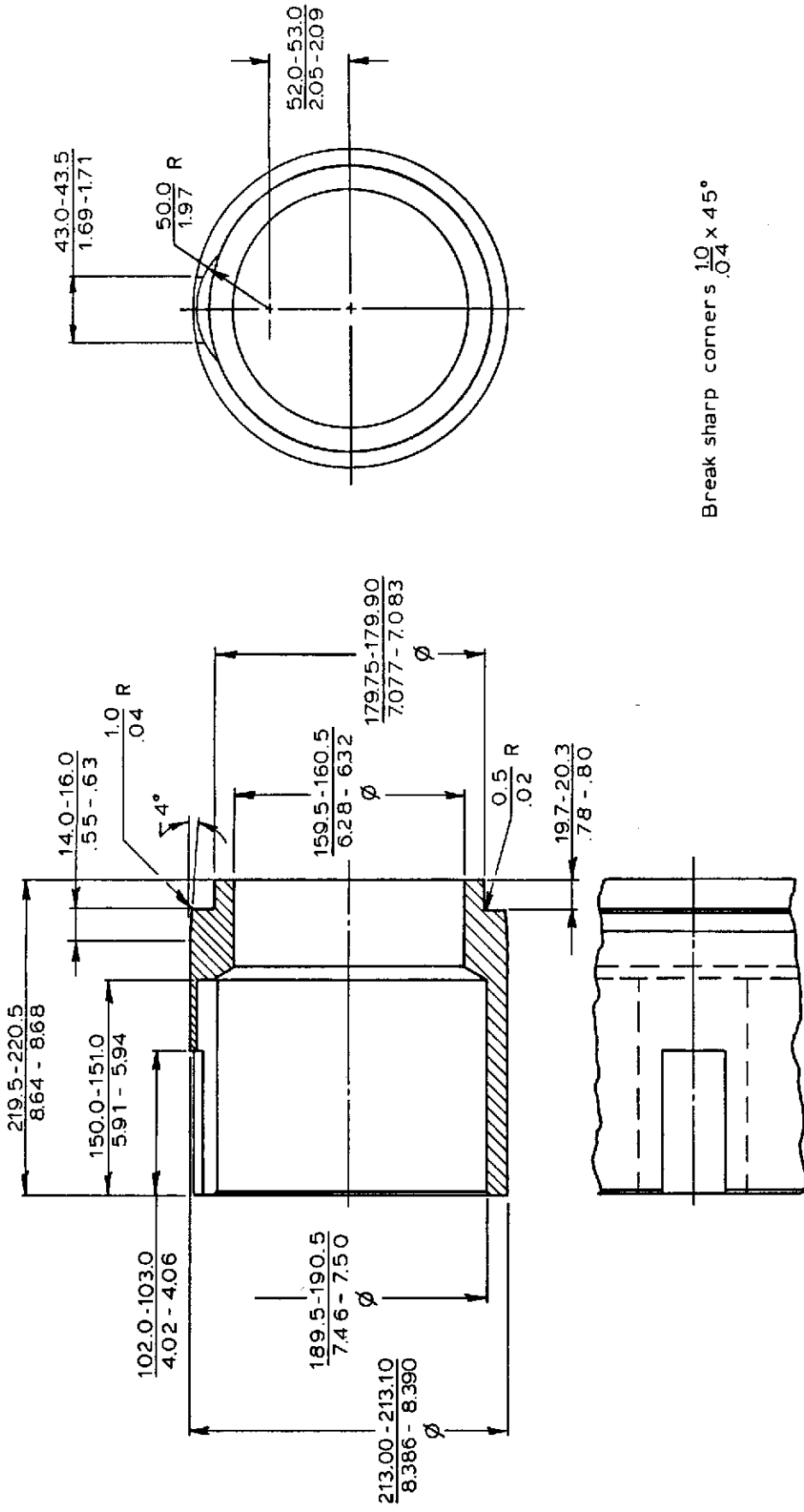


Break sharp corners $\frac{1.0}{.04} \times 45^\circ$

— FOR WGTR 130 x 300.02 x 172.65 —

REV	CHANGE	DWN	CHK	DATE	UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS	DWN	CHK	APPV	SCALE: NONE	TITLE
					INCH .XX ±				MM .125 ±	AUXILIARY INNER
					MM ±					RING
					ANGLES ±					SIZE
										B
										PART NO
										O3
										INA BEARING COMPANY, INC.

F F F F F F F F F F F F F F F F F F F F

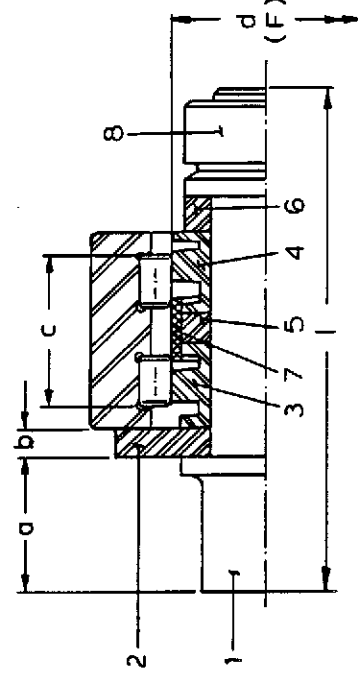


Break sharp corners $\frac{10}{.04} \times 45^\circ$

REV	CHANGE	DWN	CHK	DATE	ANGLES ±	MM	±	INCH	±	XXX	±	XX	±	INCH	±	TO BE AS FOLLOWS	UNLESS OTHERWISE SPECIFIED TOLERANCES	APPR	CHK	DWN	G. Smith	10-21-85	SCALE: None	MM	INCH	MM	INCH	TITLE	ASSEMBLY RING FOR WGR 180 x 406 4 x 224	SIZE	B	PART NO	SK-4429-3

Grinding Arbor for Back-up Roller Bearings

Grinding Arbor	WGTR Designation	Components								Dimensions						
		1 Shaft	2 Support Washer	3 Elastic Ring left	4 Elastic Ring right or 2 pieces of part 3	5 Spacer narrow	6 Spacer wide or 2 pieces of part 5	7 Plastic Spacer	8 Pre-loading Nut	1	a	b	c	d (pre-ground)	F Under The Roller Dia. min max	
F-93010	WGTR 25x 55x 31.2	F-93010-11	F-93010-21	F-93010-31							148	60	8	21.3	30.9	30.520 30.580
F-93011	WGTR 35x 80x 40	F-93011-11	F-93011-21	F-93011-31							165	70	9	31.8	40.45	40.070 40.130
F-93012	WGTR 55x 120x 52	F-93012-11	F-93012-21	F-93012-31							234	100	13	41.75	65.2	64.800 64.880
F-93013	WGTR 55x 120x 64	F-93012-11	F-93012-21	F-93012-31	F-93013-51						254	100	13	55.75	65.2	64.800 64.880
F-93014	WGTR 70x 160x 75	F-93014-11	F-93014-21	F-93014-31	F-93014-51						295	120	15	59.75	81.45	81.000 81.100
F-93015	WGTR 70x 160x 90	F-93014-11	F-93014-21	F-93014-31	F-93014-51						295	120	15	74.75	81.45	81.000 81.100
F-93016	WGTR 100x 225x 96	F-93016-11	F-93016-21	F-93016-31	F-93016-41						382	150	18	81.75	114.9	114.350 114.470
F-93017	WGTR 100x 225x 120	F-93016-11	F-93016-21	F-93016-31	F-93016-41						382	150	18	105.75	114.9	114.350 114.470
F-93018	WGTR 130x 300x 150	F-93018-11	F-93018-21	F-93018-31	F-93018-41						480	130	35	127.65	151.9	151.300 151.420
F-93019	WGTR 130x 300x 172.65	F-93018-11	F-93018-21	F-93018-31	F-93018-41						480	130	35	150.3	151.9	151.300 151.420
F-93020	WGTR 180x 406.4x 171.04	F-93020-11	F-93020-11	F-93020-21	F-93020-31						480	130	35	144.64	214	213.450 213.570
F-93021	WGTR 180x 406.4x 224	F-93020-11	F-93020-11	F-93020-21	F-93020-31						480	130	35	197.6	214	213.450 213.570
F-93022	WGTR 200x 460x 171	F-93020-11	F-93020-11	F-93022-11	F-93022-21						480	130	35	140.6	229.5	228.730 228.850
F-93023	WGTR 200x 460x 241	F-93020-11	F-93020-11	F-93022-11	F-93022-21						480	130	35	210.6	229.5	228.730 228.850
F-93033	F-92962 WGTR 45x 125x 72PP	F-93033-11	F-93033-21	F-93033-31							216	84	8	53	58.85	58.400 58.460
F-93034	F-86530 WGTR 90x 220x 94	F-93016-11	F-93016-21	F-93034-11	F-93016-61						382	150	18	94	107.9	107.420 107.520
F-93035	F-86369 WGTR 90x 220x 120	F-93016-11	F-93016-21	F-93035-11	F-93016-61						382	150	18	99.75	112.4	111.820 111.920
F-93036	F-53293 WGTR 90x 220x 120	F-93016-11	F-93016-21	F-93036-11	F-93016-61						382	150	18	107.15	120.6	120.000 120.120



The elastic rings, part 3 and 4, are ground to their final outside diameter on your grinding machine and are supplied by INA only pre-ground.
The quantity and sequence of the components 1 through 8, depends upon the design and it sometimes different than shown in the sketch.

THE UNIVERSITY OF CHICAGO PRESS

Regrinding of INA Back-up Roller Bearings for multi-roll cage mills

1. GENERAL

In order to meet these application requirements, the bearings used in multi-roll cage mills are manufactured to high precision. During operation, the outer rings of these bearings are subjected to unusually high Hertzian stresses and bending loads. For this reason, the service life of a bearing is determined by three factors:

1.1 Fatigue of the material in raceways and rolling elements

Service life is calculated using the standard formula and is therefore subject to known laws of statistics. The quality of the lubricant used also influences the service life. In practice, such lubricants usually have a low viscosity and therefore, the oil film is often inadequate. This has a negative effect on the bearing life. Failure of a bearing is the logical consequence of material fatigue underneath the contact surface of the various rolling elements, and shows up as surface pitting.

In almost every case, this pitting begins on the inner ring.

There is no known nondestructive testing procedure by which the degree of material fatigue can be determined.

1.2 Fracture of outer ring due to shock or material fatigue

The bearing outer rings are designed to safely take the loads specified by the rolling mill manufacturer. However, unusually high overloads can result in fracture of the outer ring.

1.3 Wear of outer ring outside surface

This refers in particular to pitting of the outer mantle, as well as to damage caused by the penetration of foreign matter (metal chips, scale, etc.). Due to the surface quality requirements imposed on the mill's product, back-up roller bearings require periodic regrinding of the outside diameter.

2. SHOP EQUIPMENT REQUIREMENTS

This regrinding should be executed with extreme care and only in a shop equipped with the following:

2.1 a precision, heavy-duty grinding machine with between-centers grinding capability.

Example: INA back-up roller bearings with a diameter of 220 mm:

- radial runout : 0.002 mm
- roundness : 0.005 mm
- straightness : 0.0025 mm
- cylindricity : 0.005 mm

2.2 a ceramic grinding wheel, hardness: J; grit: 46-60
or a grinding wheel of special corundum,

2.3 one INA grinding arbor,

2.4 one chamfering machine, such as RAYON-MATIC-SNECMA
(Manufactured by Charles MAIRE, dealer: COMET 10, Av.
Eugene Gazean - 60304 SENLIS),

2.5 a height-measuring device for height H, which features
a micro-precision test indicator,

2.6 a micrometer for measuring the outside diameter,

2.7 a reference plate + micro-precision test indicator equipped with magnetic base to permit accurate measurement of outside diameter or height H.

3. BEARING INSPECTION

Prior to regrinding the outside diameter, check the condition of raceways, especially those of the inner ring.

For purposes of conducting this inspection, place all bearings onto a clean work surface with the axis in an upright position. To inspect inner ring raceways, proceed as follows:

- remove the top thrust washer,
- place hand into the bore of the inner ring,
- rotate inner ring slightly and move it vertically in a continuous motion,
- check inner ring raceways for pitting,
- place inner ring into the bearing. Then center the ring on the first row of rolling elements. Without any pressure, apply a slight rotating motion to re-insert the inner ring into the bearing in one continuous motion,
- replace thrust washer,
- proceed to next bearing.

NOTE: At the first signs of raceway pitting, the bearing can be considered as unusable.

4. GRINDING ARBOR

The arbor is made up of the following:

- 1 shaft, 1
- 1 support washer, 2
- 2 elastic rings, 3 and 4
- 2 spacers, 5 and 6
- 1 plastic spacer, 7
- 1 preloading nut, 8

F F

In most cases, the elastic rings permit coverage of the entire tolerance range of the bearing under the roller diameter. Nevertheless, it is still possible that some bearings cannot be clamped onto the arbor. For this reason, we recommend a second set of elastic rings with preground diameters. The elastic ring is ground to its final outside diameter on your grinding machine in accordance with the maximum under the roller diameter of the rollers.

Since the arbor has been treated against corrosion, we recommend that it be carefully cleaned prior to grinding.

5. REGRINDING

5.1 Mounting the bearing on the arbor

- position arbor vertically and remove lock nut,
- remove thrust washer from the bearing,
- hold bearing above arbor so that the locating pin in the inner ring is on the upper area,
- bring inner ring in contact with the first elastic ring, while making sure that the top row of the rolling elements is released,
- slide the outer ring over the elastic rings until it rests against the washer,
- remove inner ring, replace nut and tighten,
- tighten nut until bearing is securely attached to the arbor,
- use screw (reference mark 8) to perform final tightening, check to make sure that the bearing is not rotating on the arbor.

NOTE: To achieve a secure fit of the bearing on the arbor, it is absolutely essential that the face of the bearing rest against the face of the washer (reference mark 2).

5.2 Grinding procedure

Special precautionary measures are required during grinding to prevent any overheating, as this would cause grinding cracks, which would result in destruction during use.

Grinding should be carried out under the following conditions:

- ceramic grinding wheel, hardness: J; grit: 46-60, or grinding wheel of special corundum,
- speed of grinding wheel: 35 meters/sec., maximum,
- adequate cooling by emulsion or similar.

This grinding should yield a cylindrical outer ring with a crown drop (15° chamfer) on either side. Such results are best attained by oscillation grinding using a narrow-width grinding wheel, then chamfering with a belt sander (§2) to obtain a perfectly smooth transition from the cylindrical area to the chamfer.

NOTE: Any abrupt transition from the cylindrical area to the chamfers may result in scoring of work roll, and consequently of the mill product as well.

Applicable dimensional and shape accuracies are determined by bearing dimensions (please consult INA).

To facilitate the subsequent sorting of bearings according to height, it is advisable to remove the same amount of material (0.1-0.2 mm with reference to the diameter) during grinding from the outer ring of all bearings mounted on one shaft. For this reason, we recommend to start grinding with the outer ring that has the most pronounced scoring.

After grinding, remove bearing from arbor, reversing the procedure described under §5.1, and carefully clean.

6. CLEANING

To remove all grinding particles, together with the emulsion resulting from the grinding process, it is necessary to thoroughly clean the bearings. A noncorrosive product must be used for cleaning. See our Catalog D304.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

In order to conduct cleaning disassemble the bearing as follows:

- a) set up two boxes, identifying them as 1 and 2,
- b) mark the face of outer and inner rings, place bearing vertically on the work surface with the marked faces up,
- c) remove the top thrust washer,
- d) remove the inner ring as directed under §3,
- e) carefully remove the rolling elements from the top row and place them in the box marked "1",
- f) remove the cage,
- g) remove rolling elements from the second row and place them in the box marked "2",

Wash out and carefully dry all components.

Caution: the rolling elements must be washed individually, row by row.

Avoid mixing up rolling elements from different boxes.

Once all components have been cleaned, they should be oiled to prevent corrosion.

Now reverse above procedure to reassemble the bearings.

7. SORTING ROLLERS BY SHAFT

Once the rollers have been reassembled, measure height H as follows:

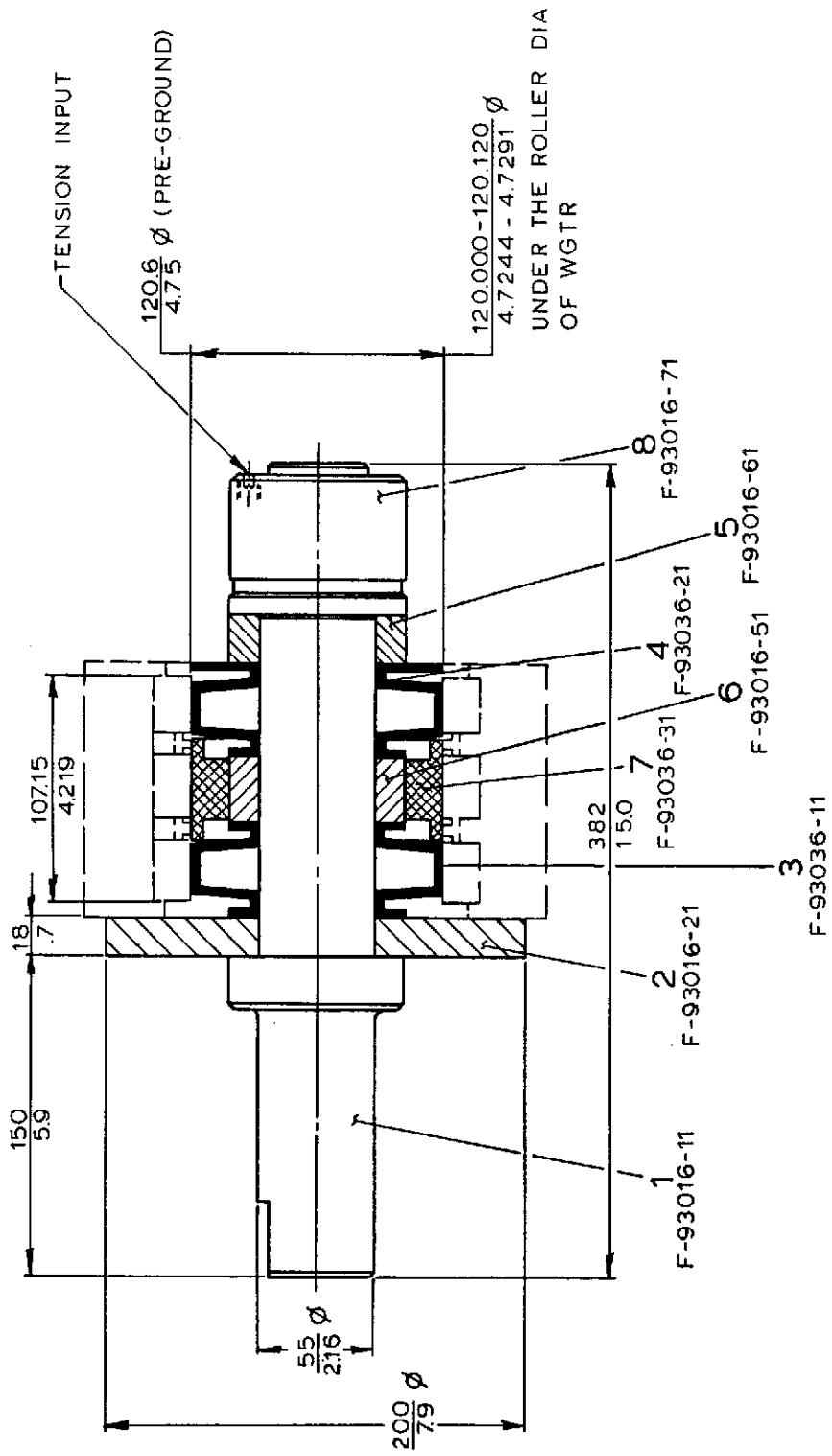
- a) Slide bearing onto shaft of measuring device, whereby the pin or the marking on the inner ring should be positioned to face upward in the direction of the comparator. The pin or the inner ring marking will line-up with the groove in the shaft.
- b) Position the contact point of the test indicator on the outside diameter of the bearing and rotate outer ring to determine highest point.

- c) Set the test indicator to 0 and mark this 0 on the face of the outer ring of the first bearing measured.
- d) Remove the roller without changing the test indicator.
- e) Following this procedure, measure the height H of all reground bearings, making sure at all times that the test indicator is not changed. Use a + or - mark on the face of the outer rings to indicate any deviation in μm from the first roller measured.
- f) Once each roller has been measured, proceed with sorting. Make sure that the deviation in height H of the bearings on one shaft is not more than 0.005 mm.

Within one set of bearings sorted to 0.005 mm, the bearings whose height H is at the maximum deviation, should be mounted in the center of the shaft, followed by the others in descending order. For example, a set of 5 bearings whose heights are found to be -2, -2, +1, +3, +1 should be arranged in the following order: -2, +1, +3, +1, -2.

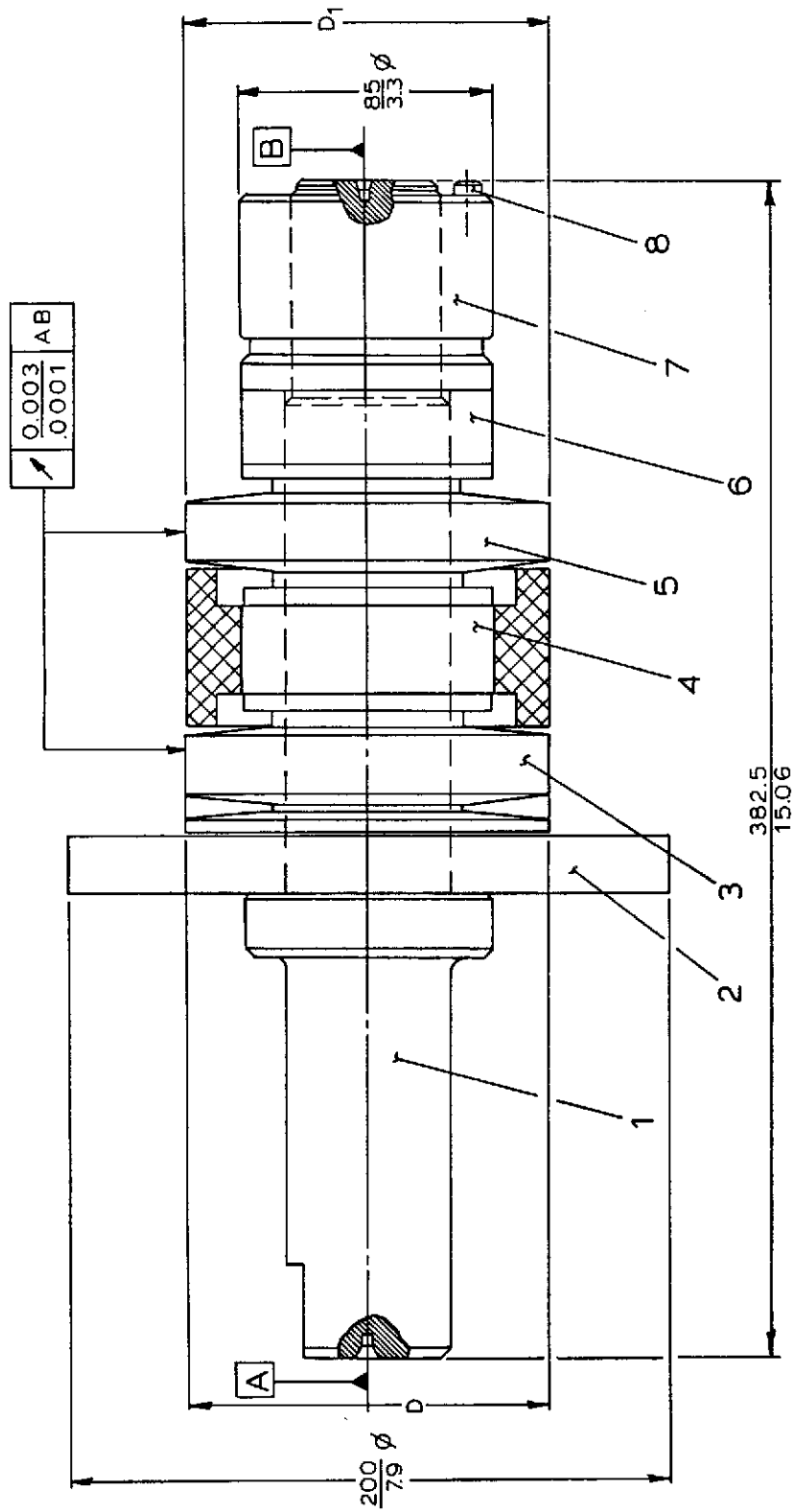
- g) Protect the shafts with the mounted bearings against corrosion until installed in the rolling mill.

F F



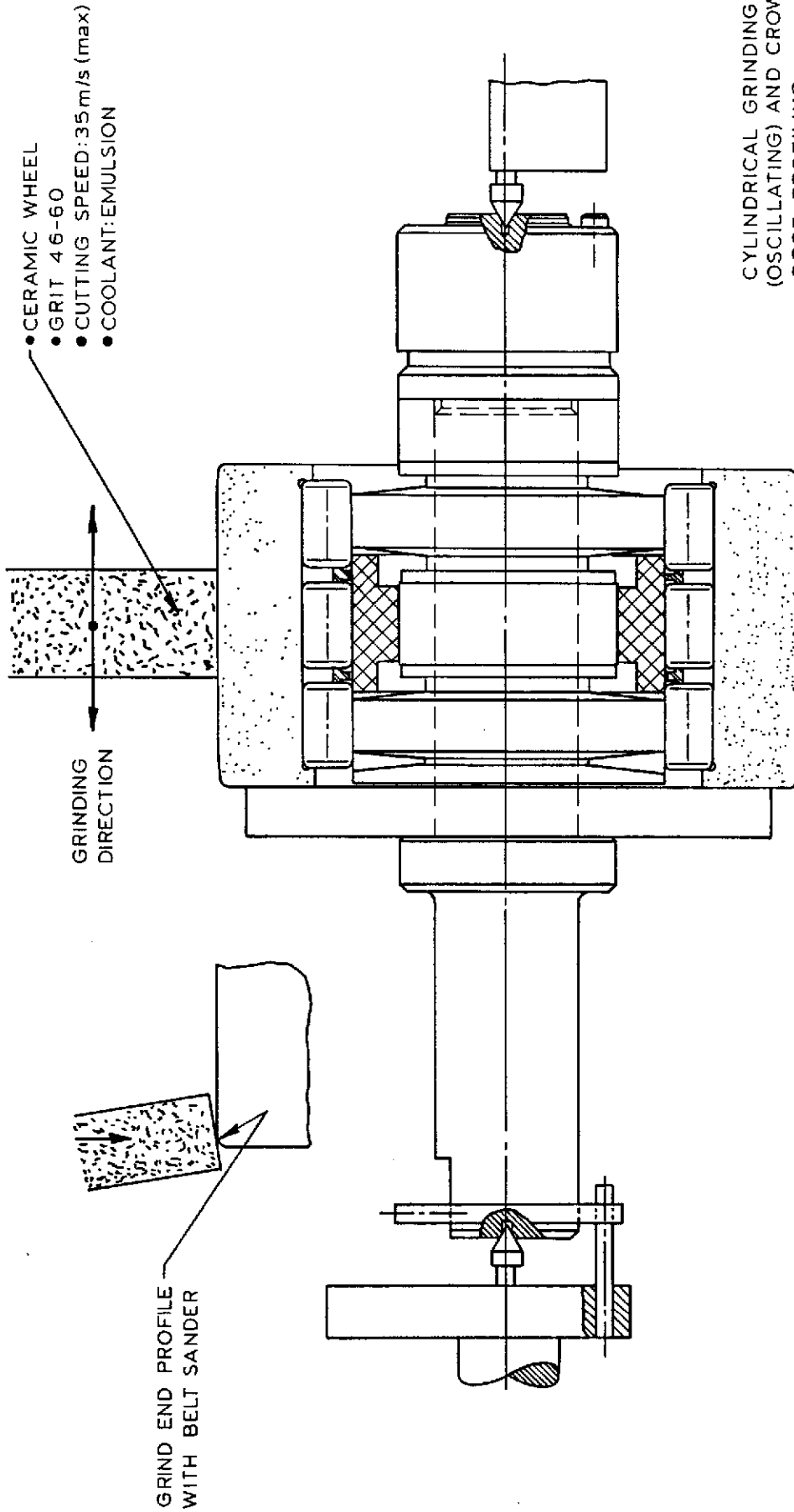
REV		CHANGE		DWN		CHK		DATE		UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS		DWN		CHK		APPV		SCALE: 1/2" = 1"		TITLE		
											INCH											GRINDING ARBOR
											.XX ±											FOR WGTR 90 x 220 x 120
											.XXX ±											F-53293
											MM ±											PART NO
											ANGLES ±											SIZE
																						B
																						F-93036

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25



TITLE RE-GRINDING DEVICE FOR BACK-UP ROLLER BEARINGS		SCALE: NONE	
PART NO B		SIZE B	
INA BEARING COMPANY, INC.		10-17-85	
DWN	G. Smith	CHK	APPV
UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS			
	INCH		
	.XX		
	.XXX		
	MM		
	ANGLES		
REV	CHANGE	DWN	CHK





- CERAMIC WHEEL
- GRIT 46-60
- CUTTING SPEED: 35 m/s (max)
- COOLANT: EMULSION

GRINDING DIRECTION

GRIND END PROFILE WITH BELT SANDER

CYLINDRICAL GRINDING
(OSCILLATING) AND CROWN
DROP PROFILING

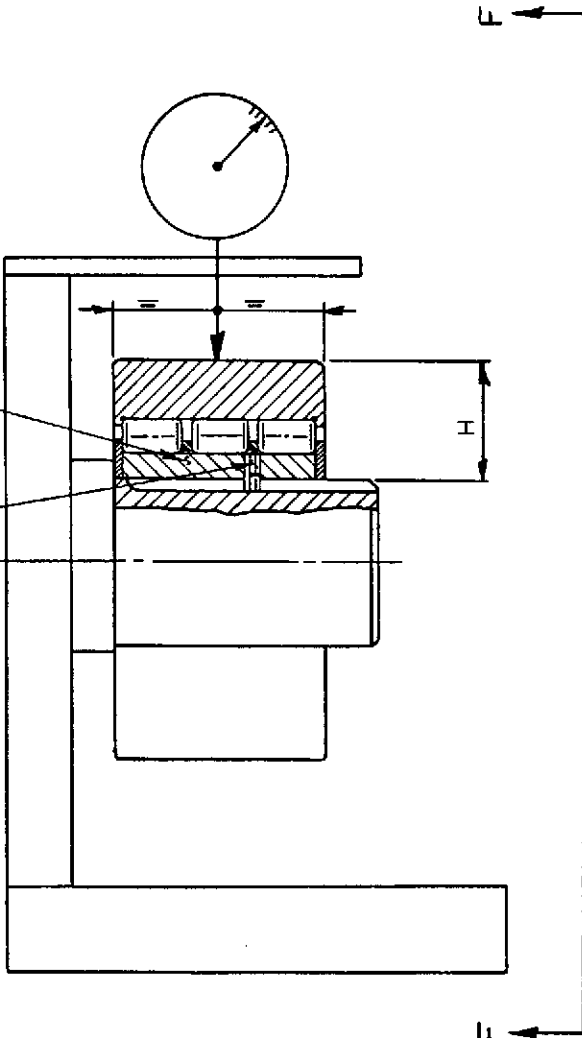
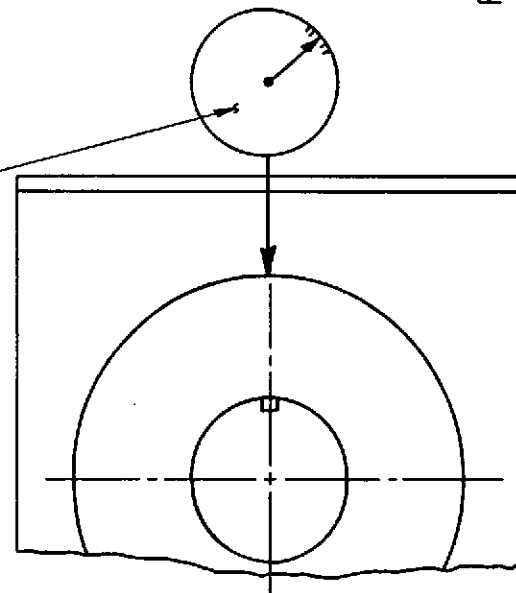
REV	CHANGE	DWN	CHK	DATE	ANGLES	MM	±	.XXX	±	.XX	±	INCH	UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS			DWN	CHK	APPLY	SCALE: <i>None</i>	TITLE	
																		MM	INCH	RE-GRINDING DEVICE FOR	
																				INA BACK-UP ROLLER BRGS.	
																				INA PART NO	
																				SIZE	9/10
																				B	
																				INA BEARING COMPANY, INC.	



HIGHEST POINT OF RADIAL RUNOUT
(MARKED WITH PIN)

FIXED INNER RING

COMPARATOR WITH
MICRO DIVISIONS



— VIEW F-F —
(PARTIAL)

REV	CHANGE	DWN	CHK	DATE	UNLESS OTHERWISE SPECIFIED TOLERANCES TO BE AS FOLLOWS	DWN	CHK	APPV	SCALE: None	TITLE
					INCH	10-17-85	10-17-85		MM	MEASURING DEVICE FOR
					.XX				INCH	RADIAL RUNOUT & HEIGHT H
					.XXX					
					MM					SIZE
					ANGLES					B
										PART NO
										10/10

INA BEARING COMPANY, INC.



RECEIVED