KAYDON MATERIAL SPECIFICATION BEARINGS DIVISION "PRINTED FROM KAYDON INTRANET" PLEASE VERIFY REVISION LETTER IN INTRANET INDEX		KBM 010 / REVISION C DATE
PREPARED BY T. Gzym	SUBJECT FORGING SPECIFICATION	SUPERSEDES 010B
APPROVED BY		PAGE 1 of 7
REVISION - C- Added section 3.1.4, Added 10.4 and 10.5 (R) indicates revised section		REVISED BY / DATE T. Gzym / 03/31/95 APPROVED BY / DATE T. Gzym / 03/31/95

1. APPLICATION

1.1 For forgings to be manufactured into anti-friction bearing races made of carburizing, through hardening or induction hardened steels.

1.2 In cases of conflict between this specification and other KBM specifications, the other KBM takes precedence.

2. REFERENCE DOCUMENTS

2.1 The latest issue of the following publications form a part of this specification to the extent specified herein.

2.1.1 KBM 015 - Packaging, Shipping and Material Identification

2.1.2 ASTM E10 - Brinell Hardness of Metallic Materials

3. MANUFACTURE

3.1 Forgings shall be formed into rings using one of the following methods:

3.1.1 Hammer or press, with mandrel and saddle
3.1.2 Flash butt welded
3.1.3 Ring rolling mill
(R) 3.1.4 Closed die

4. MATERIAL

4.1 The steel type shall be expressly stated in all inquiries and purchase orders with reference to the specific Kaydon Bearing Material (KBM) Specifications.

5. CONDITION

5.1 Heat treatment and material hardness.

5.1.1 Unless otherwise specified on this purchase order or engineering drawings, forgings covered in this document will be supplied in accordance with the designated Kaydon

Bearing Material (KBM) Specification. Forgings must be dimensionally stable and remain round to the tolerances shown on the Engineering drawing after machining.

5.1.2 Forgings that have been mechanically straightened or flattened after the required heat treatment (annealed, quench or tempered or normalized and tempered) must be properly stress relieved. Kaydon will not accept forgings that have been mechanically reworked unless we have been notified prior to shipment that they have been stress relieved, and we have given written approval to ship. A special stress relief certification must be included with the normal certifications that accompany the shipment showing the temperature and time at temperature. Reworked forgings must be identified separately with special markings.

5.1.3 Kaydon will not accept rerolled forgings due to the risk of excess decarburization unless the vendor can certify that sufficient stock remains after rerolling so that all decarburization will be removed when machined to the dimensions shown on the forging drawing.

5.1.4 The hardness shall be tested per ASTM E-10 and shall be uniform on all surfaces after stock removal per section 7.

5.2 Grain flow

5.2.1 Only when required by Engineering drawing.

5.2.2 After the forging technique is established, a forging shall be sectioned and suitably etched to reveal the grain-flow structure. This sectioning procedure shall be repeated after any major changes in the forging technique, and in either case, must be approved by the Kaydon Metallurgical Laboratory.

6. QUALITY

6.1 Surface finish and defects.

6.1.1 All surfaces must be substantially free of scale and forging flash.

6.1.2 The product shall not have surface imperfections of a degree or nature that will be detrimental to the manufacture or use as an anti-friction bearing race. Surface imperfections include, but are not restricted to, laps, folds, tears, cold shuts, cracks, and excessive decarburization.

6.2 Defects

6.2.1 Internally, the steel shall be free of defects that will hinder the performance of the final product. Internal defects include but are not restricted to overheating, burning, bursts, flakes, scale, ruptures, cracks, pipe, laps, porosity, and injurious inclusions.

6.2.2 If special testing for inclusions is required, it shall be stated on the Engineering drawing, or by specification (KBM, ASTM, etc.)

6.3 Receiving Inspection

6.3.1 All received products are subject to Kaydon Receiving Inspection.

6.4 The producer's procedures and quality program are subject to review by Kaydon Bearing Division representatives.

7. SIZES, STOCK ALLOWANCES AND TOLERANCES

7.1 Machined size

7.1.1 All inquiries and purchase orders shall be accompanied by an Engineering drawing stating the machine sizes at which the forgings must clean up free from all surface defects, including identification stamping, if used.

7.2 Preferred forging stock allowance for rolled/hammered forgings or rolled and welded rings are shown in Tables I and II. Table terminology is defined in Figure I.

7.3 Controlled diameter

7.3.1 One diameter, either O.D. or I.D., shall be a "CONTROLLED" diameter. Unless specified on the inquiry and purchase order, the choice of this controlled diameter shall be the vendor's option and shall be noted in the quotation and reported in the certification.

7.4 All diameters must be concentric with the "CONTROLLED" diameter sufficient to insure clean up within the stock allowed in Tables I and II.

7.5 Deviations in stock allowances from attached tables must be so identified in quotation. Additional machining time will be considered in the forging cost formula.

7.6 Multiple ring forgings

7.6.1 At the vendor's option for lower net cost, he may elect to quote multiple rings provided all the metallurgical requirements described in the Kaydon Bearing Material (KBM) Specifications are met.

7.6.2 If the vendor elects the option of multiple ring forgings, he must clearly state so in the quotation, indicating the yield or number of races expected including parting, facing, and chucking allowances.

7.7 Parting and facing allowances

7.7.1 Stock allowances for multiple ring forgings shall be provided as follows:

Wall Thickness	Parting	Facing/Side
Up to .75	1/8"	1/16"
.76 to 1.00	5/32"	1/16"
1.01 to 1.50	3/16"	1/16"
1.51 to 2.00	1/4"	1/16"
2.01 to 3.00	5/16"	3/32"
3.01 to 4.00	3/8"	1/8"
4.01 to 5.00	1/2"	1/8"

7.7.2 In addition to the above, a 1/2" wide chucking surface must be provided for rings less than 18" diameter.

8. PACKAGING, SHIPPING AND MATERIAL IDENTIFICATION

8.1 These items shall be per Kaydon Specification KBM 015.

9. CERTIFICATION

9.1 Notarized certifications are required in triplicate for each purchase order.

9.2 Separate certifications are required for each material type analysis.

9.3 Special stress relief certification. See section 5.1.2.

9.4 These certifications shall show, in addition to the requirement of the Kaydon Bearing Material (KBM) Specifications:

9.4.1 Method of heat identification and segregation if more than one heat is used for one part number.

9.4.2 Control diameter

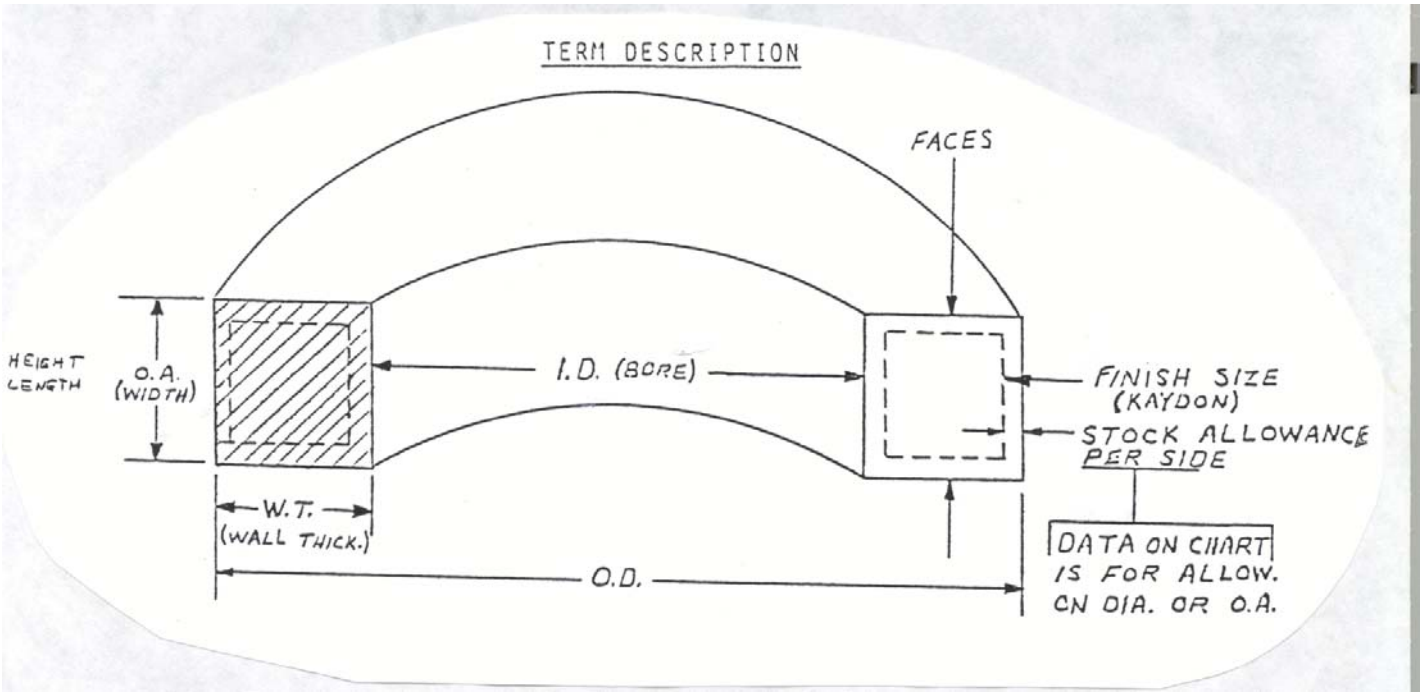
10. ACKNOWLEDGEMENT

10.1 This specification and its latest revisions shall be clearly stated in all inquiries, quotations, purchase orders, acknowledgements, and all related correspondence including certifications and reports.

10.2 Any deviation, exception or omission from any detail of this specification must be clearly stated and adequately identified for prompt recognition by nontechnical personnel.

10.3 Approval by Kaydon of such deviation, exception or omission must be clearly stated on the purchase order or appropriate change order and shall not be assumed for any reason, including reference to the pertinent correspondence.

10.4 PLEASE SEE PAGE 5 FOR TERM DESCRIPTION.


TERM DESCRIPTION
FACES
HEIGHT
LENGTH
O.A.
(WIDTH)
I.D. (BORE)
FINISH SIZE
(KAYDON)
STOCK ALLOWANCE
PER SIDE
W.T.
(WALL THICK.)
DATA ON CHART
IS FOR ALLOW.
ON DIA. OR O.A.
O.D.

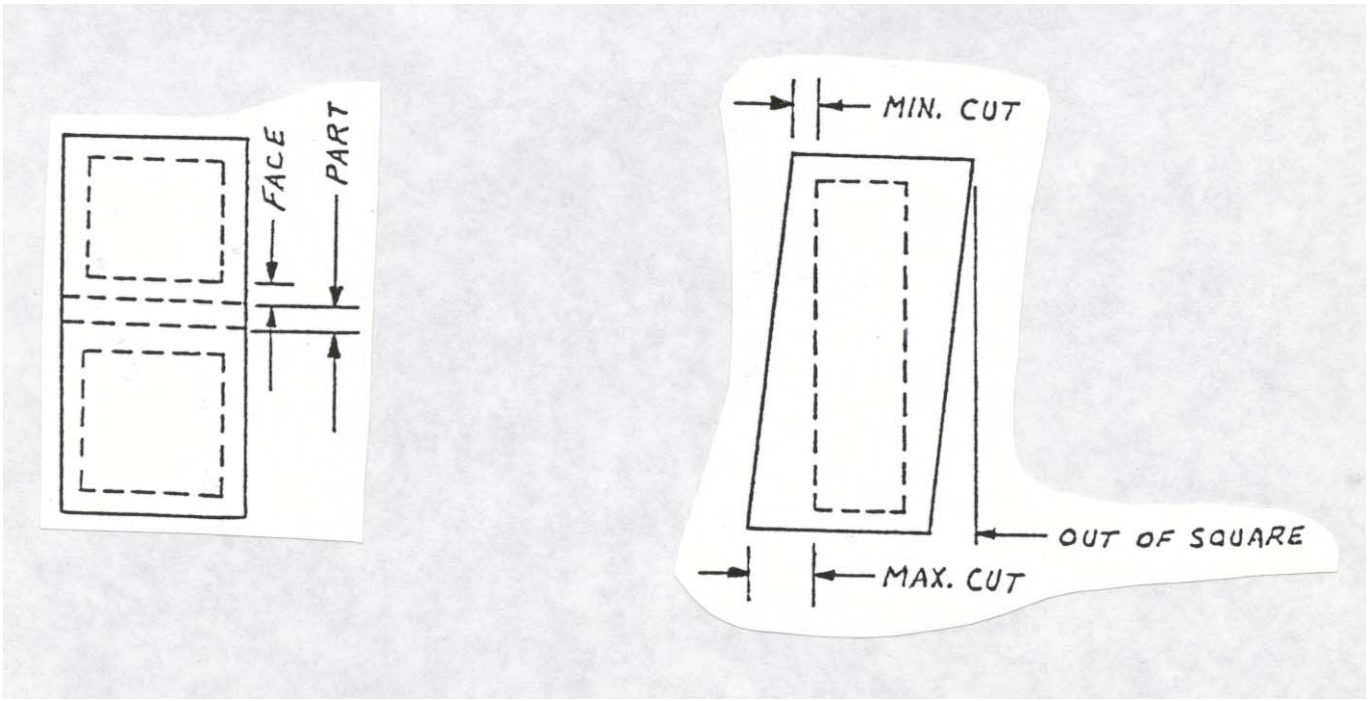

FACE
PART
MIN. CUT
OUT OF SQUARE
MAX. CUT

TABLE I

PREFERRED STOCK ALLOWANCE FOR ROLLED FORGINGS OR ROLLED AND WELDED RINGS

SUPPLIED IN ROUGH CONDITION

O. D. Finish Size (Inches) Over – To	Control Diameter Stock Allowance			Other Diameters Stock Allowance			Height Length O. A. Stock Allowance		
	Nom.	Max.	Min	Nom.	Max.	Min.	Nom.	Max.	Min.
0”– 6”	1/8	11/64	3/32	1/8	7/32	3/32	1/8	11/64	3/32
6 – 12	3/16	1/4	1/8	3/16	5/16	1/8	3/16	1/4	1/8
12 – 18	3/16	9/32	1/8	3/16	3/8	1/8	3/16	9/32	1/8
18 – 24	3/16	5/16	1/8	3/16	7/16	1/8	3/16	5/16	1/8
24 – 36	1/4	3/8	1/8	1/4	1/2	1/8	1/4	3/8	1/8
36 – 48	1/4	7/16	5/32	1/4	5/8	5/32	1/4	7/16	5/32
48 – 60	1/4	1/2	5/32	1/4	11/16	5/32	1/4	1/2	5/32
60 – 72	3/8	5/8	3/16	3/8	13/16	3/16	3/8	5/8	3/16
72 – 84	3/8	3/4	7/32	3/8	15/16	7/32	3/8	3/4	7/32
84 – 96	1/2	7/8	7/32	1/2	1	7/32	1/2	7/8	7/32
96 – 108	1/2	1	1/4	1/2	1-1/8	1/4	1/2	1	1/4

∅ NOTE –

All allowances and tolerances are for diameter and/or overall, <u>not</u> per side or cut.

Nom. is the stock desired for optimum yield and machining utilization

Min. is the stock felt necessary to allow cleanup of out-of-round forgings.

Max. is the stock beyond which additional machining time becomes necessary.

TABLE II

PREFERRED STOCK ALLOWANCE FOR HAMMER FORGED RINGS

O. D. Finish Size (Inches) Over – To	Control Diameter Stock Allowance			Other Diameters Stock Allowance			Height Length O. A. Stock Allowance		
	Nom.	Max.	Min	Nom.	Max.	Min.	Nom.	Max.	Min.
0"– 6"	1/8	5/16	3/32	1/8	3/8	3/32	1/8	5/16	3/32
6 – 12	3/16	3/8	1/8	3/16	1/2	1/8	3/16	3/8	1/8
12 – 18	3/16	7/16	1/8	3/16	9/16	1/8	3/16	7/16	1/8
18 – 24	3/16	1/2	1/8	3/16	5/8	1/8	3/16	1/2	1/8
24 – 36	1/4	5/8	1/8	1/4	3/4	1/8	1/4	5/8	1/8
36 – 48	1/4	3/4	5/32	1/4	7/8	5/32	1/4	3/4	5/32
48 – 60	1/4	7/8	5/32	1/4	1	5/32	1/4	7/8	5/32
60 – 72	3/8	15/16	3/16	3/8	1-1/16	3/16	3/8	15/16	3/16
72 – 84	3/8	1	7/32	3/8	1-1/8	7/32	3/8	1	7/32
84 – 96	1/2	1	7/32	1/2	1-1/4	7/32	1/2	1	7/32
96 – 108	1/2	1-1/16	1/4	1/2	1-5/16	1/4	1/2	1-1/16	1/4

∅ NOTE –

All allowances and tolerances are for diameter and/or overall, <u>not</u> per side or cut.
Nom. is the stock desired for optimum yield and machining utilization
Min. is the stock felt necessary to allow cleanup of out-of-round forgings.
Max. is the stock beyond which additional machining time becomes necessary.