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ANSI/AFBMA
Std. 21.1-1988

AMERICAN NATIONAL STANDARD

AFBMA STANDARD

**THRUST NEEDLE ROLLER AND
CAGE ASSEMBLIES AND THRUST WASHERS
METRIC DESIGN**

Sponsor
**The Anti-Friction Bearing
Manufacturers Association**

Approved November 17, 1988
American National Standards Institute, Inc.

American National Standard

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FOREWORD

(This foreword is not a part of ANSI/AFBMA Standard 21.1-1988, Thrust Needle Roller and Cage Assemblies and Thrust Washers, Metric Design.)

This American National Standard consolidates the boundary dimensions, tolerance limits and fitting and mounting practices for metric design thrust needle rollers and cage assemblies and thrust washers which have been in general use in the USA in recent years. Many of the boundary dimensions are formerly found in ANSI/AFBMA Standard 21-1977.

The dimensions, tolerances and clearances stated in this standard are based on metric units and are found in Part I of the various tables. A soft conversion to U.S. customary (inch-pound) units is provided in Part II of the various tables for the convenience of the user.

Suggestions for the improvement of this standard gained through experience with its use will be welcomed. These should be sent to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

The officers of Sectional Committee B3 of the American National Standard Institute and the organizations represented at the time this standard was submitted are as follows:

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AFBMA Standards
for
Ball and Roller Bearings
and Balls

- 1 — Terminology
- 4 — Tolerance Definitions and Gaging Practices
- 7 — Shaft and Housing Fits for Metric Radial Ball and Roller Bearings (Except Tapered Roller Bearings) Conforming to Basic Boundary Plans
- 8.1 — Ball and Roller Bearing Mounting Accessories, Metric Design
- 8.2 — Ball and Roller Bearing Mounting Accessories, Inch Design
- 9 — Load Ratings and Fatigue Life for Ball Bearings
- 10 — Metal Balls
- 11 — Load Ratings and Fatigue Life for Ball Bearings
- 12.1 — Instrument Ball Bearings, Metric Design
- 12.2 — Instrument Ball Bearings, Inch Design
- 13 — Rolling Bearing Vibration and Noise
- 14 — Housing for Bearings With Spherical Outside Surfaces
- 15 — Ball Bearings With Spherical Outside Surfaces and Extended Inner Ring Width (Includes Eccentric Locking Collars)
- 16.1 — Airframe Ball, Roller and Needle Roller Bearings, Metric Design
- 16.2 — Airframe Ball, Roller and Needle Roller Bearings, Inch Design
- 17 — Needle Rollers, Metric Design
- 18.1 — Needle Roller Bearings - Radial, Metric Design
- 18.2 — Needle Roller Bearings - Radial, Inch Design
- 19 — Tapered Roller Bearings, Radial, Metric Design
- 20 — Radial Bearings of Ball Cylindrical Roller and Spherical Roller Types, Metric Design
- 21.1 — Thrust Needle Roller and Cage Assemblies and Thrust Washers, Metric Design
- 21.2 — Thrust Needle Roller and Cage Assemblies and Thrust Washers, Inch Design
- 22.2 — Spherical Plain Bearings, Joint Type, Inch Design
- 23.2 — Thrust Bearings of Tapered Roller Type, Inch Design
- 24.1 — Thrust Bearings of Ball, Cylindrical Roller and Spherical Roller Types, Metric Design
- 24.2 — Thrust Bearings of Ball and Cylindrical Roller Types, Inch Design

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Thrust Needle Roller and Cage Assemblies and Thrust Washers Metric Design

CONTENTS

SECTION	PAGE
1. Scope	1
2. Identification Code	
2.1 General	1
2.2 Structure of Code	1
3. Symbols and Nomenclature	3
4. Boundary Dimensions	3
5. Assembly and Washer Tolerances	3
6. Mounting Practice	
6.1 General	10
6.2 Washer Back-up Surfaces	10

List of Tables

TABLE NO.

PAGE

BASIC PLANS FOR BOUNDARY DIMENSIONS, METRIC

1 Thrust Needle Roller and Cage Assemblies - Type NT

Part I	Dimensions shown in mm	4
Part II	Dimensions shown in inches	5

2 Thrust Washers - Type NTW

Part I	Dimensions shown in mm	6
Part II	Dimensions shown in inches	7

TOLERANCES

3 Thrust Needle Roller and Cage Assemblies - Type NT

Part I	Deviations in micrometres	8
Part II	Deviations in inches	8

4 Thrust Washers - Type NTW

Part I	Deviations in micrometres	9
Part II	Deviations in inches	9

5 MOUNTING DIMENSIONS

Part I	Deviations in micrometres	11
Part II	Deviations in inches	12

Thrust Needle Roller and Cage Assemblies and Thrust Washers Metric Design

1. SCOPE

This standard for metric thrust needle roller and cage assemblies and thrust washers includes:

- Identification Code
- Symbols and Nomenclature
- Boundary Dimensions
- Tolerances
- Mounting Practice

All thrust needle roller and cage assemblies and thrust washers listed in this standard are not necessarily available. For availability consult bearing manufacturers. Other applicable standards should be consulted for tolerance definitions, gaging practices and methods of evaluating load ratings.

This standard only covers external dimensions. Functional interchangeability between makers of standard thrust needle roller and cage assemblies and thrust washers of the same size may depend on features which are not standardized. Hence the substitution of one make of a standard bearing for another should only be made after careful comparison of their characteristics and consideration of the requirements of the particular application.

2. IDENTIFICATION CODE

2.1 General—This code identifies and as far as possible describes each thrust needle roller and cage assembly or thrust washer on the basis of complete interchangeability. This code establishes a universal language for describing and identifying assemblies and washers in order to facilitate communications between the user and the manufacturer. The code is also intended to simplify the handling by user personnel of identical assemblies or washers made by different manufacturers whose identification numbers may be different.

This code applies only to those metric thrust needle roller and cage assemblies or thrust washers whose boundary dimensions and tolerances conform to this standard.

2.2 Structure of the Code—As shown in the following table, Schematic Arrangement of a Complete Code Number, the code consists of one or two sections.

Section 1, called the Basic Number, includes a diameter symbol made up of a group of numerals, followed by a type symbol made up of a group of letters and finally by a dimension series symbol made up of a group of numerals. This Basic Number must always be used.

Section 2, pertains only to thrust needle roller and cage assemblies, and when used delineates cage materials.

In the Schematic Arrangement Table below, "O" represents any code numeral and "A" represents any code letter.

**SCHEMATIC ARRANGEMENT OF A
COMPLETE CODE NUMBER**

SECTION 1, BASIC NUMBER			SECTION 2*
Diameter	Type	Dimension Series	Cage Material
000	AAA	00	A

*Section 2, when used, pertains only to thrust needle roller and cage assemblies

2.2.1 Section 1, Basic Number

SCHEMATIC ARRANGEMENT OF SECTION 1

SECTION 1, BASIC NUMBER		
Diameter	Type	Dimension Series
000	AAA	00

The bore diameter is indicated by two or three numerals comprising the diameter symbol as shown in Boundary Dimension Tables 1 and 2.

The type is indicated by two or three letters comprising the type symbol as shown in 2.2.2.

The dimension series is indicated by two numerals which describes the outside diameter and roller diameter (or washer thickness) as shown in Boundary Dimension Tables 1 and 2.

2.2.2 Assembly and Washer Type Symbols

A. THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES

SYMBOL	DESCRIPTION
NT	Thrust Needle Roller and Cage Assembly, Metric Design

B. THRUST WASHERS

SYMBOL	DESCRIPTION
NTW	Thrust Washer, Metric Design

2.2.3 Section 2, Cage Material

SCHEMATIC ARRANGEMENT OF SECTION 2

SECTION 2 CAGE MATERIAL
A

If cage material is steel, Section 2 is omitted. If not steel, the cage material for the thrust needle roller and cage assembly is indicated by a letter from the following table:

CAGE MATERIAL SYMBOLS

SYMBOL	DESCRIPTION
N	Non-Metallic

2.2.4 Coding Examples

The following examples illustrate the application and meaning of typical identification codes for thrust needle roller and cage assemblies and for thrust washers.

35NT01. From 2.2.2, NT is found to be the type symbol for a thrust needle roller and cage assembly and Table 1 lists the Boundary Dimensions for type NT. Referring to Table 1, the diameter symbol 35 indicates a bore diameter of 35mm (1.3780 inch) and the Dimension series symbol 01 indicates an outside diameter of 52mm (2.0472 inch) and a roller diameter of 2mm (0.07874 inch). From 2.2.3, the absence of a letter indicates that the cage material is steel.

35NTW14. From 2.2.2, NTW is found to be the type symbol for a thrust washer and Table 2 lists the Boundary Dimensions for type NTW.

Referring to Table 2, the diameter symbol 35 indicates a bore of 35mm (1.3780 inch) and the dimension series symbol 14 indicates an outside diameter of 52mm (2.0472 inch) and a thickness of 1 mm (0.0394 inch).

3. Symbols and Nomenclature

The following symbols are used to identify boundary dimensions, size and size variations.

d	= Bore diameter of a shaft thrust washer
d_s	= Single diameter of a shaft thrust washer bore
$\Delta d_{s(\min)}$	= Single bore diameter deviation of a shaft washer from d as measured by the use of plug gages
d_1	= Outside diameter of a shaft thrust washer
d_{1mp}	= Single plane mean outside diameter of a shaft thrust washer
Δd_{1mp}	= Single plane mean outside diameter deviation of a shaft thrust washer from d_1
B	= Thickness of a shaft thrust washer
B_s	= Single thickness of a shaft thrust washer
ΔB_s	= Single shaft thrust washer thickness deviation from B
D_{c1}	= Bore diameter of a thrust needle roller and cage assembly
D_{c1s}	= Single diameter of a thrust needle roller and cage assembly bore
$\Delta D_{c1s(\min)}$	= Single bore diameter deviation of a thrust needle roller and cage assembly from D_{c1} as measured by the use of plug gages

D_c	= Outside diameter of a thrust needle roller and cage assembly
D_{cmp}	= Single plane mean outside diameter of a thrust needle roller and cage assembly
ΔD_{cmp}	= Single plane mean outside diameter deviation of a thrust needle roller and cage assembly from D_c
D_w	= Needle roller diameter
D_{ws}	= Single diameter of a needle roller
ΔD_{ws}	= Single needle roller diameter deviation from D_w

4. BOUNDARY DIMENSIONS

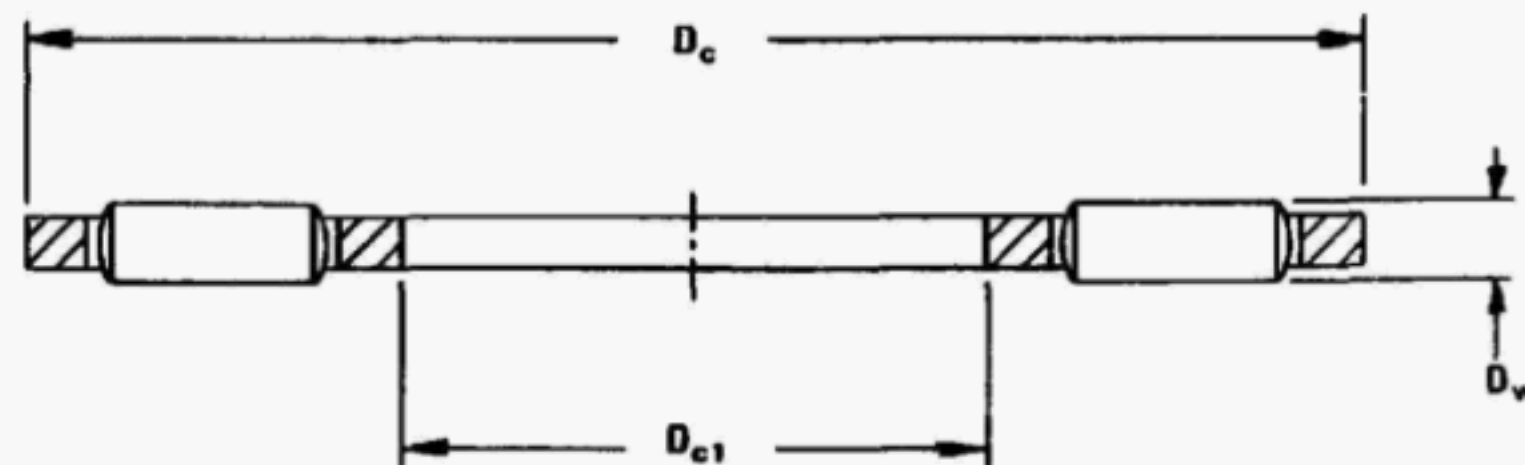
Purpose of Plans. The Boundary Plans shown in the Boundary Dimension Tables 1 and 2 are designed to reduce, as much as possible, the number of thrust needle roller and cage assemblies and thrust washers, to promote economic production and yet to provide a sufficient number of sizes and proportions to satisfy present and future needs of bearing users.

5. ASSEMBLY AND WASHER TOLERANCES

Tolerance Definitions and Gaging Practice. Definitions of terms used in the tolerance tables, as well as most gaging practices, are covered in ANSI/AFBMA Standard 4.

The metric diameter tolerances listed are in accordance with ANSI B4.2-1978—Preferred Metric Limits and Fits.

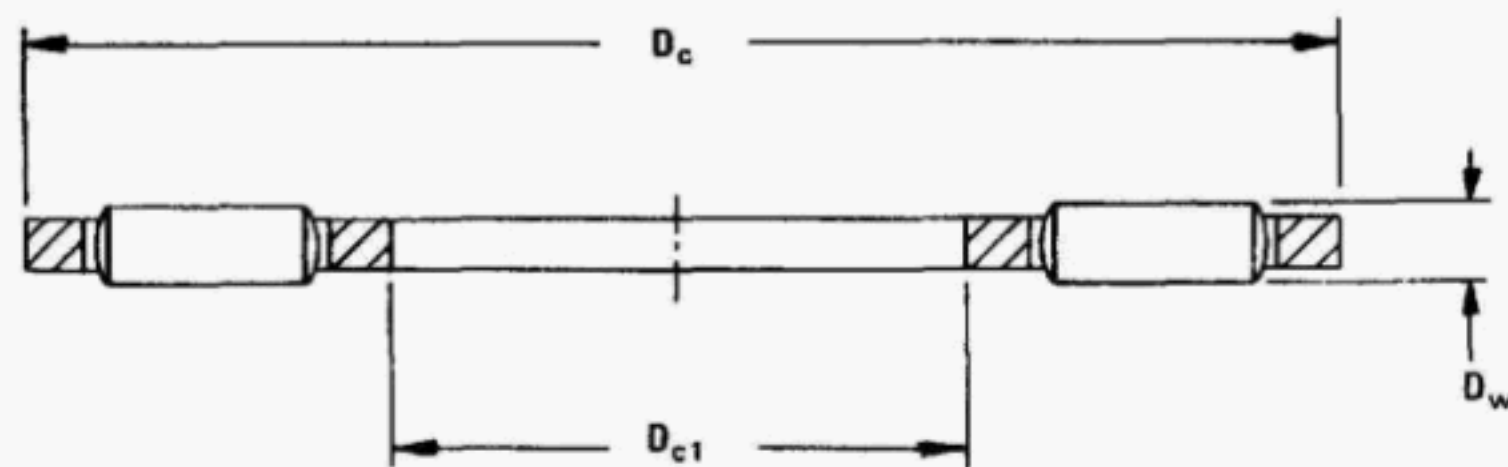
TABLE 1
BOUNDARY DIMENSIONS
THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES - TYPE NT
METRIC DESIGN

**PART I**

Dimensions in millimetres

IDENTIFICATION CODE	D_{c1}	D_c	D_w
06NT01	6	19	2
08NT01	8	21	2
10NT01	10	24	2
12NT01	12	26	2
15NT01	15	28	2
17NT01	17	30	2
20NT01	20	35	2
25NT01	25	42	2
30NT01	30	47	2
35NT01	35	52	2
40NT01	40	60	3
45NT01	45	65	3
50NT01	50	70	3
55NT01	55	78	3
60NT01	60	85	3
65NT01	65	90	3
70NT01	70	95	4
75NT01	75	100	4
80NT01	80	105	4
85NT01	85	110	4
90NT01	90	120	4
100NT01	100	135	4
110NT01	110	145	4
120NT01	120	155	4
130NT01	130	170	5
140NT01	140	180	5
150NT01	150	190	5
160NT01	160	200	5

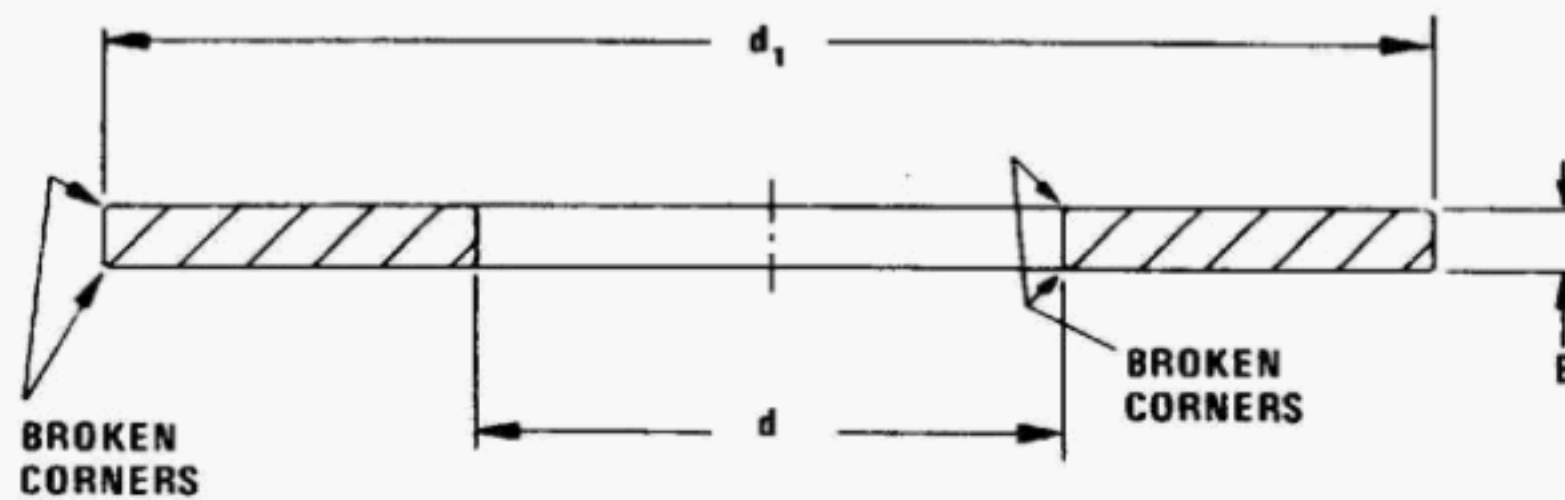
TABLE 1
BOUNDARY DIMENSIONS
THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES - TYPE NT
METRIC DESIGN

**PART II**

Dimensions in inches

IDENTIFICATION CODE	D_{c1}	D_c	D_w
06NT01	0.2362	0.748	0.07874
08NT01	0.3150	0.827	0.07874
10NT01	0.3937	0.945	0.07874
12NT01	0.4724	1.024	0.07874
15NT01	0.5906	1.102	0.07874
17NT01	0.6693	1.181	0.07874
20NT01	0.7874	1.378	0.07874
25NT01	0.9843	1.654	0.07874
30NT01	1.1811	1.850	0.07874
35NT01	1.3780	2.047	0.07874
40NT01	1.5748	2.362	0.11811
45NT01	1.7717	2.559	0.11811
50NT01	1.9685	2.756	0.11811
55NT01	2.1654	3.071	0.11811
60NT01	2.3622	3.346	0.11811
65NT01	2.5591	3.543	0.11811
70NT01	2.7559	3.740	0.15748
75NT01	2.9528	3.937	0.15748
80NT01	3.1496	4.134	0.15748
85NT01	3.346	4.331	0.15748
90NT01	3.543	4.724	0.15748
100NT01	3.937	5.315	0.15748
110NT01	4.331	5.709	0.15748
120NT01	4.724	6.102	0.15748
130NT01	5.118	6.693	0.19685
140NT01	5.512	7.087	0.19685
150NT01	5.906	7.480	0.19685
160NT01	6.299	7.874	0.19685

TABLE 2
BOUNDARY DIMENSIONS
THRUST WASHERS - TYPE NTW
METRIC DESIGN

**PART I**

Dimensions in millimetres

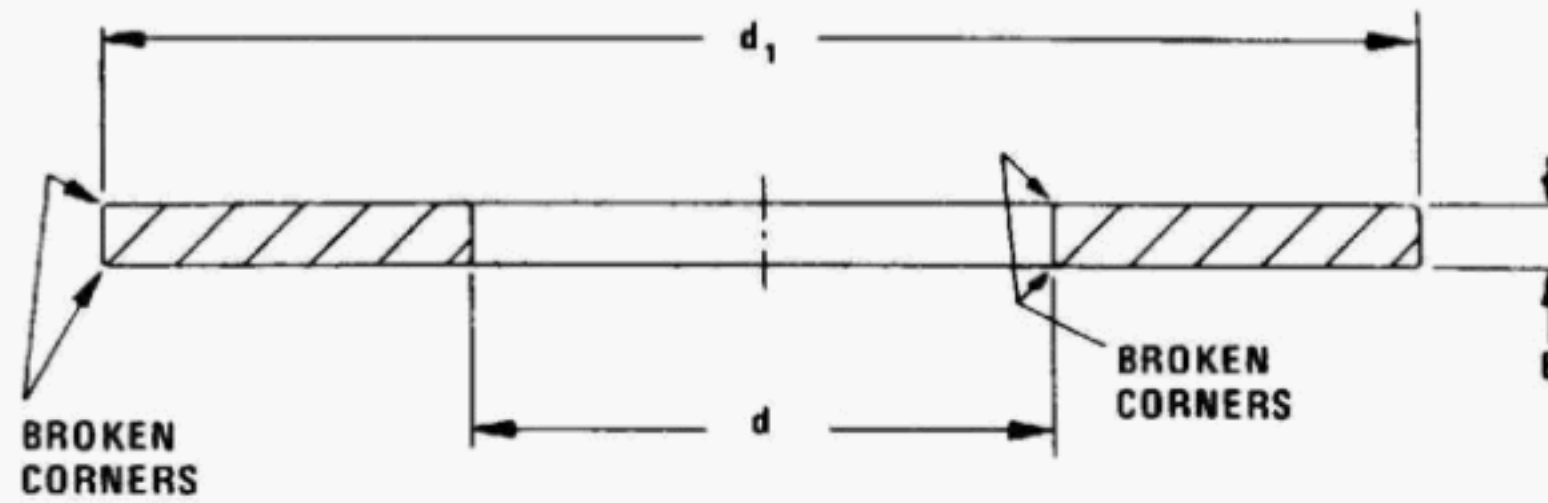
IDENTIFICATION CODE	d	d ₁	B
06NTW12	6	19	0.8
06NTW14	6	19	1
08NTW12	8	21	0.8
08NTW14	8	21	1
10NTW12	10	24	0.8
10NTW14	10	24	1
12NTW12	12	26	0.8
12NTW14	12	26	1
15NTW12	15	28	0.8
15NTW14	15	28	1
17NTW12	17	30	0.8
17NTW14	17	30	1
20NTW12	20	35	0.8
20NTW14	20	35	1
25NTW12	25	42	0.8
25NTW14	25	42	1
30NTW12	30	47	0.8
30NTW14	30	47	1
35NTW12	35	52	0.8
35NTW14	35	52	1
40NTW12	40	60	0.8
40NTW14	40	60	1
45NTW12	45	65	0.8
45NTW14	45	65	1
50NTW12	50	70	0.8
50NTW14	50	70	1
55NTW12	55	78	0.8
55NTW14	55	78	1
60NTW12	60	85	0.8
60NTW14	60	85	1

PART I

Dimensions in millimetres

IDENTIFICATION CODE	d	d ₁	B
65NTW12	65	90	0.8
65NTW14	65	90	1
70NTW12	70	95	0.8
70NTW14	70	95	1
75NTW12	75	100	0.8
75NTW14	75	100	1
80NTW12	80	105	0.8
80NTW14	80	105	1
85NTW12	85	110	0.8
85NTW14	85	110	1
90NTW12	90	120	0.8
90NTW14	90	120	1
100NTW12	100	135	0.8
100NTW14	100	135	1
110NTW12	110	145	0.8
110NTW14	110	145	1
120NTW12	120	155	0.8
120NTW14	120	155	1
130NTW12	130	170	0.8
130NTW14	130	170	1
140NTW12	140	180	0.8
140NTW14	140	180	1
150NTW12	150	190	0.8
150NTW14	150	190	1
160NTW12	160	200	0.8
160NTW14	160	200	1

TABLE 2
BOUNDARY DIMENSIONS
THRUST WASHERS - TYPE NTW
METRIC DESIGN

**PART II**

Dimensions in inches

IDENTIFICATION CODE	d	d ₁	B
06NTW12	0.2362	0.748	0.0315
06NTW14	0.2362	0.748	0.03937
08NTW12	0.3150	0.827	0.0315
08NTW14	0.3150	0.827	0.03937
10NTW12	0.3937	0.945	0.0315
10NTW14	0.3937	0.945	0.03937
12NTW12	0.4724	1.024	0.0315
12NTW14	0.4724	1.024	0.03937
15NTW12	0.5806	1.102	0.0315
15NTW14	0.5806	1.102	0.03937
17NTW12	0.6683	1.181	0.0315
17NTW14	0.6683	1.181	0.03937
20NTW12	0.787	1.378	0.0315
20NTW14	0.787	1.378	0.03937
25NTW12	0.984	1.654	0.0315
25NTW14	0.984	1.654	0.03937
30NTW12	1.181	1.850	0.0315
30NTW14	1.181	1.850	0.03937
35NTW12	1.378	2.047	0.0315
35NTW14	1.378	2.047	0.03937
40NTW12	1.575	2.362	0.0315
40NTW14	1.575	2.362	0.03937
45NTW12	1.772	2.559	0.0315
45NTW14	1.772	2.559	0.03937
50NTW12	1.969	2.765	0.0315
50NTW14	1.969	2.765	0.03937
55NTW12	2.165	3.071	0.0315
55NTW14	2.165	3.071	0.03937
60NTW12	2.362	3.346	0.0315
60NTW14	2.362	3.346	0.03937

PART II

Dimensions in inches

IDENTIFICATION CODE	d	d ₁	B
65NTW12	2.559	3.543	0.0315
65NTW14	2.559	3.543	0.03937
70NTW12	2.756	3.740	0.0315
70NTW14	2.756	3.740	0.03937
75NTW12	2.953	3.937	0.0315
75NTW14	2.953	3.937	0.03937
80NTW12	3.150	4.134	0.0315
80NTW14	3.150	4.134	0.03937
85NTW12	3.346	4.331	0.0315
85NTW14	3.346	4.331	0.03937
90NTW12	3.543	4.724	0.0315
90NTW14	3.543	4.724	0.03937
100NTW12	3.937	5.315	0.0315
100NTW14	3.937	5.315	0.03937
110NTW12	4.331	5.709	0.0315
110NTW14	4.331	5.709	0.03937
120NTW12	4.724	6.102	0.0315
120NTW14	4.724	6.102	0.03937
130NTW12	5.118	6.693	0.0315
130NTW14	5.118	6.693	0.03937
140NTW12	5.512	7.087	0.0315
140NTW14	5.512	7.087	0.03937
150NTW12	5.906	7.480	0.0315
150NTW14	5.906	7.480	0.03937
160NTW12	6.299	7.874	0.0315
160NTW14	6.299	7.874	0.03937

TABLE 3
TOLERANCES
THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES - TYPE NT
METRIC DESIGN

PART I

Dimensions in millimetres
 Deviations in micrometres

D_c		ΔD_{cmp}	
OVER	INCL	HIGH	LOW
18	30	-110	-320
30	40	-120	-370
40	50	-130	-380
50	65	-140	-440
65	80	-150	-450
80	100	-170	-520
100	120	-180	-530
120	140	-200	-600
140	160	-210	-610
160	180	-230	-630
180	200	-240	-700
200	225	-260	-720

D_{c1}		(1) $\Delta D_{c1s(min)}$		ΔD_{ws}
OVER	INCL	HIGH	LOW	
6	10	+115	+25	NOTE (2)
10	18	+142	+32	NOTE (2)
18	30	+170	+40	NOTE (2)
30	50	+210	+50	NOTE (2)
50	80	+250	+60	NOTE (2)
				NOTE (2)
80	120	+292	+72	
120	180	+335	+85	

PART II

Dimensions in inches
 Deviations in 0.0001 inch

D_c		ΔD_{cmp}	
OVER	INCL	HIGH	LOW
0.7087	1.1811	-43	-126
1.1811	1.5748	-47	-146
1.5748	1.9685	-51	-150
1.9685	2.5591	-55	-173
2.5591	3.1496	-59	-177
3.1496	3.9370	-67	-205
3.9370	4.7244	-71	-209
4.7244	5.5118	-79	-236
5.5118	6.2992	-83	-240
6.2992	7.0866	-91	-248
7.0866	7.8740	-94	-276
7.8740	8.8583	-102	-283

D_{c1}		(1) $\Delta D_{c1s(min)}$		ΔD_{ws}
OVER	INCL	HIGH	LOW	
0.2362	0.3937	+45	+10	NOTE (2)
0.3937	0.7087	+56	+13	NOTE (2)
0.7087	1.1811	+67	+16	NOTE (2)
1.1811	1.9685	+83	+20	NOTE (2)
1.9685	3.1496	+98	+24	NOTE (2)
				NOTE (2)
3.1496	4.7244	+115	+28	
4.7244	7.0866	+132	+33	NOTE (2)

- (1) The assembly bore diameter is gaged with "go" and "no go" plug gages.
 The "go" plug gage size is the minimum assembly bore diameter.
 The "no go" plug gage size is the maximum assembly bore diameter.
 (2) Assemblies will be supplied containing needle rollers in accordance with one of the needle roller grades described in ANSI/AFBMA Standard 17.

TABLE 4
TOLERANCES
THRUST WASHERS - TYPE NTW
METRIC DESIGN

PART I

d		(1) $\Delta d_{s(min)}$	
OVER	INCL	HIGH	LOW
3	6	+140	+20
6	10	+175	+25
10	18	+212	+32
18	30	+250	+40
30	50	+300	+50
50	80	+360	+60
80	120	+422	+72
120	180	+485	+85

d ₁		Δd_{1mp}	
OVER	INCL	HIGH	LOW
18	30	-40	-370
30	50	-50	-440
50	80	-60	-520
80	120	-72	-612
120	180	-85	-715
180	250	-100	-820

Dimensions in millimetres
Deviations in micrometres

B		ΔB_s	
OVER	INCL	HIGH	LOW
0	3	+50	-50

PART II

d		(1) $\Delta d_{s(min)}$	
OVER	INCL	HIGH	LOW
0.1181	0.2362	+55	+8
0.2362	0.3937	+69	+10
0.3937	0.7087	+83	+13
0.7087	1.1811	+98	+16
1.1811	1.9685	+118	+20
1.9685	3.1496	+142	+24
3.1496	4.7244	+166	+28
4.7244	7.0866	+191	+33

d ₁		Δd_{1mp}	
OVER	INCL	HIGH	LOW
0.7087	1.1811	-16	-146
1.1811	1.9685	-20	-173
1.9685	3.1496	-24	-205
3.1496	4.7244	-28	-241
4.7244	7.0866	-33	-281
7.0866	9.8425	-39	-323

Dimensions in inches
Deviations in 0.0001 inch

B		ΔB_s	
OVER	INCL	HIGH	LOW
0	0.1181	+20	-20

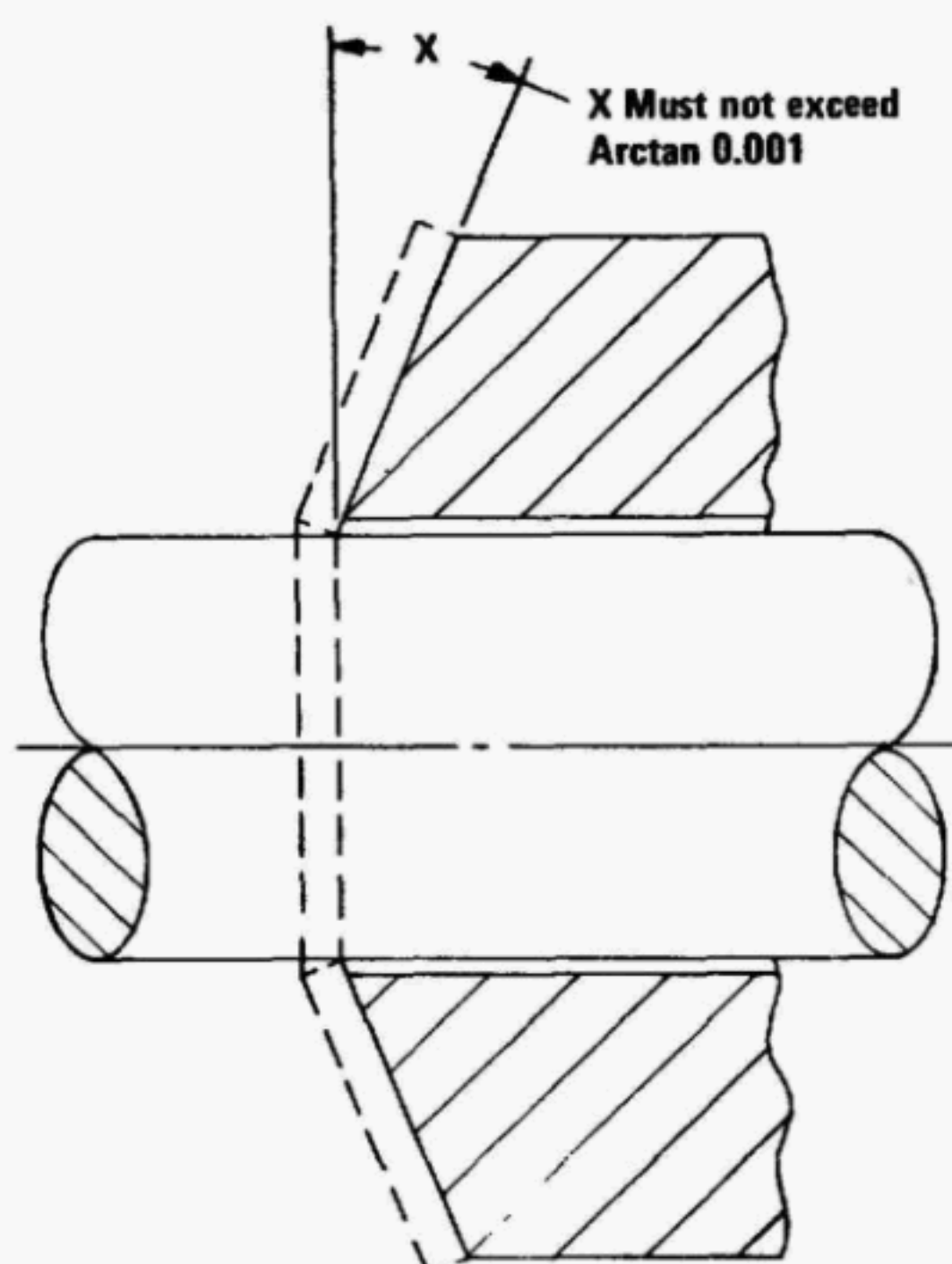
- (1) The thrust washer bore diameter is gaged with "go" and "no go" plug gages.
The "go" plug gage size is the minimum thrust washer bore diameter.
The "no go" plug gage size is the maximum thrust washer bore diameter.

6. MOUNTING PRACTICE

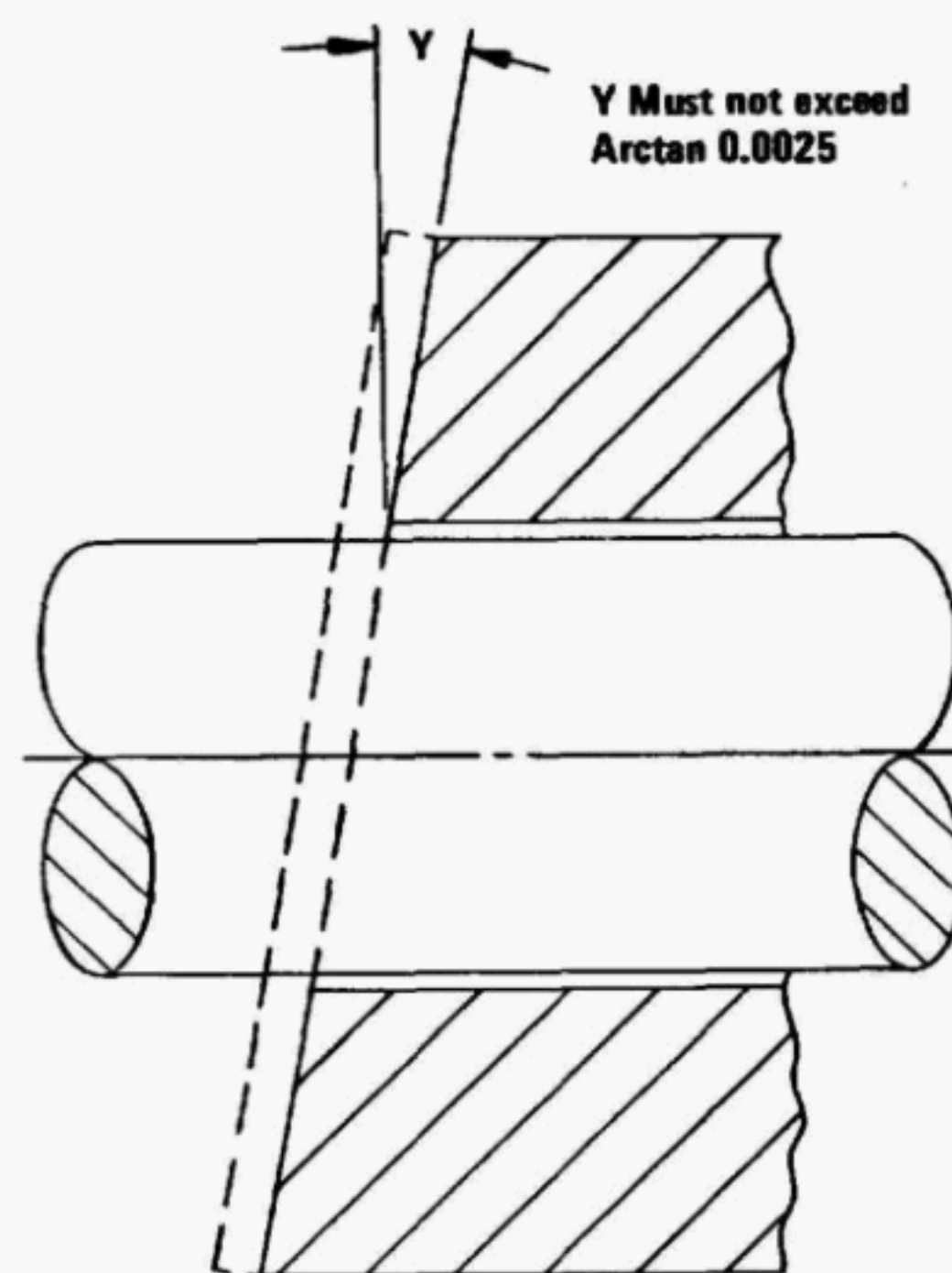
6.1 General. This section covers thrust needle roller and cage assembly and thrust washer mounting practice for normal operating conditions. Table 5 lists the shaft diameter dimensions and the tolerances required for shaft piloting assemblies and washers.

If the cage assembly is to be piloted on its outside diameter, bearing manufacturers should be consulted.

6.2 Washer Back-up Surfaces. The surfaces which back-up the washers shall not be coned or out-of-square by an amount exceeding the tolerances described in the following diagrams.



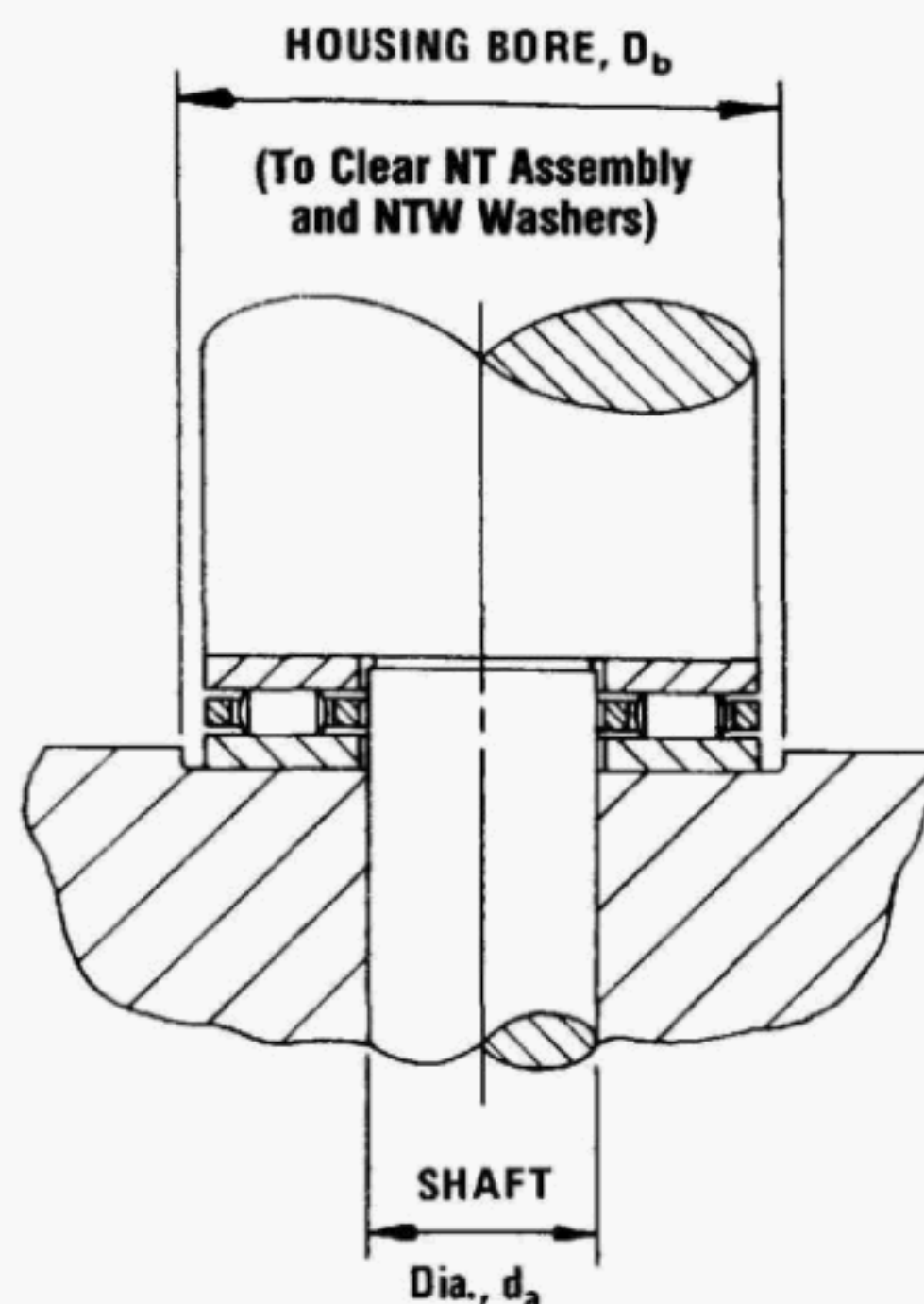
DISHED OR CONED SURFACE



OUT-OF-SQUARE SURFACE

Deflection of the thrust washers under load must be considered. For optimum performance, washers should be completely supported.

TABLE 5
MOUNTING DIMENSIONS
THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES
AND THRUST WASHERS - TYPES NT AND NTW
METRIC DESIGN



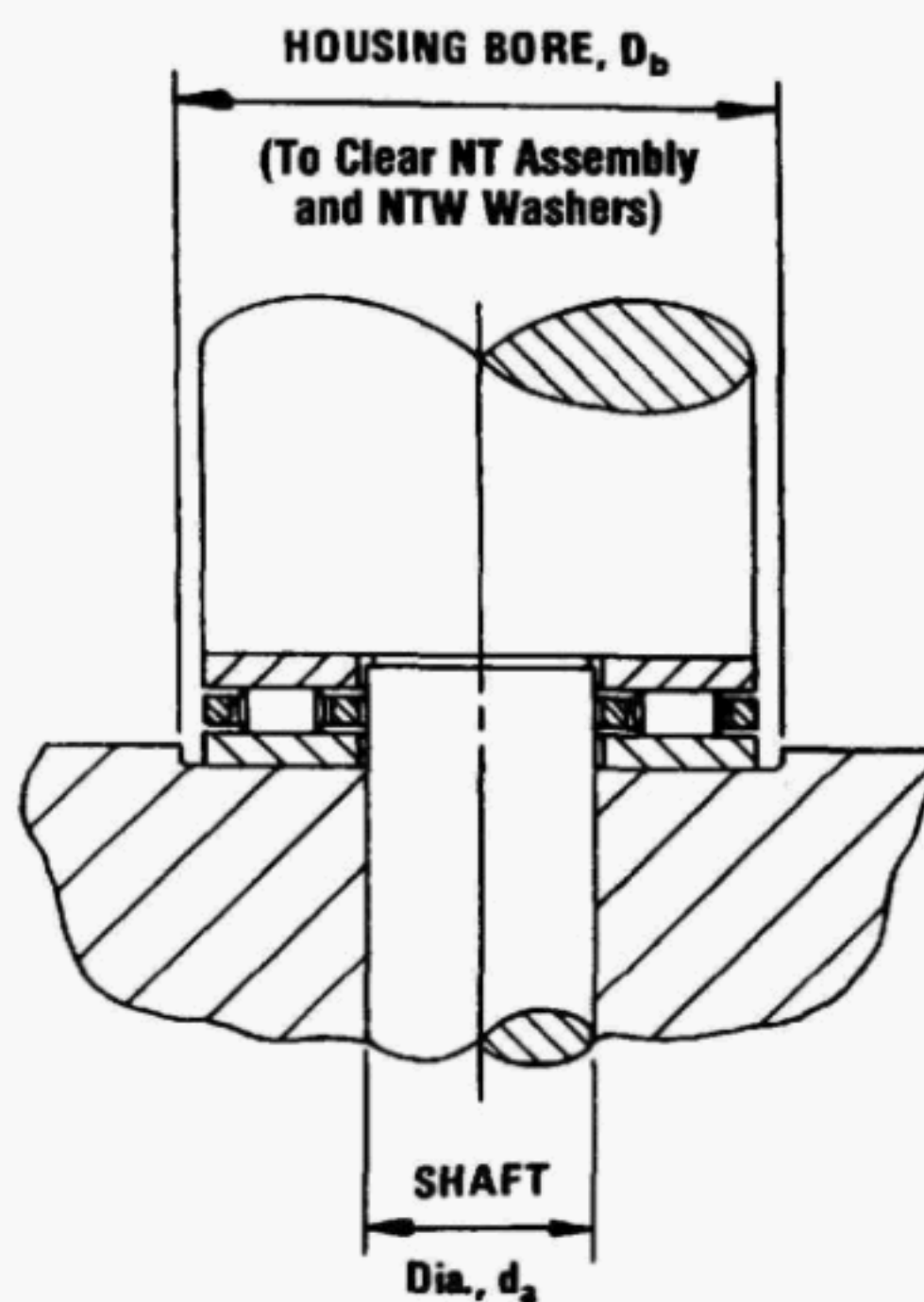
PART I

Dimensions in millimetres
 Deviations in micrometres

BASIC ASSEMBLY BORE D_{c1} AND/OR WASHER BORE, d		SHAFT DIAMETER d_s FOR NT ASSEMBLY AND/OR NTW WASHER ALLOWABLE DEVIATION FROM D_{c1} AND/OR d	
OVER	INCL	HIGH	LOW
3	6	+0	- 48
6	10	+0	- 58
10	18	+0	- 70
18	30	+0	- 84
30	50	+0	-100
50	80	+0	-120
80	120	+0	-140
120	180	+0	-160

BASIC ASSEMBLY OUTSIDE DIAMETER D_c AND/OR WASHER OUTSIDE DIAMETER d_1		HOUSING BORE D_b FOR NT ASSEMBLY AND/OR NTW WASHER ALLOWABLE DEVIATION FROM D_c AND/OR d_1
OVER	INCL	MINIMUM
18	30	+1000
30	50	+1000
50	80	+1000
80	120	+1000
120	180	+1000
180	250	+1000

TABLE 5
MOUNTING DIMENSIONS
THRUST NEEDLE ROLLER AND CAGE ASSEMBLIES
AND THRUST WASHERS - TYPES NT AND NTW
METRIC DESIGN

**PART II**

Dimensions in inches
 Deviations in 0.0001 inch

BASIC ASSEMBLY BORE D_{c1} AND/OR WASHER BORE, d		SHAFT DIAMETER d_s FOR NT ASSEMBLY AND/OR NTW WASHER	
		ALLOWABLE DEVIATION FROM D_{c1} AND/OR d	
OVER	INCL	HIGH	LOW
0.1181	0.2362	+0	-19
0.2362	0.3937	+0	-23
0.3937	0.7087	+0	-28
0.7087	1.1811	+0	-33
1.1811	1.9685	+0	-39
1.9685	3.1496	+0	-47
3.1496	4.7244	+0	-55
4.7244	7.0866	+0	-63

BASIC ASSEMBLY OUTSIDE DIAMETER D_c AND/OR WASHER OUTSIDE DIAMETER d_1		HOUSING BORE D_b FOR NT ASSEMBLY AND/OR NTW WASHER
		ALLOWABLE DEVIATION FROM D_c AND/OR d_1
OVER	INCL	MINIMUM
0.7087	1.1811	+4
1.1811	1.9685	+4
1.9685	3.1496	+4
3.1496	4.7244	+4
4.7244	7.0866	+4
7.0866	9.8425	+4

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The standard in this booklet is one of more than 10,000 standards approved to date by the American National Standards Institute.

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Each standard represents general agreement among maker, seller, and user groups as to the best current practice with regard to some specific problem. Thus the completed standards cut across the whole fabric of production, distribution, and consumption of goods and services. American National Standards, by reason of Institute procedures, reflect a national consensus of manufacturers, consumers, and scientific, technical, and professional organizations, and governmental agencies. The completed standards are used widely by industry and commerce and often by municipal, state, and federal governments.

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