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## Addendum 3

**6.2.2: First paragraph shall be changed to the following:**

The manufacturer's written specified requirements for metallic materials for bodies, bonnets, end and outlet connectors, stems, valve bore sealing mechanisms, mandrel hangers, and ring gaskets shall define the following, along with accept/reject criteria:

**Table 17: The table content shall be changed to the following:**

Temperature Class	P, S, T, U	K, L
Impact testing of studs, bolts, and screws required	No <sup>a</sup>	Yes
Acceptable ASTM bolting standards and grades for studs, bolts, and screws	A193/A193M GR. B7	A320/A320M GR. L7
	A320/A320M GR. L7	A320/A320M GR. L43
	A320/A320M GR. L43	A320/A320M GR. L7M
	A193/A193M GR. B7M	A453/A453M GR. 660D <sup>c</sup>
	A320/A320M GR. L7M	CRA <sup>d</sup>
	A453/A453M GR. 660D	—
	CRA	—
Acceptable ASTM standards and grades for nuts <sup>b</sup>	ASTM A194/A194M	ASTM A194/A194M
	GR. 2H, 2HM, 7, 7M	GR. 2H, 2HM, 7, 7M
<b>FOOTNOTES</b>  a Impact testing is required for all studs, bolts, and screws larger than 2.50 in. thread size regardless of temperature rating. b Impact testing is not required for nuts. c Impact testing is not required for A453/A453M GR. 660D d Impact testing per API 6ACRA		

**10.4.2.4.1: The section shall be renumbered to the following:**

The requirements of 10.4.1.4 shall apply.

Additionally, the requirements of 10.4.2.4 shall apply to PSL 1, PSL 2, PSL 3, and PSL 4, except as noted in the following.

- a) For PSL 1, bodies, bonnets, end and outlet connectors, stems, loose connectors and clamp hub end connectors with 13.8 MPa, 20.7 MPa, and 34.5 MPa (2000 psi, 3000 psi, and 5000 psi) working pressure, sampling shall be in accordance with ISO 2859-1:1999, level II, 4.0 AQL (acceptance quality limit), with the following exception. For DD, EE, FF, and HH material class equipment, each pressure-containing or pressure-controlling part shall be individually hardness tested.
- b) For PSL 2, PSL 3, and PSL 4, all parts shall be hardness tested.

NOTE 1 This additional requirement does not apply to PSL 1.

- c) For PSL 3 and PSL 4, additionally one hardness test shall be performed on each finished part (body, bonnet, and end connectors) with additional tests on each end connector face. When it is not possible to hardness test the end connector face, the hardness test shall be performed on the nearest accessible surface.

NOTE 2 Where multiple end connector faces are located on the same finished machined surface, a single hardness punch may be used to represent all end connectors.

NOTE 3 This additional requirement does not apply to PSL 1 and PSL 2.

If bodies, end and outlet connectors, and clamp hub ends have different material designations, each part shall be tested.

**10.4.5.4: The following content shall be deleted:**

Dimensional inspection shall be performed on ring gaskets and nonintegral metal seals manufactured according to this specification.

Sampling shall be in accordance with the manufacturer's documented requirements.

The manufacturer's documented procedures shall be followed.

Acceptance criteria for ring gaskets shall be in accordance with 14.2.2.1. Nonintegral metal seals shall be in accordance with the manufacturer's documented requirements.

**10.4.5.4.1: The following section shall be added:**

**10.4.5.4.1 Nonintegral Metal Seals**

Dimensional inspection shall be performed on nonintegral metal seals manufactured according to this specification.

Sampling shall be in accordance with the manufacturer's documented requirements.

The manufacturer's documented procedures shall be followed.

Acceptance criteria shall be in accordance with the manufacturer's documented requirements.

**10.4.5.4.2: The following section shall be added:**

**10.4.5.4.2 Ring Gaskets**

Dimensional inspection shall be performed on ring gaskets manufactured according to this specification.

**10.4.5.4.2.1: The following section shall be added:**

**10.4.5.4.2.1 Inspection Method (BX 151 through BX 156, BX 169, R and RX gaskets)**

The inspection method for BX 151 through BX 156, BX 169, R and RX gaskets shall be as follows:

Sampling for ring gaskets shall be in accordance with ISO 2859-1:1999, level II, 1.5 AQL.

The manufacturer's documented inspection procedures shall be followed.

Acceptance criteria shall be in accordance with 14.2.2.1.

**10.4.5.4.2.2: The following section shall be added:**

**10.4.5.4.2.2 Inspection Method (BX 157 through BX 303, excluding BX 169)**

The inspection method for BX 157 through BX 303, excluding BX 169 gaskets shall be as follows:

Sampling for ring gaskets shall be in accordance with ISO 2859-1:1999, level II, 1.0 AQL.

All gaskets shall be finished and measured in the free state. All measured surfaces shall be clean and ungreased.

NOTE 1 - Gaskets may be inspected in the uncoated condition.

Measured dimensions shall conform with dimensional tables D.12 / E.12 (Type BX Ring Gaskets) as applicable.

The manufacturer's documented procedures shall be followed for dimensional inspection and shall include provisions for inspection record retention.

Sealing angle - The 23 degree angles shall be measured using a validated inspection method.

NOTE 2 - Validated inspection methods may employ the use of a CMM, a calibrated inspection gauge or optical device.

Ovality of the BX gasket shall be inspected according to the following method:

(1) Measure the Outer Ring Diameter ( $\varnothing$  OD Table D.12/E.12) at a minimum of 4 equidistant diameter locations using a validated inspection procedure. See Table D.12 / E.12 for inspection locations.

NOTE 3 - Additional inspection locations not shown in Table D.12 / E.12 may be used.

(2) Average the OD dimensions obtained.

(3) Calculate the ovality of the ring by subtracting the smallest OD dimension from the largest OD dimension obtained in step (1).

Cross-section and height of BX gaskets shall be inspected by measuring the Ring width (A) and Ring Height (H) at a minimum of 4 equidistant locations.

**10.4.5.4.2.3: The following section shall be added:**

**10.4.5.4.2.3 Acceptance Criteria**

- The variance in width (A) or height (H) shall not exceed 0.10 mm (0.004 in.) at any measured location.
- The average OD shall be within the tolerance specified in Table D.12/E.12.
- The OD ovality shall not exceed 0.2% of the nominal ring diameter.

**10.4.5.6: The section shall be changed to the following:**

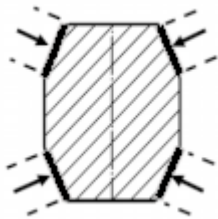
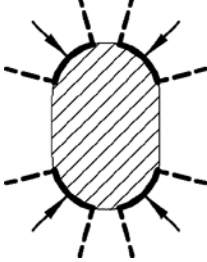
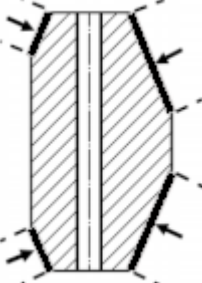
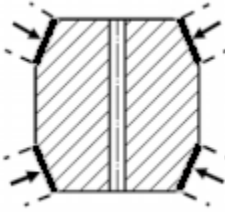
The manufacturer's documented procedures, including the sampling criteria, shall be followed.

The sealing surfaces of ring gaskets as illustrated in Table 28 shall have a surface finish as specified in Annex D and Annex E.

For nonintegral metal seals, the acceptance criteria shall be per the manufacturer's documented requirements.

**Table 28: The table title and content shall be changed to the following:**

**Table 28 – Sealing Surface Locations for Ring Gaskets**

Gasket Type	R (Octagonal)	R (Oval)	RX	BX
Sealing Surface Locations				
<p>Note 1: See Annex D.9 &amp; E.9, D.10 &amp; E.10, D.12 &amp; E.12 for surface finish requirements</p> <p>Note 2: Highlighted dark heavy lines and arrows identify the sealing surfaces subject to visual inspection</p>				

**10.4.5.7: The following section shall be added:**

#### **10.4.5.7 Visual Inspection – Ring Gaskets**

Visual inspection shall be performed on ring gaskets manufactured according to this specification.

All ring gaskets shall be visually inspected.

No visible surface defects are permitted on the sealing surface as identified in Table 28.

**10.4.5.8: The following section shall be added:**

#### **10.4.5.8 Traceability – Ring Gaskets**

Traceability for ring gaskets shall conform with Section 10.4.2.8, PSL 3.

**13.5: The section shall be changed to the following:**

The packaging shall provide protection during handling, storage and shipping. Ring gaskets shall be individually wrapped or boxed. Ring gaskets with outside diameter greater than 14" shall be shipped and stored horizontally (flat).

**14.2.3.1.2: The section shall be changed to the following:**

When used, coating and plating thicknesses shall be 0.013 mm (0.0005 in.) maximum.

NOTE Coatings and plating may be employed to aid the seal engagement while minimizing galling and to extend shelf life.

**14.2.3.3.1: The section title and content shall be changed to the following:**

**14.2.3.3.1 Melting, Casting, Hot Working and Welding**

The following requirements shall apply.

- a) Melting practices: The manufacturer shall select and specify the melting practice(s) used to fabricate ring gaskets. The melt shop shall use practices that produce homogeneous material, free from cracks, banding, piping, and flakes.
- b) Casting practices: Centrifugal casting shall be the only acceptable method of casting ring gaskets.
- c) Hot working practices: Wrought materials shall be hot worked throughout. Ring gaskets may be made from pierced tubing or pipe, rolled rings, or rolled and welded bar or plate.

For welded gaskets, the manufacturer's documented fabrication and weld procedures shall be followed.

**14.2.3.3.2: The section shall be changed to the following:**

All heat-treating of parts shall be performed with equipment meeting the requirements of 6.5.

Heat-treatment operations shall be in accordance with the manufacturer's written specification.

Ring gaskets manufactured from soft iron or carbon or low alloy steel shall be either normalized or annealed as the last stage of material processing prior to final machining, depending on the material grade.

Ring gaskets manufactured from 304 stainless steel, 316 stainless steel, nickel alloy UNS N08825 or other CRA materials with an austenitic microstructure shall be solution annealed and quenched to maintain the required microstructure as the last stage of material processing prior to final machining. The applicable ASTM standards or manufacturer's specification shall be followed for heat treatment. Transfer time shall be specified in the procedure.

NOTE: See API 6HT for guidance on transfer time.

**14.2.3.3.3: The section shall be changed to the following:**

The chemical composition of soft iron, carbon steel, or low alloy steel ring gaskets shall be as described in the manufacturer's written specification.

The chemical composition of 304 stainless steel, 316 stainless steel, UNS N08825 or other CRA material ring gaskets shall be analyzed and meet the chemical composition of the corresponding UNS number.

For stainless steel and CRA materials manufactured by the centrifugal casting method, a process validation applicable only to a specific manufacturing process, for a sample heat for each specific material shall be performed and documented. The coupons for chemical analysis shall be taken from a prolongation of the centrifugally cast tube after stock removal. The analysis shall be performed at the OD and ID of the ring gaskets. The chemical composition at the gasket od and id dimension shall meet the applicable UNS with the applicable ASTM chemistry product tolerances. Revalidation shall be required for any changes in process controls.

**Table 39: The table shall be changed to the following:**

Marking Requirement	Marking	Location
Date of manufacture	(Month/Year)	Outside diameter of gasket
Traceability to heat, heat treat lot & job lot	Traceability Code(s)	Outside diameter of gasket
Manufacturer's name or mark	PMR	Outside diameter of gasket
Ring gasket type and number	Example: "BX 155"	Outside diameter of gasket
Ring gasket manufacturing method (Wrought (F), Cast (C) or Welded (W))	F	Outside diameter of gasket, following gasket material code, with or without a dash
	C	
	W	
Ring gasket material code:		Outside diameter of gasket, following gasket type and number, with or without a dash  Examples: "R 24-D-W" "RX 39 316-F" "BX 169-825-C"
Soft iron	D	
Carbon or low-alloy steel	S	
304 Stainless steel	304	
316 Stainless steel	316	
Nickel alloy UNS N08825	825	
Other CRA materials	(UNS number)	

**15.2.3: The section shall be changed to the following:**

For Ring Gaskets, the following material test records shall be maintained:

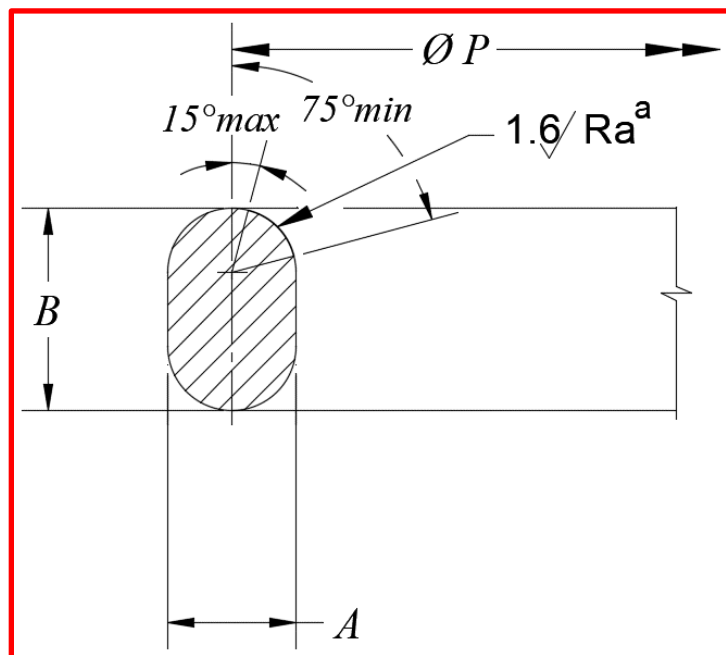
- chemical analysis / heat number;
- hardness test;
- job lot traceability

For Nonintegral Metal Seals, no records required

**Section B.7: The section shall be changed to the following:**

When fire resistance qualification of equipment in this specification is required, qualification in accordance with API 6FA (for valves) or API 6FB (for OECs) should be specified or as agreed to between the manufacturer and the purchaser.

**Table D.9: Change b) Oval gasket style to the following:**

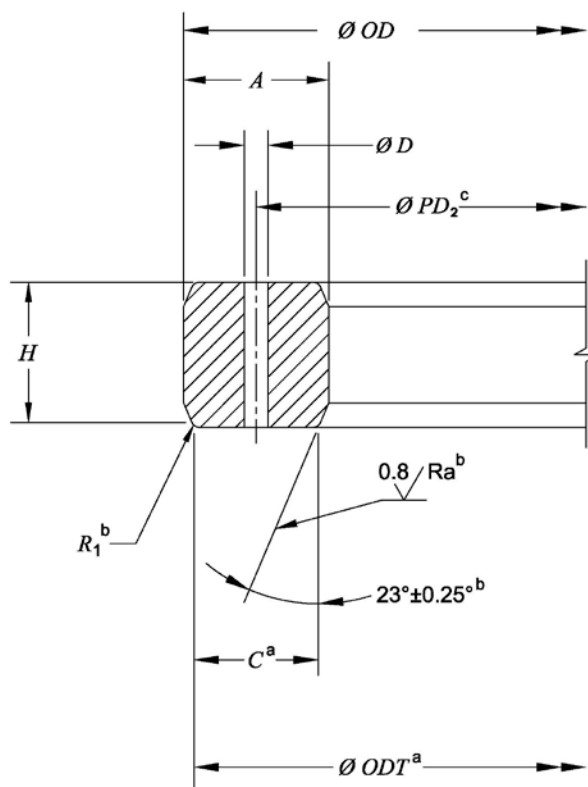




**Table D.12: The table shall be changed to the following:**

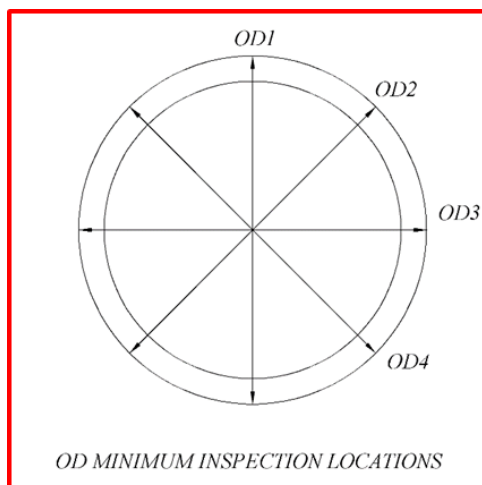
**Table D.12—Type BX Ring Gaskets**

Dimensions in millimeters; surface roughness in micrometers



#### FOOTNOTES

- <sup>a</sup> Typical two places (top and bottom).
- <sup>b</sup> Typical four places (all corners).
- <sup>c</sup> Reference dimension (see Table D.11 for value).



**Table D.12—Type BX Ring Gaskets** *(continued)*

Dimensions in millimeters unless noted otherwise

Groove Number	Outside Diameter <sup>b</sup>	Width of Ring <sup>a</sup>	Height of Ring <sup>a</sup>	Diameter of Flat	Width of Flat	Hole Size	Radius on Ring	
	<i>OD</i>	<i>A</i>	<i>H</i>	<i>ODT</i>	<i>C</i>	<i>D</i>	<i>R</i> <sub>1</sub>	
Tolerance>	+0/-0.15	+0.20/-0	+0.20/-0	± 0.05	+0.15/-0	± 0.5	min.	max.
BX 151	76.40	9.63	9.63	75.03	8.26	1.6	0.8	1.2
BX 152	84.68	10.24	10.24	83.24	8.79	1.6	0.8	1.2
BX 153	100.94	11.38	11.38	99.31	9.78	1.6	0.9	1.4
BX 154	116.84	12.40	12.40	115.09	10.64	1.6	1.0	1.5
BX 155	147.96	14.22	14.22	145.95	12.22	1.6	1.1	1.7
BX 156	237.92	18.62	18.62	235.28	15.98	3.2	1.5	2.2
BX 157	294.46	20.98	20.98	291.49	18.01	3.2	1.7	2.5
BX 158	352.04	23.14	23.14	348.77	19.86	3.2	1.9	2.8
BX 159	426.72	25.70	25.70	423.09	22.07	3.2	2.1	3.1
BX 160	402.59	13.74	23.83	399.21	10.36	3.2	1.9	2.9
BX 161	491.41	16.21	28.07	487.45	12.24	3.2	2.2	3.4
BX 162	475.49	14.22	14.22	473.48	12.22	1.6	1.1	1.7
BX 163	556.16	17.37	30.10	551.89	13.11	3.2	2.4	3.6
BX 164	570.56	24.59	30.10	566.29	20.32	3.2	2.4	3.6
BX 165	624.71	18.49	32.03	620.19	13.97	3.2	2.6	3.8
BX 166	640.03	26.14	32.03	635.51	21.62	3.2	2.6	3.8
BX 167	759.36	13.11	35.87	754.28	8.03	1.6	2.9	4.3
BX 168	765.25	16.05	35.87	760.17	10.97	1.6	2.9	4.3
BX 169	173.51	12.93	15.85	171.27	10.69	1.6	1.3	1.9
BX 170	218.03	14.22	14.22	216.03	12.22	1.6	1.1	1.7
BX 171	267.44	14.22	14.22	265.43	12.22	1.6	1.1	1.7
BX 172	333.07	14.22	14.22	331.06	12.22	1.6	1.1	1.7
BX 303	852.75	16.97	37.95	847.37	11.61	1.6	3.0	4.6

**FOOTNOTE**

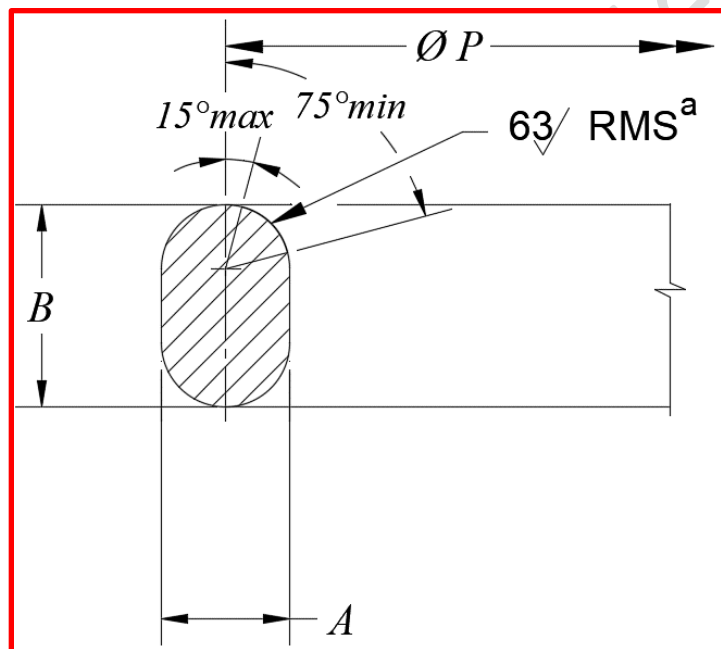
<sup>a</sup> The variation of width *A* or height *H* of any ring shall not exceed 0.10 mm throughout its entire circumference.

<sup>b</sup> The requirements of 10.4.5.4.2.2 and 10.4.5.4.2.3 shall apply.

**Table E.6: The table shall be changed as shown:**

Nominal Size of Flange	Radius of Hub  <i>R</i>	Bolt Circle  <i>BC</i>	Number of Bolts  <i>N</i>	Bolt Size and TPI	Bolt Holes  <i>BH</i>		Blind Flange		Ring Groove
							C'bore Depth  <i>E</i>	Hub Height  <i>J<sub>4</sub></i>	
Tolerance	± 0.06	See figure for GDT		(Ref.)	Diameter	Tolerance	max.	min.	
1 <sup>13</sup> / <sub>16</sub>	0.38	8.00	8	1-8	1.12	+0.06/−0.02	—	—	BX 151
2 <sup>1</sup> / <sub>16</sub>	0.38	9.06	8	1 <sup>1</sup> / <sub>8</sub> -8	1.25	+0.06/−0.02	—	—	BX 152
2 <sup>9</sup> / <sub>16</sub>	0.38	10.31	8	1 <sup>1</sup> / <sub>4</sub> -8	1.38	+0.06/−0.02	—	—	BX 153
3 <sup>1</sup> / <sub>16</sub>	0.38	11.31	8	1 <sup>3</sup> / <sub>8</sub> -8	1.50	+0.06/−0.02	—	—	BX 154
4 <sup>1</sup> / <sub>16</sub>	0.38	14.06	8	1 <sup>3</sup> / <sub>4</sub> -8	1.88	+0.09/−0.02	—	—	BX 155
7 <sup>1</sup> / <sub>16</sub>	0.62	21.81	16	2-8	2.12	+0.09/−0.02	0.438	0.31	BX 156
9	1.00	27.00	16	2 <sup>1</sup> / <sub>2</sub> -8	2.62	+0.09/−0.02	0.500	0.25	BX 157
11	1.00	29.50	16	2 <sup>3</sup> / <sub>4</sub> -8	2.88	+0.09/−0.02	0.562	0.50	BX 158
13 <sup>5</sup> / <sub>8</sub>	1.00	40.00	20	3-8	3.12	+0.12/−0.02	0.625	0.56	BX 159

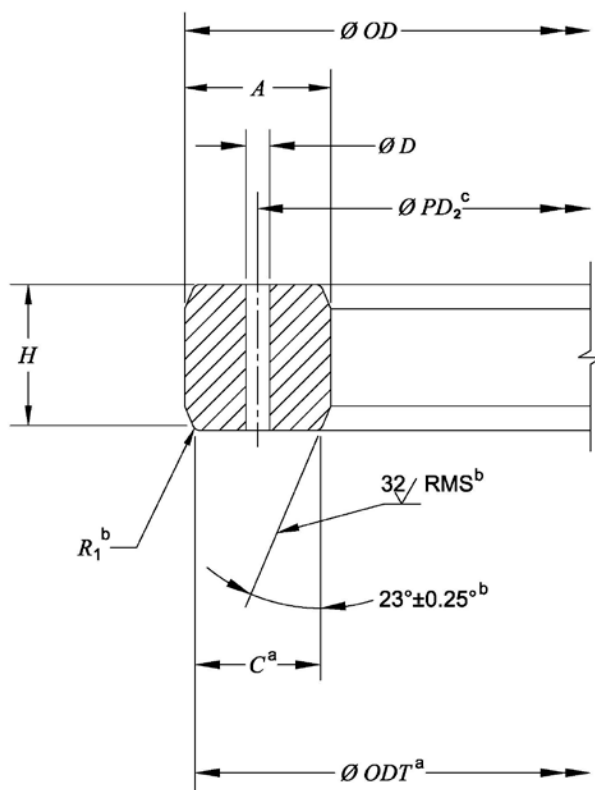
**Table E.9: Change b) Oval gasket style to the following:**



**Table E.12: The table shall be changed to the following:**

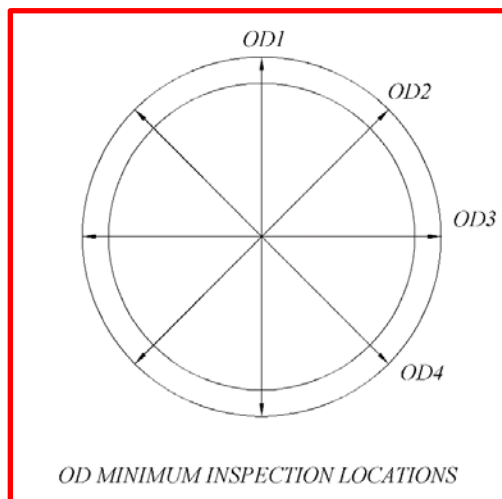
**Table E.12—Type BX Ring Gaskets**

Dimensions in inches; surface roughness in microinches



FOOTNOTES

- <sup>a</sup> Typical two places (top and bottom).
- <sup>b</sup> Typical four places (all corners).
- <sup>c</sup> Reference dimension (see Table E.11 for value).



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**FOOTNOTE**

a The variation in width  $A$  or height  $H$  of any ring shall not exceed 0.004 in. throughout its entire circumference.

b The requirements of 10.4.5.4.2.2 and 10.4.5.4.2.3 shall apply.