

# Votator® and Thermutator Mechanical Seals

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READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.





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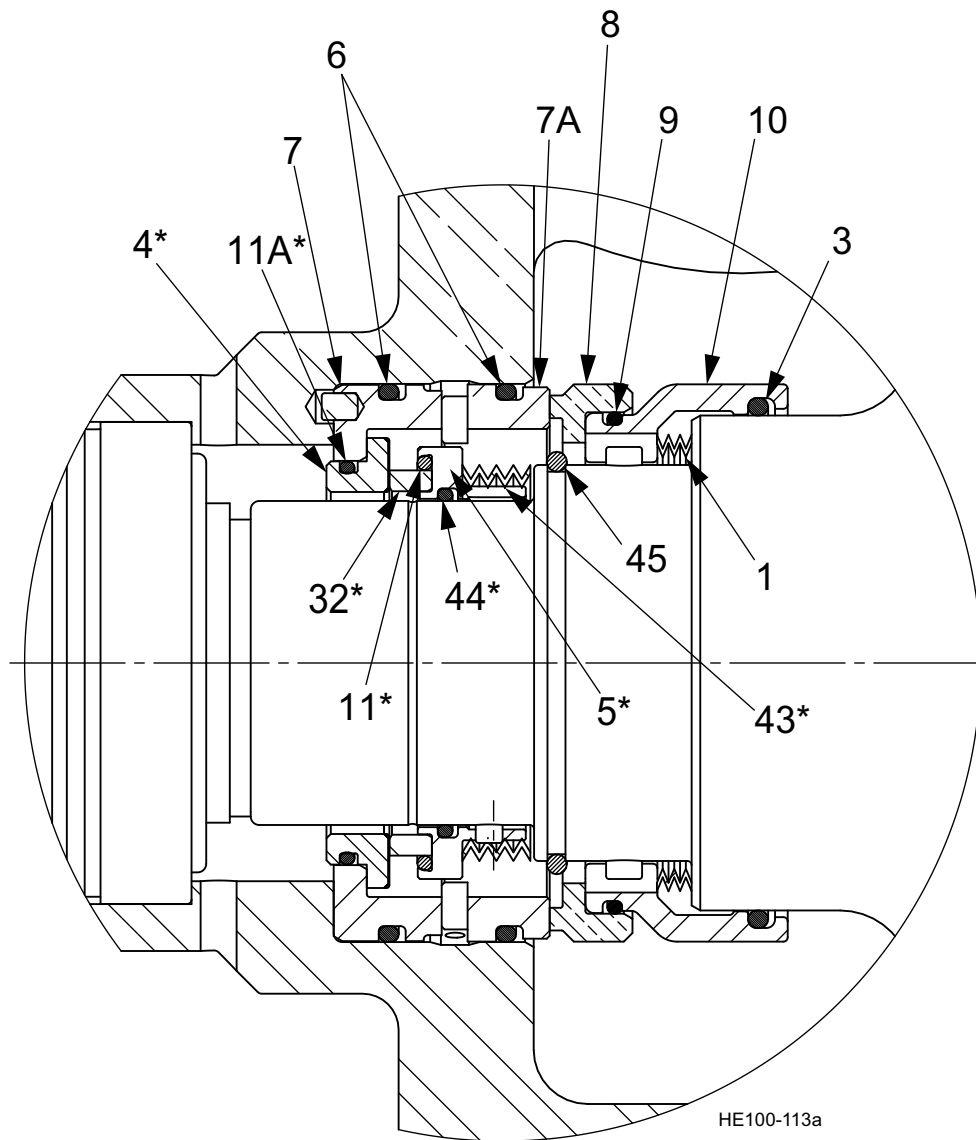
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<b>Mechanical Seals .....</b>	<b>2</b>
Votator® II 2012 Single and Double Mechanical Seal .....	3
2012 Mechanical Seal Design .....	4
2012 Primary/Secondary Seal Head Insert Removal and Installation .....	4
2005 Mechanical Seal Design .....	6
Double Mechanical Seal - Secondary .....	6
Single Mechanical Seal - Primary .....	6
Votator® II One-Piece Single & Double Mechanical Seal (2005-2012) .....	7
Votator® II Two-Piece Single & Double Mechanical Seal (2000-2004) .....	9
Votator® II Two-Piece Single Mechanical Seal (with flushing lip seal) (1997-2004) .....	11
Votator® II Two-Piece Single Mechanical Seal (Retrofit of the One-Piece Design - 2005) .....	13
Votator® II Two-Piece Double Mechanical Seal (Retrofit of the One-Piece Design - 2005) .....	15
Votator® Medium/Heavy Duty Single Mechanical Seal (1961-1997) .....	17
Votator® Extra Heavy Duty Single Mechanical Seal (1966-2004) .....	19
Votator® 5 Series Single Mechanical Seal (2014) .....	21
Votator® 5 Series Double Mechanical Seal (2014) .....	23
Votator® 4x120 Single Mechanical Seal .....	25
Thermutator Single Mechanical Seal .....	27
Thermutator Aseptic Flushing Seal .....	29
2012 Votator® II Seal Selection Chart .....	30
Two- and One-Piece Votator® II Seal Selection Chart .....	31
Seal Material Selection .....	32
Carbon .....	32
Ceramic .....	32
Silicon Carbide .....	32
Siliconized Graphite .....	33
Tungsten Carbide .....	33
Chrome Oxide .....	33

## Mechanical Seals

## Votator® II 2012 Single & Double Mechanical Seal (2012-Present)



\* Used on Double Mechanical Seal only.

**Votator® II 2012 Single and Double Mechanical Seal**

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Spring-VII Product Seal (Wavy Washer)	1	Standard	LL922313A
			Buna	N70237
3	O-ring	1	EPDM	E70237
			FKM	V70237-680
4*	Seal ring	1	Chrome oxide	LL934871
5*	Seal Body-VII Secondary	1		LL932357
			Buna	N70239
6	O-ring	2	EPDM	E70239
			FKM	V70239
7	Gland-VII Pinned Seal Seat	1	316LSS	129426+
			Ceramic	122986+
7A	Seat-Seal Head Insert	1	Silicon Carbide	122987+
			Tungsten Carbide	129988+
			Carbon	129059+
			Silicon Carbide	129061+
8	Seal Face-VII Rotary	1	Tungsten Carbide	129062+
			Tungsten Carbide (narrow face)	129402+
			Buna	N70152
9	O-ring	1	EPDM	E70152
			FKM	V70152
10	Seal Body-VII Positive Drive	1	Standard	128896+
			Buna	N70147
11*	O-ring	1	EPDM	E70147
			FKM	V70147
			Buna	N70146
11A*	O-ring	1	EPDM	E70146
			FKM	V70146
32*	Insert-Seal Body	1		LL934083
43*	Spring-VII Outer Seal (Wavy Washer)	1	Standard	LL932362
			Buna	N70140
44*	O-ring	1	EPDM	E70140
			FKM	V70140
			Buna	N70230
45	O-ring	1	EPDM	E70230
			FKM	V70230

**NOTE:** Seal face material options (items 7A and 8): Permissible material combinations are: Carbon/Ceramic; Carbon/Silicon Carbide; Silicon Carbide/Silicon Carbide; and Tungsten Carbide/Silicon Carbide.

**NOTE:** Items 4, 5, 11, 11A, 32, 43, and 44 are required when the seal must be flushed.

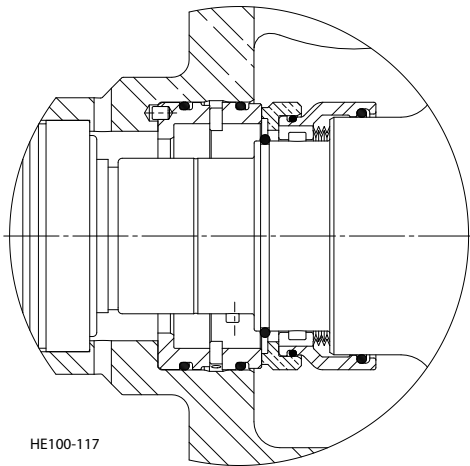
**NOTE:** Use ODE Head Installation Tool LL121191 to protect head insert when installing or removing the opposite drive end product head.

**NOTE:** Seal installation tool kit 135228+ can be used for inserting and removing the gland and seal. The small end is used for secondary seal installation and removal and removal of the gland and seat. The large end is used for gland and seal seat installation. See Figure 4 on page 4.

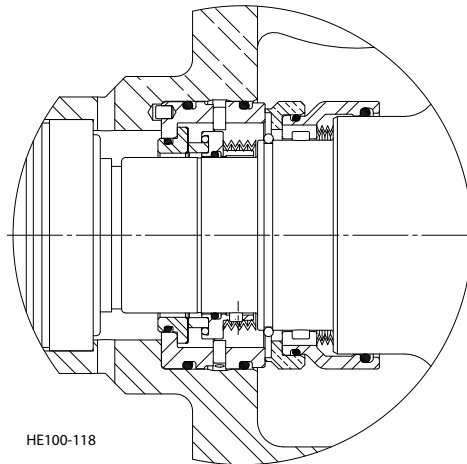
\* Used on Double Mechanical Seal only.

## 2012 Mechanical Seal Design

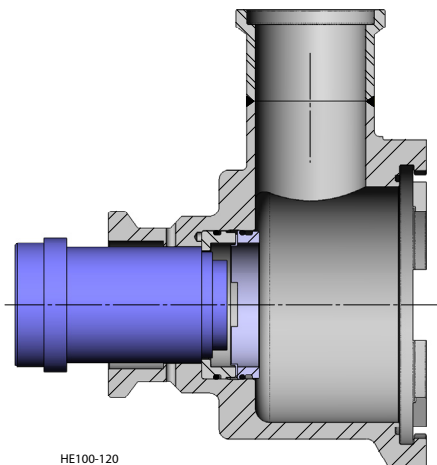
Standard units furnished starting in 2012 have removable rotary seal faces in solid carbon, silicon carbide, tungsten carbide, and narrow-face tungsten carbide materials. The stationary seal faces are made of solid ceramic or silicon carbide. Like the 2005 design, the 2012 single mechanical seal can be converted to a double mechanical seal by adding secondary components to contain a water or steam flush.



**Figure 1 - 2012 Single Mechanical Seal (Primary)**



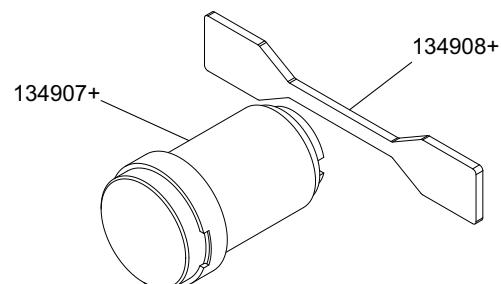
**Figure 2 - 2012 Double Mechanical Seal (Secondary) (shown with Narrow-Face Rotary)**



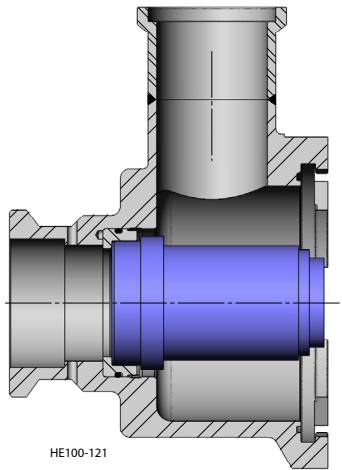
**Figure 3 - Gland and Seat Removal**

## 2012 Primary/Secondary Seal Head Insert Removal and Installation

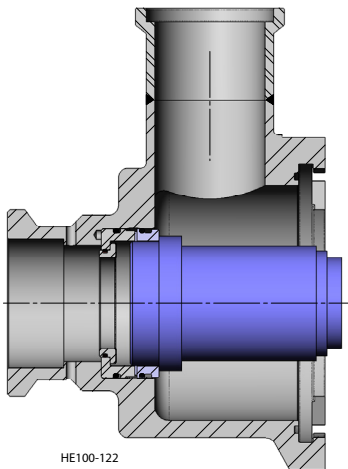
The primary seal head insert from 2012 onward has two parts, a gland and a seat, but is removed by pushing with the special Seal Installation/Removal tool. Part number 135228+ is a kit which includes the tool, part number 134907+; and handle, part number 134908+.



**Figure 4 - Seal Installation/Removal Tool kit 135228+**



**Figure 5 - Gland Installation**



**Figure 6 - Seal Installation**

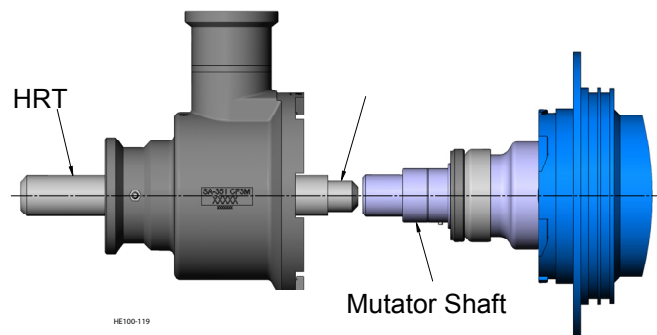
The gland contains the secondary seal head insert, if present, which is held in the primary by an O-ring. Make sure to hold the insert or use a soft cloth to catch it to prevent it from dropping when removed.

**NOTE:** To prevent damage to the seal face, do not place seal face down on any surface during maintenance.

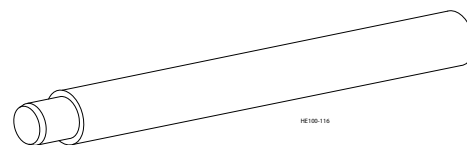
To install a new primary or secondary insert, lubricate all o-rings. Use the fit of the o-ring at the top of the head bore to verify that the inserts are correctly aligned in the bore. Make sure to align the anti-rotation pin with the hole in the bottom of the head bore.

Insert the stainless steel gland into the head, using the Seal Installation/Removal Tool with an even distribution of force. Then install the secondary insert into the gland. Finally, align the lugs on the stationary seal face with the spaces between the lugs on the gland, and insert until it meets the gland.

Insert HRT as shown in Figure 7 and slide the head and bearing off the shaft to protect the stationary seal face during disassembly.



**Figure 7 - Use of Head Removal Tool (HRT)**



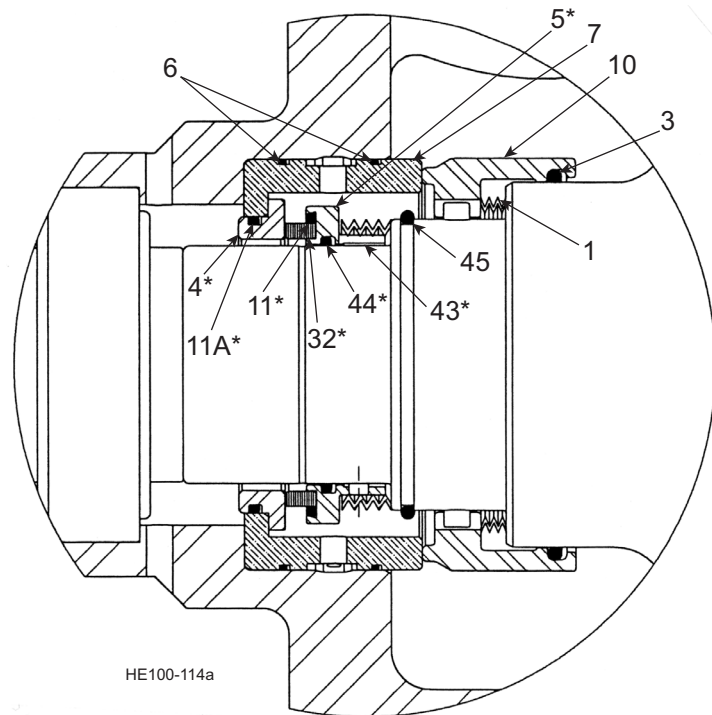
**Figure 8 - ODE Head Installation/Removal Tool LL121191**

## Votator® II One-Piece Single & Double Mechanical Seal (2005-2012)

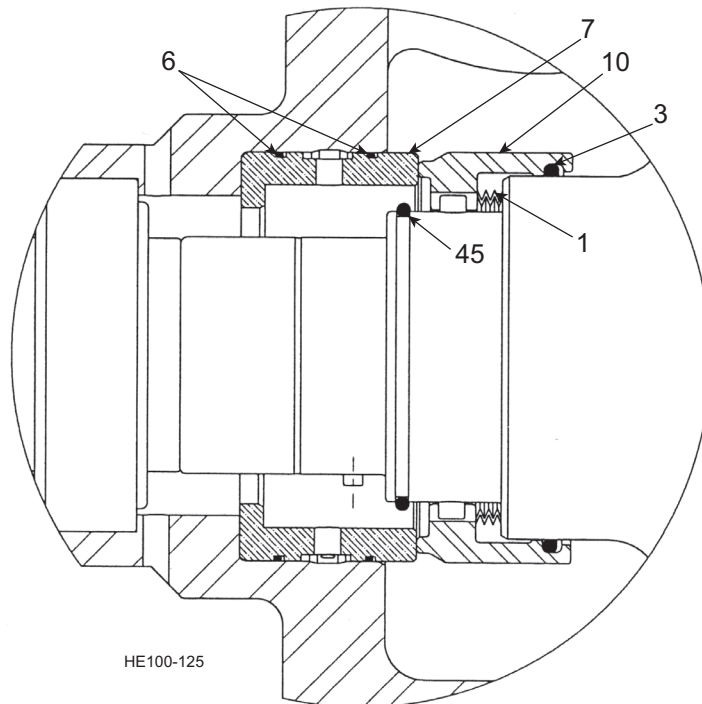
### 2005 Mechanical Seal Design

Units furnished between 2005 and 2012 have a one-piece chrome-oxide coated rotating body running against a stationary ceramic head insert. It can easily be converted to a double mechanical seal by adding secondary components to contain a steam or water flush.

### Double Mechanical Seal - Secondary



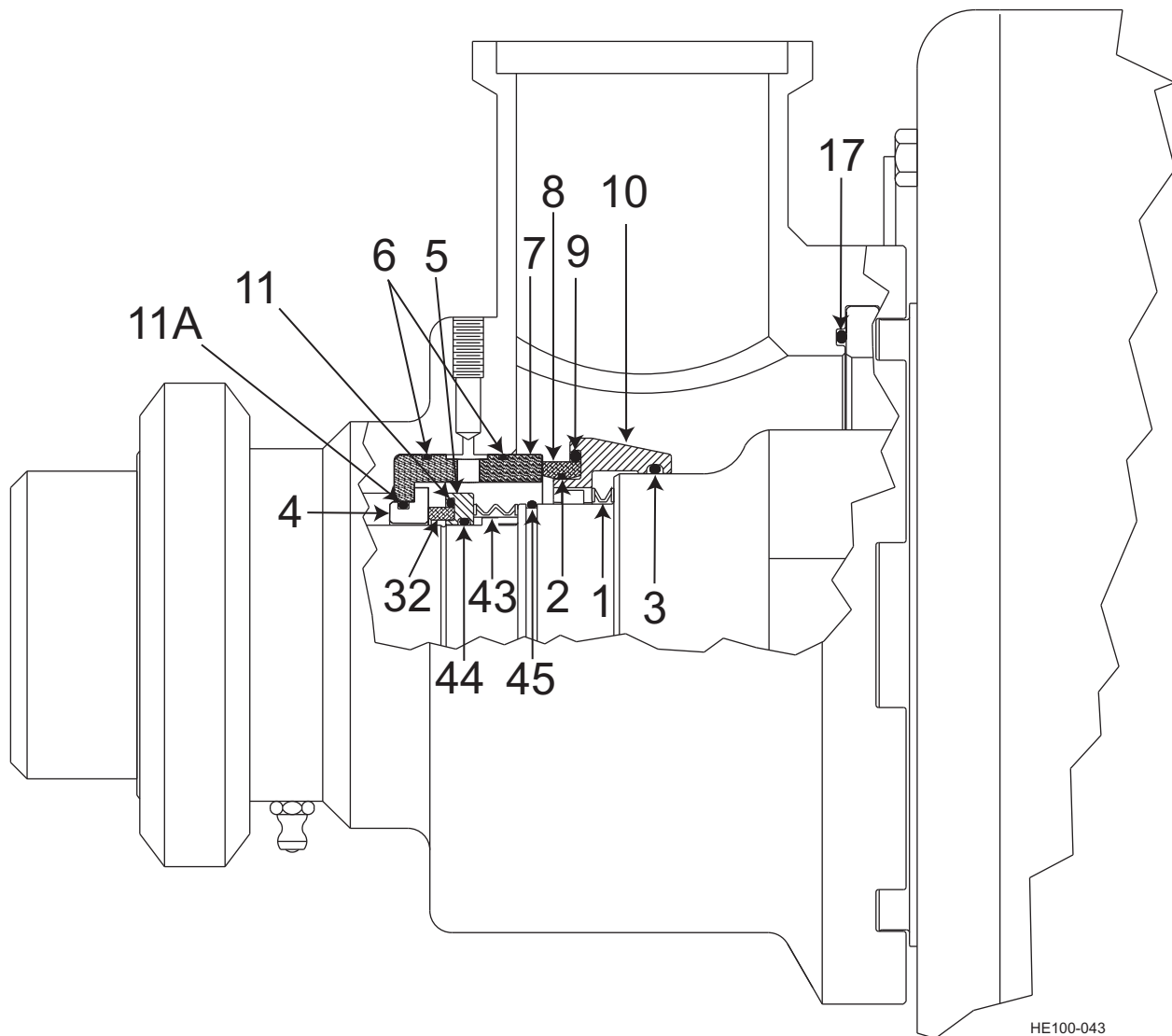
### Single Mechanical Seal - Primary



**Votator® II One-Piece Single & Double Mechanical Seal (2005-2012)**

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Wavy Washer (Primary)	1	Standard	LL922313
3	Seal Body O-ring (Primary)	1	Buna	N70237
			EPDM	E70237
			FKM	V70237-680
4*	Seal Ring (Secondary), if required	1	All	LL934871
5*	Seal Body (Secondary), if required	1	All	LL932357
6	Seal Head Insert O-ring (Primary)	2	Buna	N70044
			EPDM	E70044
			FKM	V70044-680
7	Seal Head Insert (Primary)	1	Ceramic	LL934873
10	One Piece Seal Body (Primary)	1	Chrome Oxide/316SS	LL122411
11*	Seal Ring/Body O-ring (Secondary)	1	Buna	N70147
			EPDM	E70147
			FKM	V70147
11A*	Seal Ring/Body O-ring (Secondary)	1	Buna	N70146
			EPDM	E70146
			FKM	V70146
17	Product Head O-ring	2 per cyl	Buna	N70259
			EPDM	E70259
			FKM	V70259-680
32*	Seal Body Insert (Secondary)	1	All	LL934083
43*	Wavy Washer (Secondary)	1	All	LL932362
44*	Seal Body O-ring (I.D. Secondary)	1	Buna	N70140
			FKM	V70140
			EPDM	E70140
45	Seal Keeper O-ring (Primary)	1	Buna	N70230
			FKM	V70230
			EPDM	E70230

**NOTE:** Use ODE Head Installation Tool LL121191 to protect head insert when installing or removing the opposite drive end product head.

**Votator® II Two-Piece Single & Double Mechanical Seal (2000-2004)**

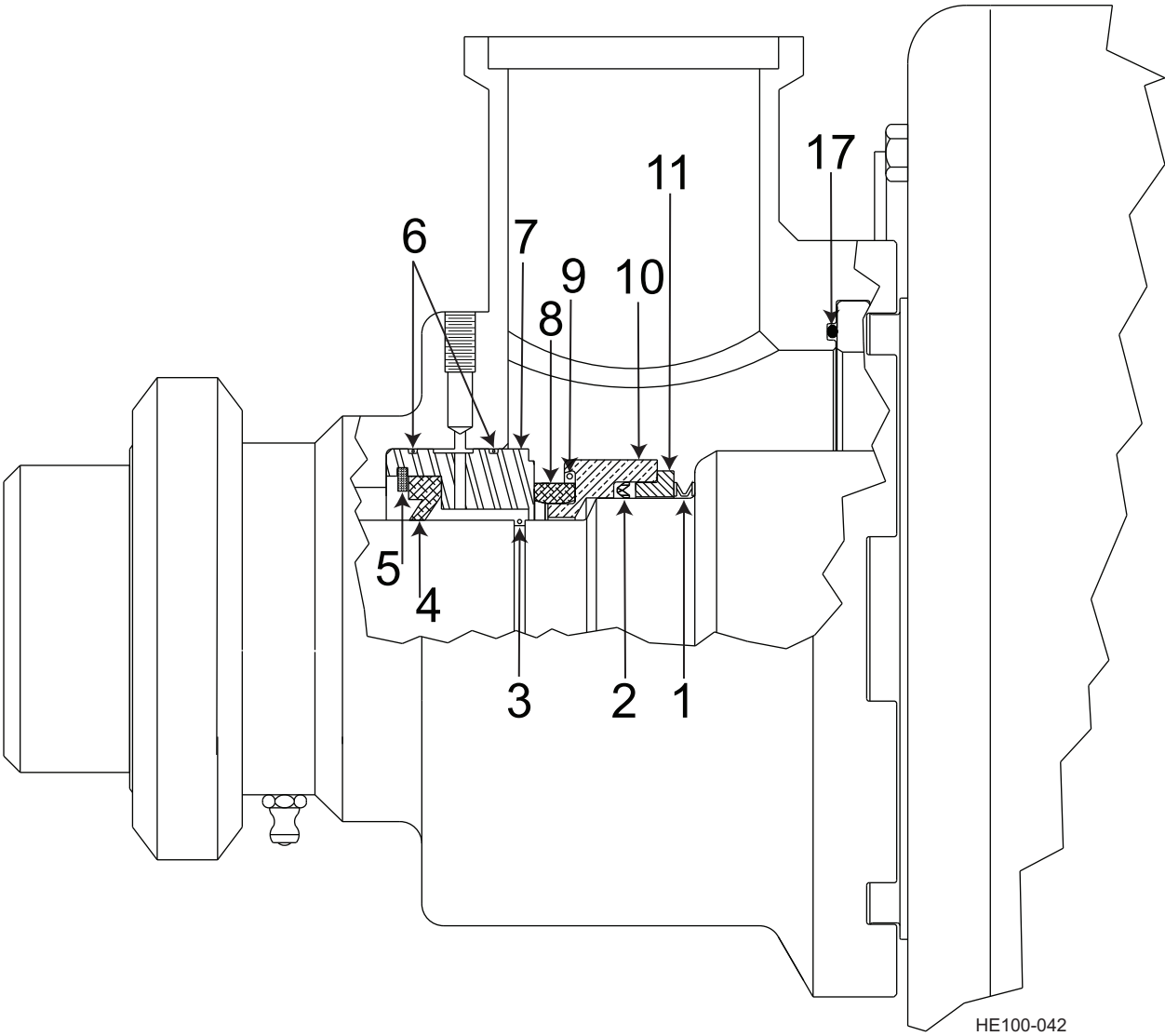
This is the standard mechanical seal for most Votator IIs manufactured between 2000 and 2004. The primary seal body is positioned on the 2.75-inch stub ends on the mutator. If the unit has a double mechanical seal, including secondary items 4, 5, 11, 11A, 32, 43, and 44, the secondary seal body (Item 5) is positioned on the 2.25-inch stub ends of the mutator.

An alternative seal available is the Ball-Lock Seal Design, which must be reviewed by Application Engineering.

**Votator® II Two-Piece Single & Double Mechanical Seal (2000-2004)**

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Wavy Washer (Primary)	1	Standard	LL922313
2	Seal Body Insert O-ring (I.D. Primary)	1	Buna	N70042-674
			EPDM	E70042
3	Seal Body O-ring (Primary)	1	Buna	N70237
			EPDM	E70237
			FKM	V70237-680
4	Seal Ring (Secondary), if required	1	All	LL934871
5	Seal Body (Secondary), if required	1	All	LL932357
6	Seal Head Insert O-ring (Primary)	2	Buna	N70044
			EPDM	E70044
			FKM	V70044-680
7	Seal Head Insert (Primary)	1	Ceramic	LL934873
8	Seal Body Insert (Primary)	1	Carbon	LL932351
			Siliconized Graphite	LL932352
			Ceramic	LL934332
9	Seal Body Insert O-ring (O.D. Primary)	1	Buna	N70240
			EPDM	E70240
			FKM	V70240-680
10	Seal Body (Primary)	1	All	LL932358
11	Seal Ring/Body O-ring (Secondary)	1	Buna	N70147
			EPDM	E70147
			FKM	V70147
11A	O-ring	1	Buna	N70146
			EPDM	E70146
			FKM	V70146
17	Product Head O-ring	2 per cyl	Buna	N70259
			EPDM	E70260
			FKM	V70260-680
32	Seal Body Insert (Secondary)	1	All	LL934083
43	Wavy Washer (Secondary)	1	All	LL932362
44	Seal Body O-ring (I.D. Secondary)	1	Buna	N70140
			EPDM	E70140
			FKM	V70140
45	Seal Keeper O-ring (Primary)	1	Buna	N70230
			EPDM	E70230
			FKM	V70230

**Votator® II Two-Piece Single Mechanical Seal (with flushing lip seal)  
(1997-2004)**

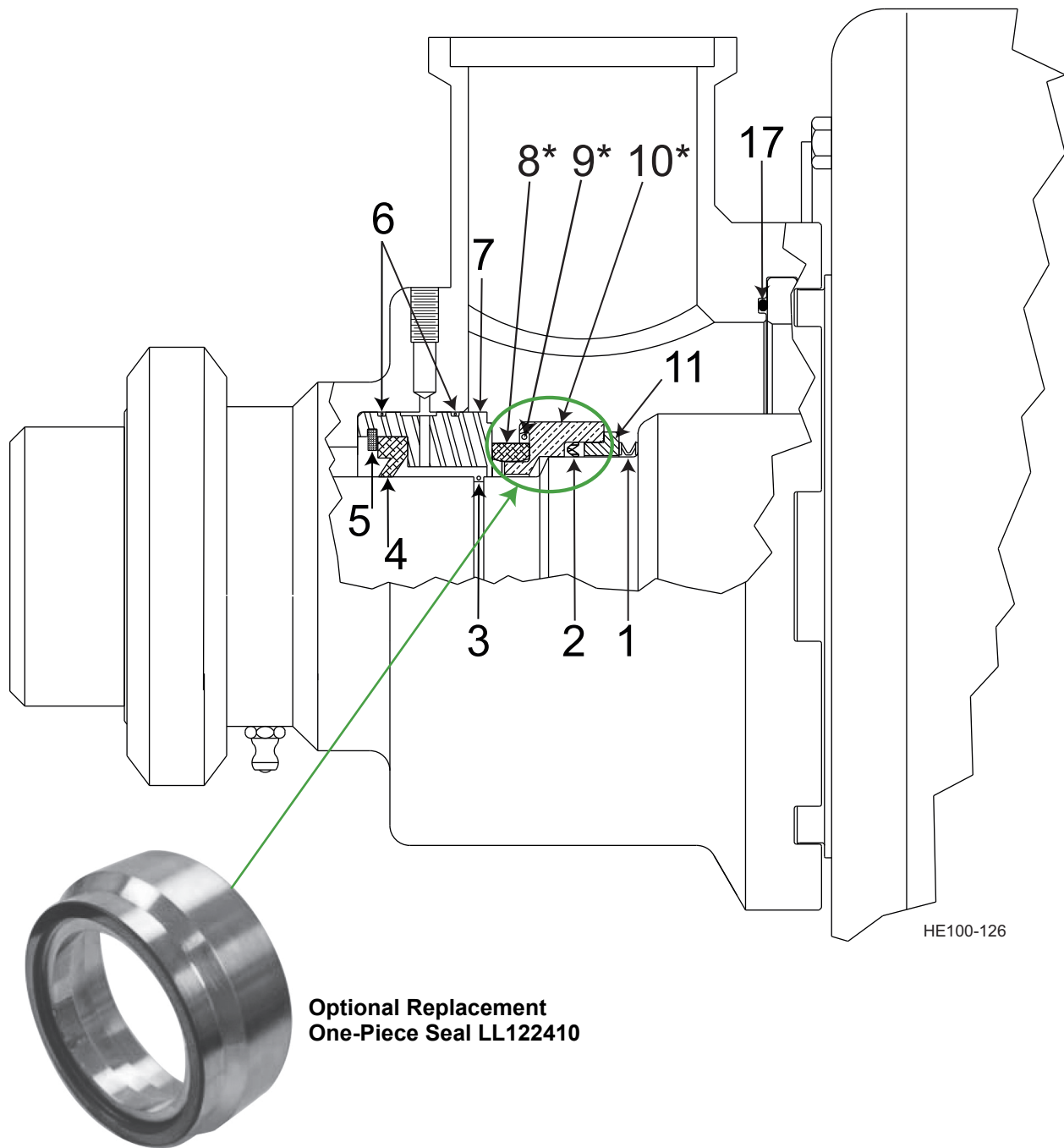


## Votator® II Two-Piece Single Mechanical Seal (with flushing lip seal) (1997-2004)

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Wavy Washer	1	Standard	LL922313
			Particulate Option	LL19625A
2	Seal Body U-cup	1	Buna	LL700014A05
			EPDM	LL700014A03
			FKM	LL700014A08
3	Seal Keeper O-ring	1	Buna	N70226
			EPDM	E70226
			FKM	V70226-680
4	Flushing Lip Seal	1	All	LL925472
5	Retaining Ring	1	All	LL930685
6	Seal Head Insert O-ring	2	Buna	N70044
			EPDM	E70044
			FKM	V70044-680
7	Seal Head Insert	1	Chrome Oxide/316 SS	LL923210
			Ceramic	LL928508
			Carbon	LL110892A4
8	Seal Body Insert	1	Siliconized Graphite	LL929270
			Ceramic	LL110892C1
			Pin Option (Ceramic)	LL934610
9	Seal Body Insert O-ring	1	Buna	N70235
			EPDM	E70235
			FKM	V70235-680
10	Seal Body	1	Standard	LL110893A
			Pin Option	LL927352
11	Seal Back Up Ring	1	Standard	LL110203CI
17	Product Head O-ring	2 per cyl	Buna	N70259
			EPDM	E70259
			FKM	V70259-680

**NOTE:** Use ODE Head Installation Tool LL121191 to protect head insert when installing or removing the opposite drive end product head.

**NOTE:** Items 4, 5, 11, 11A, 32, 43, and 44 are required when the seal must be flushed.

**Votator® II Two-Piece Single Mechanical Seal  
(Retrofit of the One-Piece Design - 2005)**

This is the standard rotating single mechanical seal for all Votator IIs manufactured between 1997 and 2004. The seal body is positioned on the 2.25-inch diameter stub ends of the mutator. This seal can be retrofitted to a one piece design by replacing items 8, 9, and 10 with a chrome oxide one piece body, p/n LL122410, and running it against a ceramic head insert, part number LL928508.

**Votator® II Two-Piece Single Mechanical Seal  
(Retrofit of the One-Piece Design - 2005)**

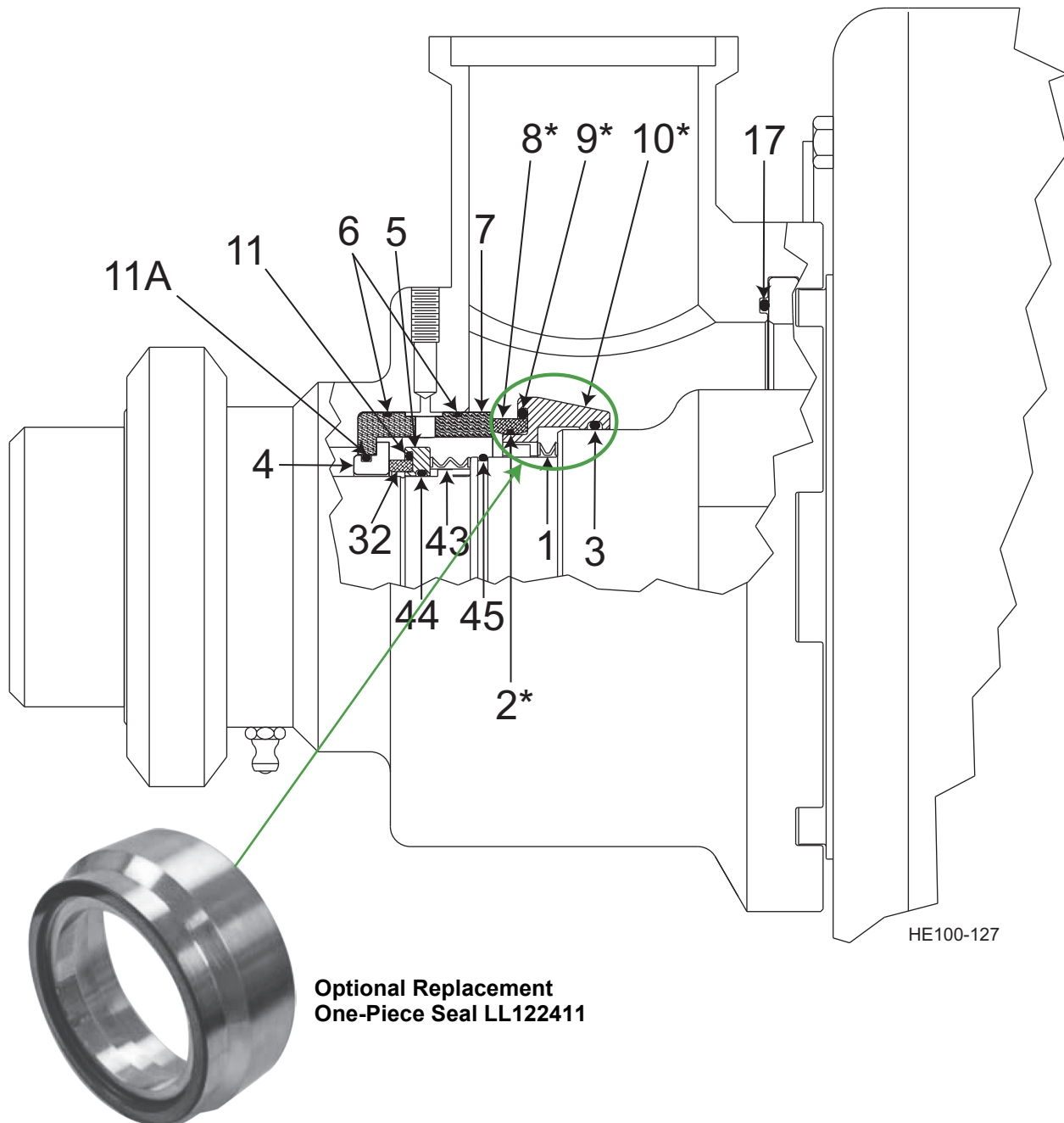
ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Wavy Washer	1	Standard	LL922313
			Particulate Option	LL19625A
2	Seal Body U-cup	1	Buna	LL700014A05
			EPDM	LL700014A03
			FKM	LL700014A08
3	Seal Keeper O-ring	1	Buna	N70226
			EPDM	E70226
			FKM	V70226-680
4	Flushing Lip Seal	1	All	LL925472
5	Retaining Ring	1	All	LL930685
6	Seal Head Insert O-ring	2	Buna	N70044
			EPDM	E70044
			FKM	V70044-680
7	Seal Head Insert	1	Chrome Oxide/316 SS	LL923210
			Ceramic	LL928508
8*	Seal Body Insert	1	Carbon	LL110892A4
			Siliconized Graphite	LL929270
			Ceramic	LL110892C1
			Pin Option (Ceramic)	LL934610
9*	Seal Body Insert O-ring	1	Buna	N70235
			EPDM	E70235
			FKM	V70235-680
10*	Seal Body	1	Standard	LL110893A
			Pin Option	LL927352
11	Seal Back Up Ring	1	Standard	LL110203CI
17	Product Head O-ring	2 per cyl	Buna	N70259
			EPDM	E70259
			FKM	V70259-680

**NOTE:** Use ODE Head Installation Tool LL121191 to protect head insert when installing or removing the opposite drive end product head.

**NOTE:** Items 4, 5, 11, 11A, 32, 43, and 44 are required when the seal must be flushed.

\* This seal can be retrofitted to a one piece design by replacing items 8, 9, and 10 with a chrome oxide one piece body, p/n LL122410

## Votator® II Two-Piece Double Mechanical Seal (Retrofit of the One-Piece Design - 2005)

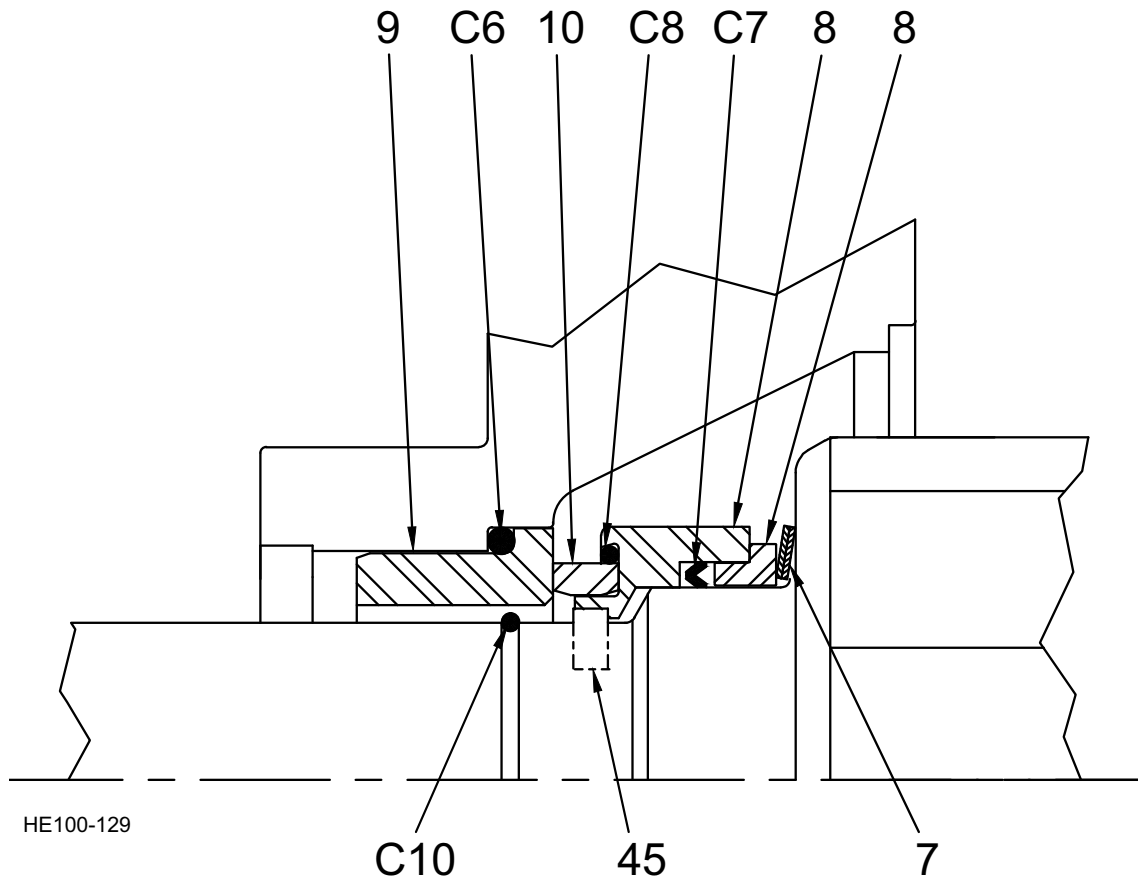


This is the standard double mechanical seal for all Votator IIs manufactured between 2000 and 2004. The primary seal body is positioned on the 2.75-inch diameter stub ends of the mutator and the secondary seal body (Item 5) is positioned on the 2.25-inch diameter stub ends. The two-piece primary seal body can be retrofitted to a one-piece design by replacing items 2, 8, 9, and 10 with a chrome oxide seal body, p/n LL122411 running against a ceramic head insert, p/n LL934873.

**Votator® II Two-Piece Double Mechanical Seal  
(Retrofit of the One-Piece Design - 2005)**

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
1	Wavy Washer (Primary)	1	Standard	LL922313
2*	Seal Body Insert O-ring (I.D. Primary)	1	Buna	N70042-674
			EPDM	E70042
			FKM	V70042
3	Seal Body O-ring (Primary)	1	Buna	N70237
			EPDM	E70237
			FKM	V70237-680
4	Seal Ring (Secondary)	1	All	LL934871
5	Seal Body (Secondary)	1	All	LL932357
6	Seal Head Insert O-ring (Primary)	2	Buna	N70044
			EPDM	E70044
			FKM	V70044-680
7	Seal Head Insert (Primary)	1	Chrome Oxide/316 SS	LL934872
			Ceramic	LL934873
			Carbon	LL932351
8*	Seal Body Insert (Primary)	1	Siliconized Graphite	LL932352
			Ceramic	LL934332
9*	Seal Body Insert O-ring (O.D. Primary)	1	Buna	N70240
			EPDM	E70240
			FKM	V70240-680
10*	Seal Body (Primary)	1	All	LL932358
11	Seal Ring/Body O-ring (Secondary)	1	Buna	N70147
			EPDM	E70147
			FKM	V70147
11A	O-ring	1	Buna	N70146
			EPDM	E70146
			FKM	V70146
17	Product Head O-ring	2 per cyl	Buna	N70259
			EPDM	E70259
			FKM	V70259-680
32	Seal Body Insert (Secondary)	1	All	LL934083
43	Wavy Washer (Secondary)	1	All	LL932362
44	Seal Body O-ring (I.D. Secondary)	1	Buna	N70140
			EPDM	E70140
			FKM	V70140
45	Seal Keeper O-ring (Primary)	1	Buna	N70230
			EPDM	E70230
			FKM	V70230

\* This seal can be retrofitted to a one piece design by replacing items 2, 8, 9, and 10 with a chrome oxide seal body, p/n LL122411.

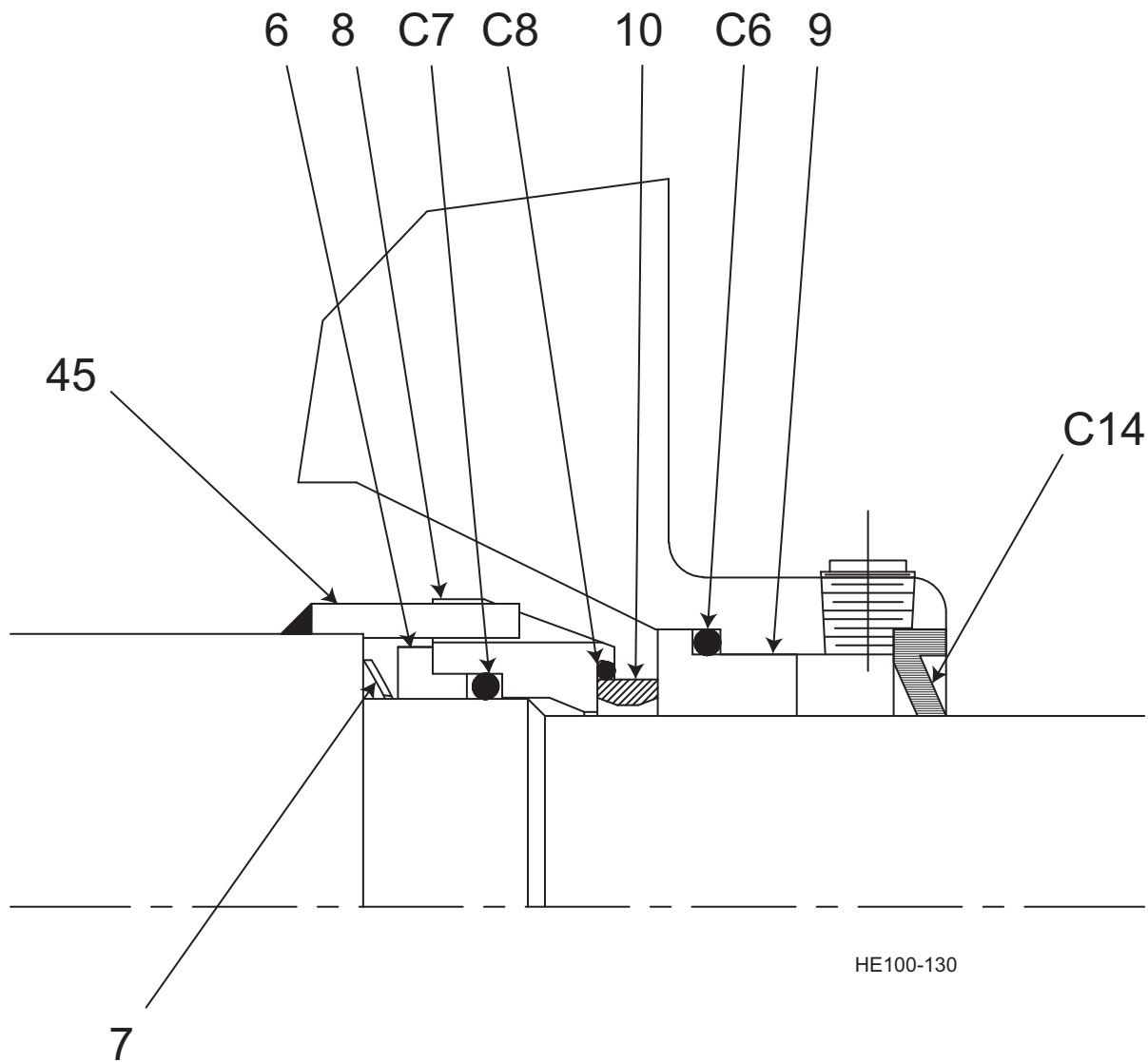
**Votator® Medium/Heavy Duty Single Mechanical Seal  
(1961-1997)**

This is the standard single mechanical seal for most 6-inch diameter Votator Medium Duty units manufactured between 1961 and 1997. The seal body is positioned on the 2.25-inch diameter stub ends of the mutator. This seal can be retrofitted to a one piece design by replacing items 8, C8, and 10 with a chrome oxide one-piece body, part number LL122410, and running it against a ceramic or tungsten carbide head insert.

## Votator® Medium/Heavy Duty Single Mechanical Seal (1961-1997)

ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
6	Seal Back Up Ring	1	Standard	LL110203C1
7	Wavy Washer (Primary)	2	Standard	LL19625A
8*	Seal Body	1	Standard	LL110893A
			One-Piece	LL122410
9	Seal Head Insert	1	Tungsten Carbide/ 316SS	LL110891C
			Ceramic	LL110891A
10*	Seal Body Insert	1	Carbon	LL110892A4
			Siliconized Graphite	LL929270
			Ceramic	LL110892C1
			One-Piece	LL122410
45	Seal Drive Pin	2	Standard	LL119036
C6	Seal Head Insert O-ring	1	Buna	N70339
			EPDM	E70339
			FKM	V70339-680
C7	Seal Body U-cup	1	Buna	LL700014A05
			EPDM	LL700014A03
			FKM	LL700014A08
C8*	Seal Body Insert O-ring	1	Buna	N70235
			EPDM	E70235
			FKM	V70235-680
C10	Seal Keeper O-ring	1	Buna	N70226
			EPDM	E70226
			FKM	V70226-680

\* This seal can be retrofitted to a one piece design by replacing items 8, C8, and 10 with a chrome oxide one-piece body, part number LL122410.

**Votator® Extra Heavy Duty Single Mechanical Seal  
(1966-2004)**

This single mechanical seal design was used on all 6 inch diameter Extra Heavy Duty Votators manufactured between 1966 and 2004. The seal body is positioned on the 3-inch diameter stub ends of the mutator. This seal design **cannot be retrofitted to a one piece body**.

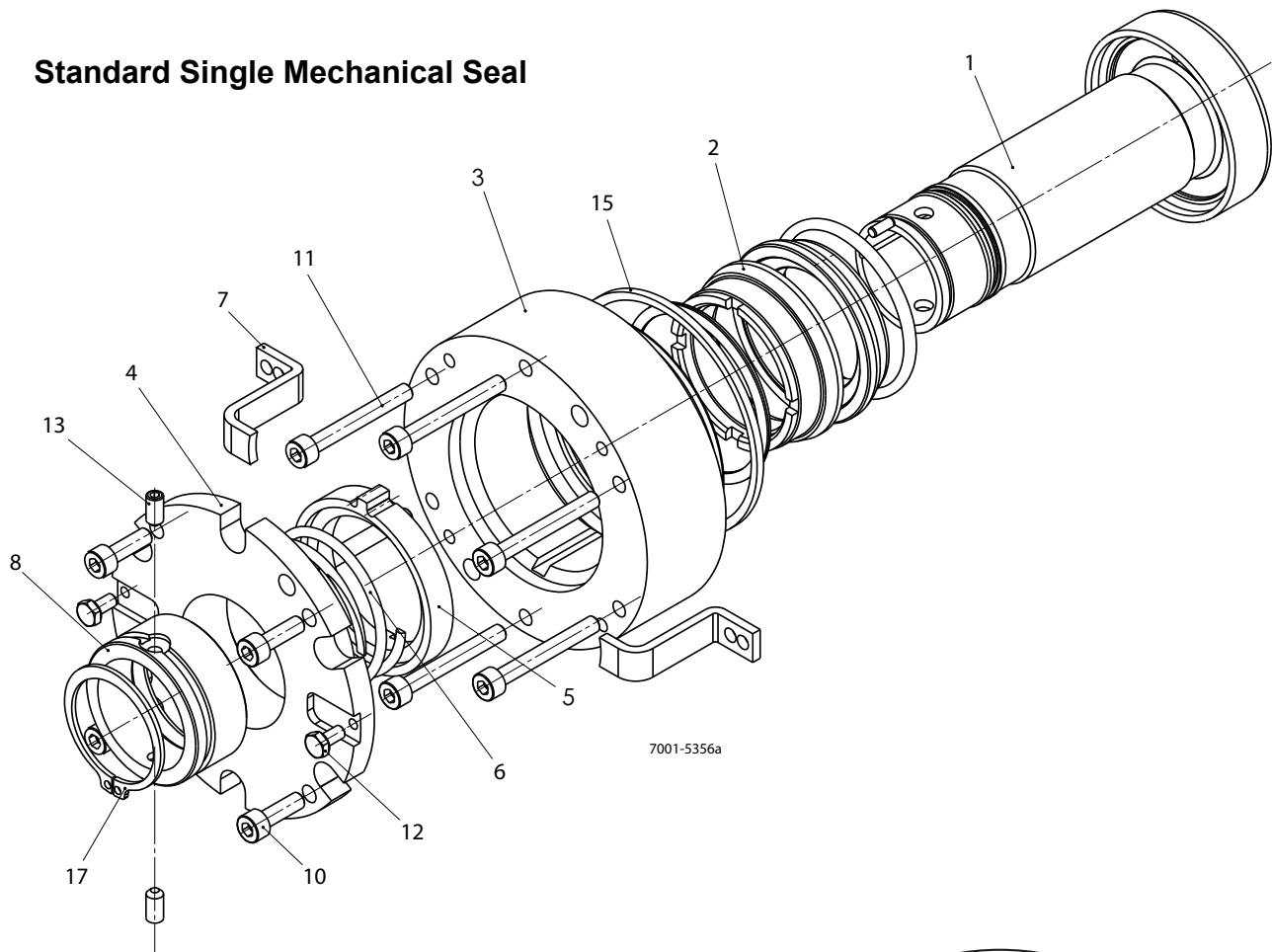
Note: C7 is available as a U-cup or O-ring (O-ring shown).

## Votator® Extra Heavy Duty Single Mechanical Seal (1966-2004)

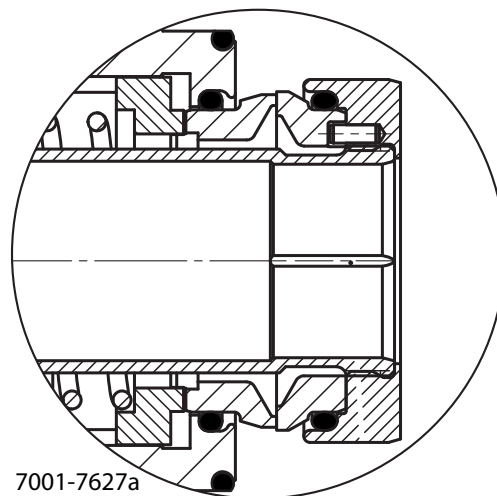
ITEM #	DESCRIPTION	QTY PER SEAL	MATERIAL OPTION	PART #
6	Seal Back Up Ring	1	Standard	LL19600D1
7	Wavy Washer	2	Standard	LL19599B1
8	Seal Body	1	Standard	LL117502A
			Pin Option	LL922361
9	Seal Head Insert	1	Tungsten Carbide/ 316SS	LL117503B
			Ceramic	LL117503A
			Carbon	LL117504A3
10	Seal Body Insert	1	Ceramic	LL922363
			Pin Option (Ceramic)	LL922364
45	Seal Drive Pin	1	Standard	LL19598
			Welded (3-15/16" dia.)	LL117511
			Buna	N70342
C6	Seal Head Insert O-ring	1	EPDM	E70342
			FKM	V70342-680
	Seal Body U-cup (used on XHD Conc. Cylinder)	1	Buna	LL700014A18
			EPDM	LL718440
C7	Seal Body O-ring (used on XHD Oval Cylinder)	1	Buna	N70337
			EPDM	E70337
			FKM	V70337-680
			Buna	N70236
C8	Seal Body Insert O-ring	1	EPDM	E70236
			FKM	V70236-680
C14	Shaft Seal (Lip Seal)	1	Buna	LL700030A88

## Votator® 5 Series Single Mechanical Seal (2014)

## Standard Single Mechanical Seal



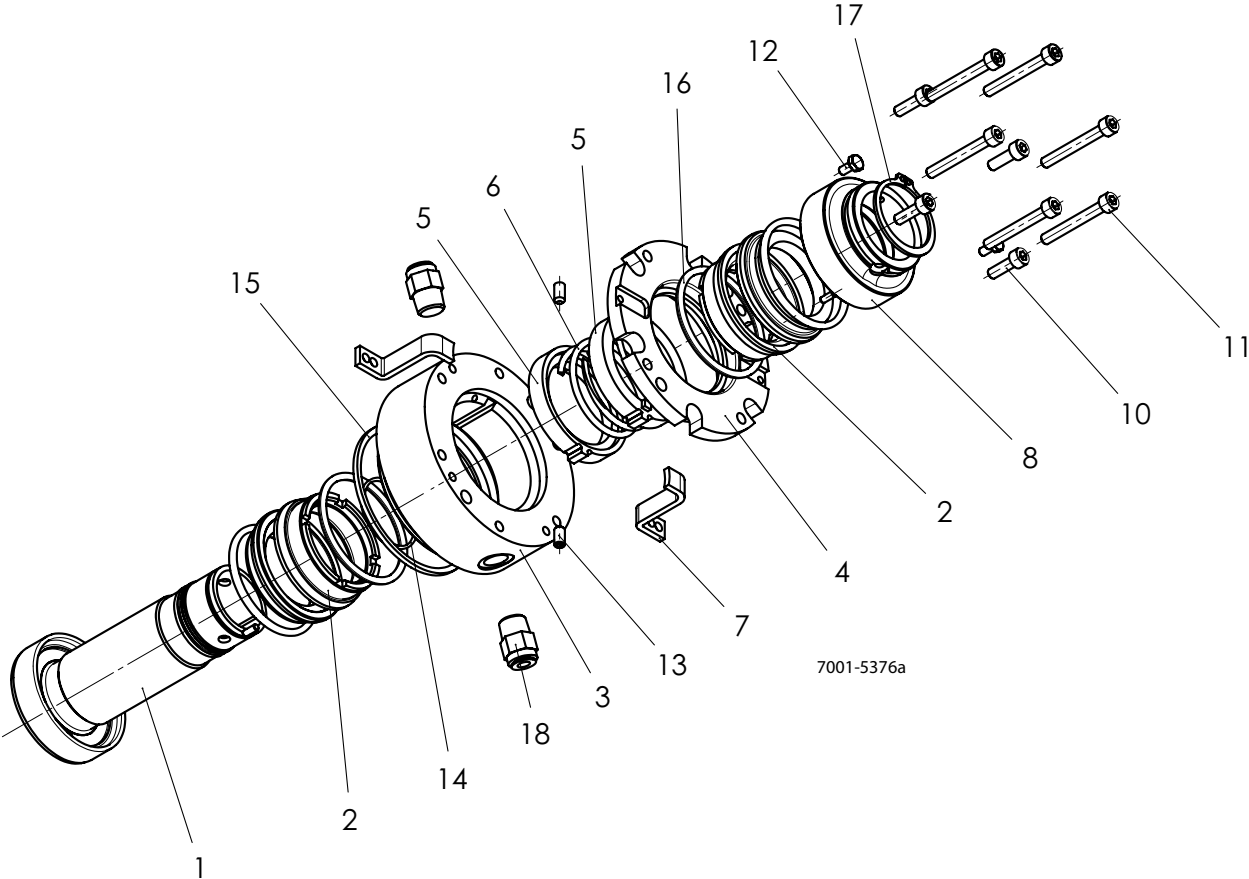
## Knife Edge Single Mechanical Seal



**Votator® 5 Series Single Mechanical Seal (2014)**

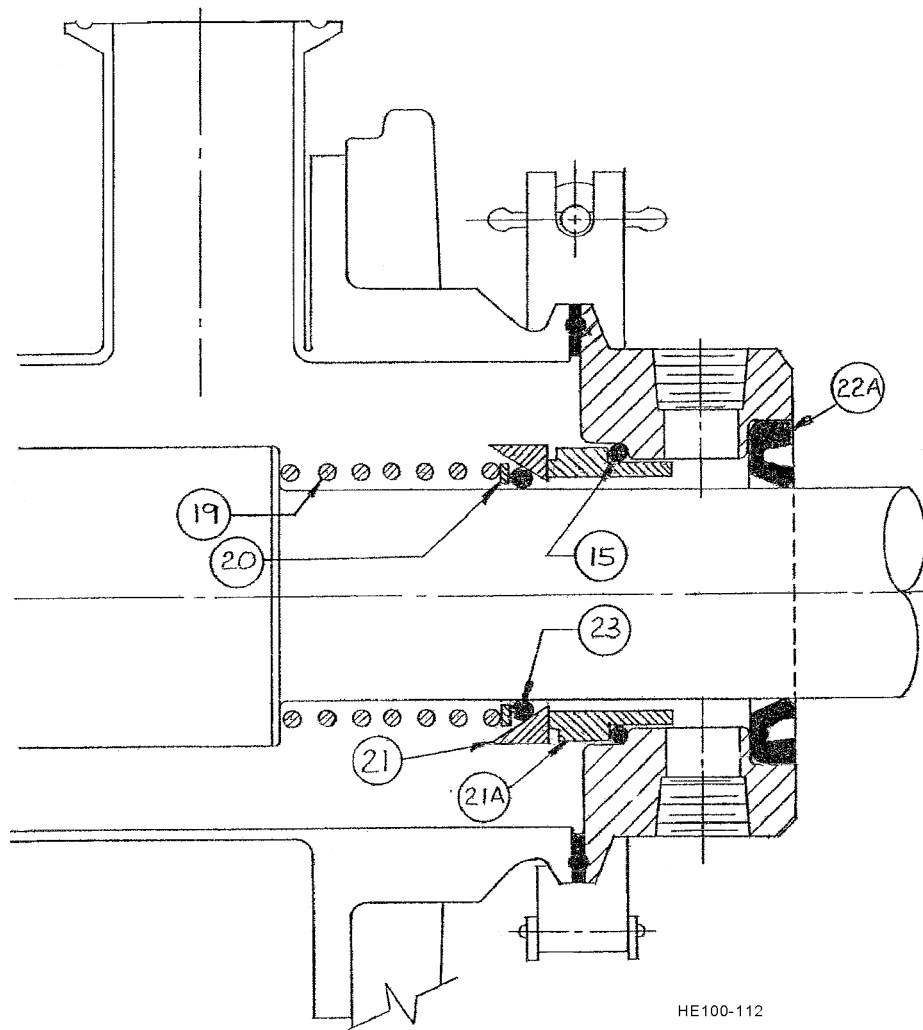
ITEM	PART NAME	QTY	EPDM DESIGN	FKM DESIGN
	<b>Single Mechanical Seal Cartridge, Standard</b>		<b>K7001-5388</b>	<b>K7001-5356</b>
	<b>Single Mechanical Seal Cartridge, Knife Edge</b>		N/A	<b>K7001-7627</b>
1	Sealing shell	1	K7001-5378	K7001-5378
2	Seal face kit, standard	1	K7001-5069	K7001-5070
	Seal face kit, knife edge		N/A	K7001-7626
3	Follower	1	K7001-5389	K7001-5389
4	Cover	1	K7001-5390	K7001-5390
5	Thrust ring	1	K7001-5358	K7001-5358
6	Helical spring	1	K7001-5607	K7001-5607
7	Assembly jig	2	K7001-5385	K7001-5385
8	Sleeve/Follower	1	K7001-5392	K7001-5392
10	Screw M5x16	4	K160-0321	K160-0321
11	Screw M5x40	6	K7001-5298	K7001-5298
12	Set screw M4x8	2	K160-0085	K160-0085
13	Set screw M5x10	2	K160-0865	K160-0865
15	O-ring	1	K7001-5370	K7200-4746
17	Retaining ring	1	K106127	K106127

Votator® 5 Series Double Mechanical Seal (2014)



**Votator® 5 Series Double Mechanical Seal (2014)**

ITEM	PART NAME	QTY	EPDM DESIGN	FKM DESIGN
	<b>Double Mechanical Seal Cartridge</b>		<b>K7001-5376</b>	<b>K7001-5355</b>
1	Sealing shell	1	K7001-5378	K7001-5378
2	Seal face kit	2	K7001-5069	K7001-5070
3	Follower	1	K7001-5382	K7001-5382
4	Cover	1	K7001-5384	K7001-5384
5	Thrust ring	2	K7001-5358	K7001-5358
6	Helical spring	1	K7001-5607	K7001-5607
7	Assembly jig	2	K7001-5385	K7001-5385
8	Sleeve/Follower	1	K7001-5383	K7001-5383
10	Screw M5x16	4	K160-0321	K160-0321
11	Screw M5x40	6	K7001-5298	K7001-5298
12	Set screw M4x8	2	K160-0085	K160-0085
13	Set screw M5x10	2	K160-0865	K160-0865
14	O-ring	1	K7001-5371	K7001-5371
15	O-ring	1	K7001-5370	K7200-4746
16	O-ring	1	K140-0243	K140-0243
17	Retaining ring	1	K106127	K106127
18	Straight connector	2	K176196	K176196

**Votator® 4x120 Single Mechanical Seal**

This is the standard seal arrangement for all 4x120 Votators.

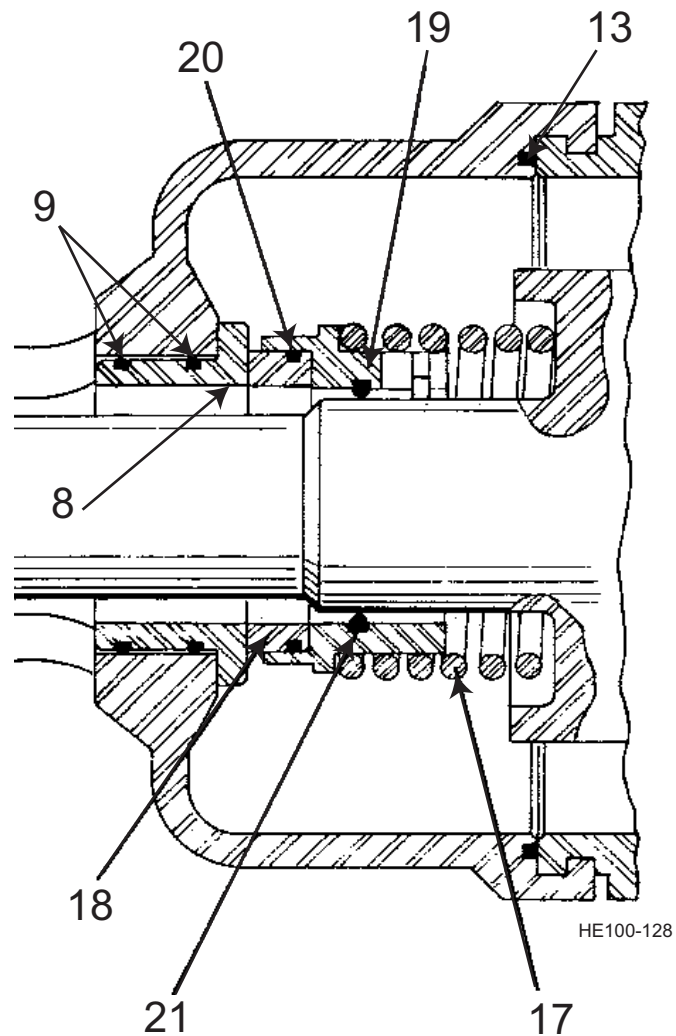
**Votator® 4x120 Single Mechanical Seal**

ITEM	DESCRIPTION	QUANTITY	MATERIAL	PART NUMBER
15	Insert O-Ring	1	Buna	N70227
			EPDM	E70227
			FKM	V70227-680
19	Seal Spring	1		LL122393A01
20	Seal Washer	1		LL13177A
21	Seal Ring	1	Ceramic	LL13174A01
			Carbon	LL113174G
21A	Seal Insert	1	Ceramic	LL112691C
			Carbon	LL112691A
22A	Lip Seal	1	Buna	LL700030A38
23	Seal O-Ring	1	Buna	N70327
			EPDM	E70327
			FKM	V70327-680

## Thermutator Single Mechanical Seal

This is the seal arrangement for all 6-inch diameter Thermutators manufactured after 1978, excluding units with aseptic seals and ones with Tungsten Carbide inserts. **This seal cannot be retrofitted to a one-piece body.**

**NOTE:** After about 1992, the aseptic seal arrangement became the standard design for Thermutators. See page 28.



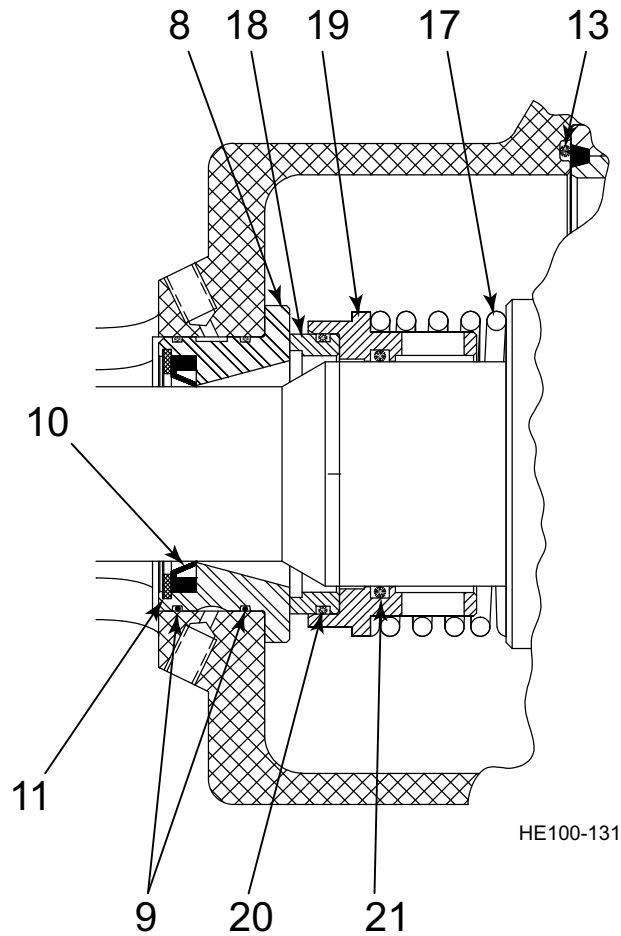
**Thermutator Single Mechanical Seal**

ITEM	DESCRIPTION	QUANTITY	MATERIAL	PART NUMBER
8	Seal Head Insert	1	Chrome Oxide	LL3002743
9	Head Insert O-ring	2	Buna	N70037
			EPDM	E70037
			FKM	V70037-680
13	Product Head O-ring	1	Buna	N70259
			EPDM	E70259
			FKM	V70259-680
17	Compression Spring	1		LL7041859
18	Seal Ring	1	Carbon	LL5540909
19	Rotary Seal Shell	1		LL3001571
20	Sleeve Seal O-ring	1	Buna	N70146
			EPDM	E70146
			FKM	V70146-680
21	Shaft Seal O-ring	1	Buna	N70228
			EPDM	E70228
			FKM	V70228-680

## Thermutator Aseptic Flushing Seal

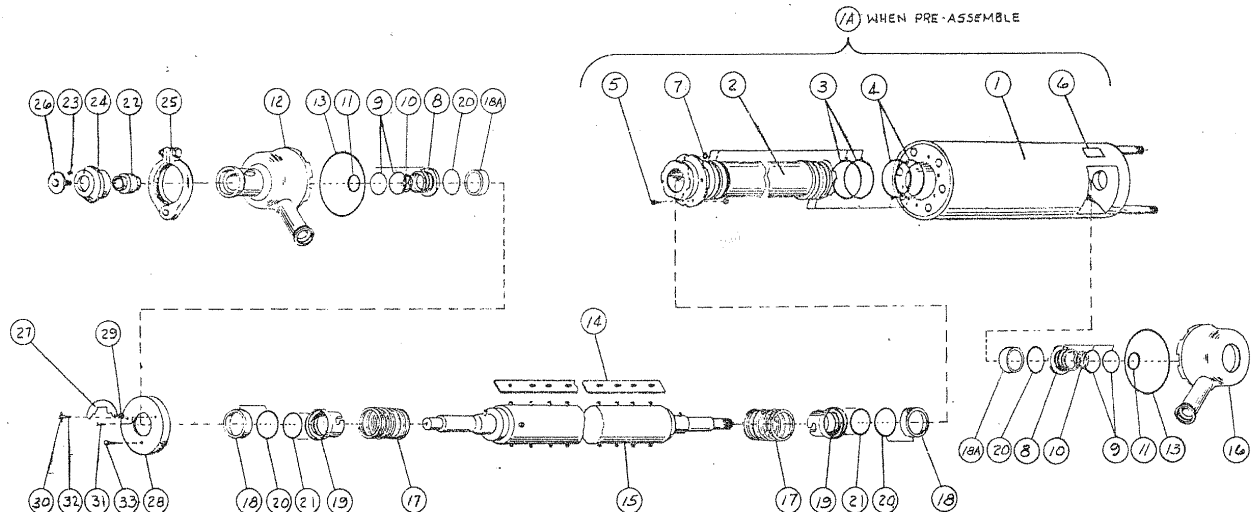
This is the aseptic seal arrangement for all 6-inch diameter Thermutators manufactured after 1978, excluding units with o-ring seals and ones with Tungsten Carbide inserts. **This seal cannot be retrofitted to a one-piece body.**

**NOTE:** After about 1992, the aseptic seal arrangement became the standard design for Thermutators



## Tungsten Carbide Seal

Refer to item numbers 8, 9, 10, 11, 17, 18, 18A, 19, 20, and 21, below.



**Thermutator Aseptic Flushing Seal**

Item	DESCRIPTION	QUANTITY	MATERIAL	PART NUMBER
8	Seal Head Insert	1	Chrome Oxide	LL3002742
9	Head Insert O-ring	2	Buna	N70037
			EPDM	E70037
			FKM	V70037-680
10	Flushing Lip Seal	1	Buna	LL5540917
11	Retaining Ring	1		LL9590181
13	Product Head O-ring	1	Buna	N70259
			EPDM	E70259
			FKM	V70259-680
17	Compression Spring	1		LL7041859
18	Seal Ring	1	Carbon	LL5540909
19	Rotary Seal Shell	1		LL3001571
20	Sleeve Seal O-ring	1	Buna	N70146
			EPDM	E70146
			FKM	V70146-680
21	Shaft Seal O-ring	1	Buna	N70228
			EPDM	E70228
			FKM	V70228-680

**Tungsten Carbide Seal Face Conversion**

Parts list for conversion of Thermutator Unit to Tungsten Carbide Seal Faces

ITEM	DESCRIPTION	QUANTITY	MATERIAL	PART NUMBER
8	Head Adapter	1	304 SS	LL3007046
9	Head Insert O-ring	2	EPDM	E70037
10	Flushing Lip Seal	1	Buna	LL5540917
11	Retaining Ring	1	SS	LL9590181
17	Compression Spring	1	SS	LL7041859
18	Seal Ring	1	Tungsten Carbide	5541742+
18A	Seal Ring	1	Tungsten Carbide	5541741+
19	Seal Body	1	304 SS	LL3007045
20	Sleeve Seal O-ring	1	EPDM	E70232
21	Shaft Seal O-ring	1	EPDM	E70228

**NOTE:** Elastomers above are EPDM. Check duty to ensure compatibility with product.

## 2012 Votator® II Seal Selection Chart

Specific Product	Rotary Seal					Stationary Seal		
	(Carbon)	(SC)	(TC)	Narrow TC	Polymer	(Ceramic)	(TC)	(SC)
Algae Paste	X					X		
Almond Butter	X					X		
Banana Puree		X						X
Bean Puree		X						X
Blueberry Puree		X						X
Candle Wax	X					X		
Caramel-like Filling		X						X
Cheese Sauce		X						X
Coffee Extract		X						X
Cookie Cream		X						X
Cream Cheese	X					X		
Deboned Meat					X	X		
Deodorant		X						X
Emulsion		X						X
Fish Offal		X						X
Garlic Butter	X					X		
Grease	X					X		
Ground Turkey					X	X		
Gum Base			X					X
Icings		X						X
Lecithin Gums		X						X
Licorice		X						X
Lipid	X							X
Lotions/Creams	X					X		
Margarine	X					X		
Marshmallow		X						X
Milk Slurry	X					X		
OJ Concentrate		X						X
Oyster Slurry	X					X		
Peanut Butter		X						X
Pet Offal		X						X
Petroleum Coke			X					X
Petroleum Jelly	X					X		
Pie Filling	X					X		
Popcorn Oil				X				X
Prepolymer				X				X
Pumpkin Puree		X						X
Shortening	X					X		
Silicone Sealant								
Solvent Slurry	X							X
Starch Paste		X						X
Sugar Solution		X						X
Tahini	X					X		
Toffee			X					X
Tomato Paste		X						X
White Chocolate		X						X

The above selection chart should be used as a guideline based on the previously successful application of seal materials for various products listed. The content of this chart does not guarantee success due to the variety of formulas within the same class of products.

## Two- and One-Piece Votator® II Seal Selection Chart

Specific Product	Rotary Seal Materials				Stationary Seal Materials	
	Carbon	Purebide(SC)	Ceramic (TC)	CO	Ceramic	CO (SC)
Algae Paste	X			Y	X Y	
Almond Butter	X			Y	X Y	
Banana Puree		X	X			X
Bean Puree		X	X	Y	Y	X
Blueberry Puree		X	X	Y	Y	X
Candle Wax	X			Y	X Y	
Caramel-like Filling		X	X	Y	Y	X
Cheese Sauce		X	X			X
Coffee Extract		X	X	Y	Y	X
Cookie Cream		X	X	Y	Y	X
Cream Cheese	X				X	
Deboned Meat	X			Y	X	Y
Deodorant		X	X			X
Emulsion		X	X			X
Fish Offal		X	X	Y		X Y
Garlic Butter	X			Y	X Y	
Grease	X				X	
Ground Turkey	X			Y	X	Y
Gum Base				X		X
Icings		X	X	Y	Y	X
Lecithin Gums		X	X	Y	Y	X
Licorice		X	X	Y	Y	X
Lipid	X			Y	Y	X
Lotions/Creams	X			Y	X Y	
Margarine	X			Y	X Y	
Marshmallow		X	X	Y	Y	X
Milk Slurry	X			Y	X Y	
OJ Concentrate		X	X	Y	Y	X
Oyster Slurry	X			Y	X Y	
Peanut Butter		X	X	Y	Y	X
Pet Offal		X	X	Y		X Y
Petroleum Jelly	X			Y	X Y	
Pie Filling	X			Y	X Y	
Prepolymer						X
Pumpkin Puree		X	X	Y	Y	X
Shortening	X			Y	X Y	
Starch Paste		X	X	Y	Y	X
Sugar Solution		X	X	Y	Y	X
Tahini	X				X	
Tomato Paste		X	X	Y	Y	X
White Chocolate		X	X	Y	Y	X

Red Y denotes One-Piece seal

The above selection chart should be used as a guideline based on the previously successful application of seal materials for various products listed. The content of this chart does not guarantee success due to the variety of formulas within the same class of products.

## Seal Material Selection

### Carbon

Carbon seals offer the greatest economy and best lubricity for sealing non-abrasive materials. It is good for clean, abrasive-free fluids. Its self-lubricating properties reduce friction and heat and extend service life. Carbon mates with any other seal material.

- Low friction
- Good chemical compatibility
- Good thermal stability
- Cost effective

### Ceramic

Ceramic (alumina ceramic) has substantially greater resistance to abrasive materials and offers greater strength than carbon. Ceramic mates with carbon, chrome oxide, and itself.

- Good strength and stiffness
- Good hardness and wear resistance
- Good corrosion resistance
- Good thermal stability
- Lowest cost of all hard materials

### Silicon Carbide

Silicon carbide offers superior strength, abrasion resistance, and thermal conductivity to alumina ceramic. Its combination of hardness, strength, and temperature resistance gives it excellent capabilities for services in a wide range of applications where high speeds, high pressures, and chemical and abrasion resistance are required. Mates well with carbon, tungsten carbide, and itself.

- Hardest seal face WCB offers
- Excellent resistance to wear and abrasion
- Excellent resistance to corrosion; the material tolerates a wide range of acids and alkalis
- Resistant to oxidation
- Good thermal shock resistance
- Retains strength at high temperature

**Siliconized Graphite**

Siliconized graphite (sometimes referred to as Purebide) is specially formulated graphite on which the surface has been converted to silicon carbide. This provides surface characteristics similar to silicon carbide but is less costly to produce than solid silicon carbide. Free graphite in the silicon carbide layer reduces friction and improves performance. (Siliconized graphite is only offered in WCB's 200 Series centrifugal pump, Shear Pump, and Colloid Mill.) Mates with carbon, silicon carbide, and itself.

- Good hardness and wear resistance
- Good corrosion resistance
- Good thermal stability
- Cost effective
- Less strength than solid silicon carbide

**Tungsten Carbide**

Tungsten carbide is unique among seal materials in that it is a composite of tungsten carbide particles held together by a metallic binder. Tungsten carbide seal parts offered by WCB use a nickel binder. A nickel binder was chosen for its excellent corrosion resistance and compatibility with food and beverage products. The metallic binder provides "toughness" to the seal material, making it perfect for heavy-duty applications where high starting torques or shock loading is present. Tungsten carbide mates with carbon, silicon carbide or itself.

- Ideal for product that is sticky, sets-up, or crystallizes
- Very tough material
- High hardness
- Very wear resistant
- High corrosion resistance
- High temperature performance

**Chrome Oxide**

Chrome oxide seal components consist of a machined stainless steel base part with a coating of chrome oxide on the seal face. The stainless steel provides a strong base that resists high starting torques, impact loading, and rough handling. The chrome oxide coating provides a hard, wear resistant face that provides performance similar to solid ceramic.

- Good for product that is sticky, sets-up, or crystallizes
- Good toughness
- Tolerates rough handling
- Higher cost than ceramic







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