## APPLICATIONS

## TRACTOR PTO

PTO applications have one primary challenge, the ingress of fiber debris, either from weeds, straw, or sometimes baler twine. Fiber debris tends to wrap on the PTO shaft and collect next to the seal. That material can get forced into the seals dust lip and then into the main lip causing an aggressive leak.

The T26 design shown here is used to help guard against any ingress of fiber material. The design incorporates a metal guard, sometimes called a weed cutter. This guard has a slight clearance to the shaft and helps to cut up any straw or weeds before it has a chance to present itself at the dust lip.

#### Tractor PTO.

Seals are designed to help prevent plant fibers that tend to wrap on the PTO shaft from damaging the main lip.





#### HIGH CONTAMINATION SEALING DESIGNS

The EVO and TSL series of seals are specifically designed for high contamination applications. Both seals contain multiple lips and a labyrinth type pathway that helps to slow the progression of mud and dirt into the seal itself.

The TSL is a conventional unitized type design, incorporating multiple components that are crimped together forming one single piece for installation. The TSL series come pregreased, and incorporate a seal sleave that eliminates any wear on the shaft surface. The TSL series are very effective at protecting your application from mud and debris.

The EVO series incorporates our patent pending EVO technology, a metal on metal sealing element that keeps large and small contamination from entering into the seal itself. The EVO technology can be used on it's own or incorporated with multiple exclusion lips for improved performance.



# TRACTOR AXLE - STANDARD FIELD ENVIRONMENT

Tractor axles are known for living in a dirty environment. Dirt and mud can get kicked up by the tires and at times fording through mud is required. This application requires a seal with higher than normal dirt exclusion capabilities.

With this application there are many choices available. Here we are showing a couple of common seals concepts, they can be modified to fit specific applications.

The T26 style shown incorporates a main seal lip for retention of oil in the axle, three dust lips for good dirt and dust exclusion and a metal can excluder that helps to keep large debris and weeds from entering the main lip.

The OUB2 style shown utilizes four long lips that run on a stamped metal insert. This style has a good life in dust/dirt environments when a greasing interval is specified in the application. The lips are designed such that grease will purge past the lips and effectively replace old dirty grease with fresh clean grease.

## APPLICATIONS







OUB2

#### Tractor Axle.

This applications requires a seal with higher than normal dirt exclusion capabilities.

#### HIGH SHAFT RUNOUT

Generally, radial shaft seals are installed in a location near a bearing, where the shaft is well supported and the runout or misalignment of the shaft to the bore is minimal. But at times seals are needed in locations where shaft runout can be excessive.

Our high runout line of seals can extend the runout capability of a standard seal and help to fix some runout issues that come up. The seal cross section incorporates a flexible membrane that helps the main lip follow a shaft with a high runout issue.



## FLUID SPLITTING

Fluid splitting seals utilize a double sealing lip and are used in applications that involve the separation of two fluids.

These types of seals can be found in grease/oil applications. Or most commonly in wet clutch applications where a seal is needed between the engine and transmission/clutch.

#### Fluid Splitting Seals.

These types of seals can be found in grease/oil applications.





#### DUO CONE FACE SEALS

Metal face seals are used in high contamination environments at moderate speeds. The seal consists in two metal rings that spin, one against the other, keeping out contamination in extreme conditions.

Metal faces are loaded with rubber o-rings which help to apply an even load to the face of the seal for the life of the seal, when the o-rings fail they can be replaced and the metal faces can be used again.



#### FL SEAL SERIES

The patent pending FL Series Seal<sup>™</sup> offers a unique exclusion design that accommodates for production and application seal gap variability.

The FL Series Seal<sup>™</sup> installs onto a chamfer with a specifically engineered angle and length. As the seal gap changes during use, the FL seal slides up and down the chamfer, maintaining constant contact with the sealing face.

Typical pivot pin applications utilize a standard pin or wiper seal to keep dirt out of the bearing or bushing. These standard pin seals will seal on the outer diameter of the pin, but as the seal lip wears, leakage can occur. The FL seal self-adjusts as the lip wears, extending the life of the seal itself.





## Request for Quotation

ESP International 5920 Dry Creek Lane NE Cedar Rapids, IA 52402 Ph: 319-393-4310 Fax: 319-393-5327 www. espint.com

Company: Date: Contact Name: F-Mail: Phone: Fax: Dim Description Value Fax: Dim Description Value Fax: Dim Description Value Fax: Dim Description Phone: Fax: Dim Description Phone Fax: Dim Description Phon										
Contract Name:       E-Mail:         Phone:       Fax:         Dim       Description       Value         SD       Shaft Diameter       Fax:         BD       Bore Diameter       Fax:         BL       Bore Depth       Fax:         SA.       Shaft Chamfer Angle       Social         SCL.       Shaft Chamfer Angle       Social         BCL.       Bore Chamfer Length       Bore Chamfer Length       Bore Chamfer Length         W       Seal Width       Sorial       Counterbore         Material:       Horizontal       Vertical       Sorial Chamfer Kengle       Sorial Chamfer Kengle         Staft Offset:       Sorial Chamfer Kengle       Sorial Chamfer Kengle       Sorial Chamfer Kengle       Sorial Chamfer Kengle         Shaft Offset:       Staft Shaft Chamfer Kengle       Sorial Kengle       Sorial Kengle       Sorial Kengle         Shaft Offset:       Temperature **       Chamfer: Yes       No         Shaft Offset:       Temperature **       F. C         Shaft Offset:       K of Exposure:       K of Exposure:       F. C         Shaft Offset:       Degrees of Arc       Offen       Yes       No         Shoff Shoed (II / min) **       Degrees of Arc	Compar	יy:					Date:			
Phone:         Fax:           Dm         Description         Value           SD         Shaft Diameter         Image: Control of the second of the s	Contact Name:						E-Mail:			
Dim       Description       Value         SD       Shaft Diameter          BD       Bore Diameter          L       Bore Depth          SA       Shaft Chamfer Angle          SCL       Shaft Chamfer Length          BA       Bore Chamfer Length          W       Seal Width       Bare         Shaft       Vertical       Straight       Counterbore         Moterial:       Vertical       Straight       Counterbore         Moterial:       Straight       Counterbore       Moterial:         Hardness:       Surface Finish:       Surface Finish:       Surface Finish:         Lead Angle:       Opnamic Runout:       Surface Finish:       Surface Finish:         Shaft Molion       Rev:       Surface Finish:       Surface Finish:         Rotating       Normal       Max       % of Exposure:         Rotating       Normal       Max       % of Exposure:         Strait Molion       Ker       Somp:       Outside:         Rever       Degrees of Arc       Somp:       Fessure (PSI)**         Removal:       Rare       Offen       Somp Fill Level:         S	Phone:						Fax:			
SD Shaft Diameter   BD Bore Diameter   L Bore Dapth   SA Shaft Chamfer Angle   SCL Shaft Chamfer Angle   BCL Bore Chamfer Length   BA Bore Chamfer Length   W Sold Width     Shaft     Shaft   Bore   Shaft Diameter   SCL   Shaft Chamfer Angle   BCL   Bore Chamfer Length   W   Sold Width     Shaft Speed (H /min) **   I   2   Shaft Speed (H /min) **   I   2   Statif Speed (H /min) **   Statif Speed (H /min) **   Shaft Speed (H /min) **   Shaft Speed (H /min) **   Shaft Speed (H /min) **   Statif Speed (H /min) **   Statif Speed (H /min) **   Shaft Speed (H /min) **   Beres   Normal   Max   Shaft Speed (H /min) **   Space Restrictions:   Yes   Normal   Max   Space Restrictions:   Yes   Normal   Space Restrictions:   Yes   Normal   Space Restrictions:   Yes   Normal   Space Restrictions:   Yes   Normal   Space Restrictions:   Yes   No   Space Restrictions:   Yes   No   Space Restrictio	Dim	Descrip	otion		Value					
BD       Bore Diameter         L       Bore Dapth         SA       Shaft Chomfer Angle         SCL       Shaft Chomfer Length         BA       Bore Chamfer Angle         BCL       Bore Chamfer Angle         Shaft Chomfer Length       Straight         Material:       Hardness:         Strafter Finish:       Straight         Lead Angle:       Straft Cerlish:         Lead Angle:       Straft Offiner:         Yender Finish:       Chamfer:         Raft Offing       Normal         RPM:       Straft Speed (H min) **         Reciprocating       Oscillating         Straft Speed (H min)       Max         Space Restrictions:       Yes         Space Restrestions       Noi	SD	SD Shaft Diameter					*			
L       Bore Depth         SA       Shaft Chamfer Angle         SCL       Shaft Chamfer Length         BA       Bore Chamfer Length         W       Seal Width         Shaft Chamfer Length       Straight         Commer Length       Straight         Shaft Chamfer Length       Straight         W       Seal Width         Shaft Chamfer Length       Vertical         Material:       Hardness:         Surface Finish:       Surface Finish:         Lead Angle:       Vertical         Dynamic Runout:       Surface Finish:         Shaft Motion       Nomal         RPM:       Particle Type:         Shaft Speed (If / min) **       Particle Type:         Reciprocating       Oscillating         Store Length:       Degrees of Arc         Cycle / Min:       Rar         Space Restrictions:       Yes         Normal       Max         Space Restriction:       Yes         Normal       Max         Gorder Straight Installation Direction       Fessure (PSI) **         Space Restrictions:       Yes         Normal       Max         Space Restrictions:       Yes <td colspan="5">BD Bore Diameter</td> <td></td> <td colspan="4">-BA</td>	BD Bore Diameter						-BA			
SA       Shaft Chamfer Length         BA       Bore Chamfer Length         BA       Bore Chamfer Length         W       Seal Width         Shaft Chamfer Length         W       Seal Width         Shaft Spee Chamfer Length         W       Seal Width         Shaft Spee (Hinther Angle         Surface Finish:         Contimution Level **         Contimution Level **         Surface Finish:         Contimution Level **         Surface Finish:         Contimution Level **         Surface Finish:         Continuition Level **         Surface Finish:         Continuition Level **         Surface Finish:         Continuition Level **         Surface Finish:         Reciprocating       Oscillating         No         Surde (PS) ** <td< td=""><td>L</td><td>Bore Depth</td><td></td><td></td><td></td><td></td><td></td><td></td><td>Ø BD</td><td>ØS</td></td<>	L	Bore Depth							Ø BD	ØS
SCL       Shaft Chamfer Length         BA       Bore Chamfer Angle         BCL       Bore Chamfer Length         W       Seal Width         Horizontal       Vertical         Material:       Material:         Hardroess:       Hardroess:         Surface Finish:       Lead Angle:         Lead Angle:       Chamfer:         Vertical       Material:         Material:       Hardroess:         Surface Finish:       Chamfer:         Lead Angle:       Chamfer:         Vertical       Max         Shaft Motion       Yes         Rotating       Normal         Rotating       Normal         Rotating       Normal         Rotating       Oscillating         Stand Chamber - Particle Type:       Standard         Rotating       Oscillating         Stand Chamber - Particle Type:       Standard         Rotating       Oscillating         Stand A oscillating       Standard         Normal       Max         Cycle / Min:       Normal         Max       Standard         Material       Yes         Stand Stroke Length:       Normal </td <td>SA</td> <td>Shaft Chamfer A</td> <td>Angle</td> <td></td> <td></td> <td></td> <td>SA&gt;</td> <td></td> <td>E .</td> <td></td>	SA	Shaft Chamfer A	Angle				SA>		E .	
BA       Bore Chamfer Length       Bore         Shaft       Seal Width       Counterbore         Material:       Hardness:       Straight       Counterbore         Material:       Material:       Material:       Hardness:         Surface Finish:       Surface Finish:       Chamfer:       Yes       No         Dynamic Runout:       Surface Finish:       Chamfer:       Yes       No         Shaft Motion       Particle Type:       *       No       Contamination Level **         Shaft Speed (H /min) **       1       2       3       4       5         Shaft Speed (H /min) **       Temperature **       Submerged:       *       *         Reciprocating       Oscillating       Standard       Med/Low       Med       High         Stroke Length:       Degrees of Arc       Grease       Oil       Temperature **       Grease       Oil         Sysce Restrictions:       Yes       No       Sump:       Underlip:       Outside:       *         Grease       Oil       Type:       Yee:       Sump Fill Level:       Sump Fill Level:       *       *         Normal:       Max       No       Sump Fill Level:       Oil       *       *	SCL	Shaft Chamfer L	ength				ØSD -			
BCL       Bore Chamfer Length         W       Seal Width         Horizontal       Vertical         Horizontal       Vertical         Material:       Material:         Hardness:       Hardness:         Surface Finish:       Surface Finish:         Lead Angle:       Surface Finish:         Dynamic Runout:       Surface Finish:         Shaft Motion       Max         Rotaling       Normal         Rotafing       Normal         Rotafing       Normal         Rotafing       Normal         Rotafing       Max         Rotafing       Normal         Rotafing       Normal         Rotafing       Max         Rotafing       Sale         Staff Speed (ft / min)**       Temperature **         Rotafing       Oscillating         Stroke Length:       Degrees of Arc         Normal       Max         Kasembly       Yes         Shaft Installation Direction into Bore       No         State length:       Yes         Normal       Kase         State length:       Yes         Normal       Max         Vin Index:	BA	Bore Chamfer A	ngle					JUL		
W       Seal Width       Bare         Horizontal       Vertical       Straight       Counterbore         Material:       Material:       Material:       Material:         Hardness:       Surface Finish:       Straight       Counterbore         Surface Finish:       Straight       Counterbore       Material:         Hardness:       Surface Finish:       Chamfer:       Yes       No         Dynamic Runout:       Contamination Level **       Contamination Level **       Straight       Straight <td< td=""><td>BCL</td><td>Bore Chamfer L</td><td>ength</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	BCL	Bore Chamfer L	ength							
Shaft         Bore           Harizantal         Vertical         Straight         Counterbore           Material:         Material::         Hardness:         Surface Finish:         Surface Finish:           Lead Angle:         Straination         Surface Finish:         Chamfer:         Yes         No           Dynamic Runout!         Chamfer:         Yes         No         Surface Finish:         Contamination Level **           Shaft Motion         Forcige         Surface Finish:         Contamination Level **         No           Rotating         Normal         Max         % of Exposure:         Submerged:         Submerged:           Shaft Motion         Force         Submerged:         Submerged:         Submerged:         Submerged:           RPM:         % of Exposure:         % of Exposure:         Submerged:         Submerged:         Submerged:           RPM:         Degrees of Arc         Image **         Image **         Image **         Forces         Outside:           Reciprocating         Oscillating         Strandard         Med/Low         High         Gerease         Oil           Cycle / Min:         Max         Yes         No         Sump Fill Level:         Application Description:         Applicat	W	Seal Width								
Horizontal       Vertical       Straight       Counterbore         Material:       Hardness:       Material:       Hardness:         Surface Finish:       Surface Finish:       Surface Finish:       Surface Finish:         Lead Angle:       Charmfer:       Yes       No         Dynamic Runout:       Surface Finish:       Charmfer:       Yes       No         Shaff Molion       Particle Type:       Rotating       Normal       Max       % of Exposure:       %         RPM:       RPM:       Temperature **       F       C         Shaff Molion       F       C       Sump:       Underlip:       Outside:         Shaff Speed (If / min) **       Temperature **       F       C       Sump:       Outside:         Reciprocating       Oscillating       Standard       Med/Low       Med       High         Storke Length:       Degrees of Arc       F       C       Sump:       F       C         Reciprocating       Oscillating       Max       Standard       Med/Low       Med       High         Space Restrictions:       Yes       No       Sump Fill Level:       Application       F       C         Shaft Installation Direction       Intermittent	Shaft					Bore				
Material:       Material:       Material:         Hardness:       Surface Finish:       Surface Finish:         Lead Angle:       Chamfer:       Yes       No         Dynamic Runout:       Contamination Level **       No         Shaft Offset:       1       2       3       4       5         Shaft Motion       Max       % of Exposure:       %       F       C         Rotating       Nomol       Max       % of Suposure:       F       C         Shaft Motion       Max       % of Exposure:       F       C         Rotating       Nomol       Max       % of Exposure:       F       C         Shaft Speed (ft / min) **       Temperature **       F       C       Sump:       Outside:       F       C         1       2       3       4       5       Sump:       Underlip:       Outside:       F       C         (0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)       Pressure (PSI) **       F       C         Storke Length:       Degrees of Arc       Grease       Oil       Grease       Oil       Sump Fill Level:       Sump Fill Level:       F       Max       Supplication Description:	Horizo	ntal	Vertical			Stra	ight		Coun	terbore
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Shaft Offset:       I       2       3       4       5         Shaft Motion       Particle Type:       Particle Type:       % of Exposure:       % of Exposure:       % of Exposure:       % of Exposure:       %       %         Rotating       Normal       Max       % of Exposure:       % of Exposure:       % <td< td=""><td colspan="5">Dynamic Runout:</td><td>Contam</td><td>ination Leve</td><td>el **</td><td></td><td>5</td></td<>	Dynamic Runout:					Contam	ination Leve	el **		5
Shaft Motion       Particle Type:         Rotating       Normal       Max       % of Exposure:         RPM:       % of Exposure:       % Submerged:         1       2       3       4       5         1       2       3       4       5         (0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)         Reciprocating       Oscillating       Standard       Med/Low       Med         Stroke Length:       Degrees of Arc       (0-10)       (10-50)       (500-1000)       (<1000)	Shaft Offset:						- 2	3	4	5
Kotating       Normal       Max       % of Exposure:         RPM:       % of Exposure:       %         RPM:       %       % of Exposure:         Shaft Speed (ft / min) **       Temperature **       F       C         1       2       3       4       5         (0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)         Reciprocating       Oscillating       Standard       Med/Low       Med         Stroke Length:       Degrees of Arc       (0-10)       (10-50)       (500-1000)       (<1000)	Shaft Motion					Particle	lype:			
KPM:       % Submerged:         Shaft Speed (ft / min) **       F         1       2       3       4       5         (0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)         Reciprocating       Oscillating       Standard       Med/Low       Med         Stroke Length:       Degrees of Arc       (0-10)       (10-50)       (500-1000)       (< 1000)	Rotating Normal Max					% of Exp	osure:			
Shaft Speed (if / min) **       Implefature **	RPM:					% Subm	erged:		_	5
1       2       3       4       3       30 mp.       onderip.       ounderip.       ounderip.         (0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)       Pressure (FSI) **         Reciprocating       Oscillating       Standard       Med/Low       Med       High         Stroke Length:       Degrees of Arc       (0-10)       (10-50)       (500-1000)       (< 1000)	Shaft Speed (ft / min) **					Sump:	ature	Underlint	0	F C
(0-500)       (500-750)       (750-1750)       (1750-4000)       (4000-up)         Reciprocating       Oscillating       Standard       Med/Low       Med       High         Stroke Length:       Degrees of Arc       (0-10)       (10-50)       (500-1000)       (< 1000)	1	2 5	4		5	30mp.		undenip.	0	UISIGE.
Reciprocating Stroke Length:       Oscillating Degrees of Arc       Standard       Med/Low       Med       High (0-10)         Normal       Max       Fluid / Lubrication       Grease       Oil         Assembly       Type:       VI Index:       Sump Fill Level:       Oil         Space Restrictions:       Yes       No       Sump Fill Level:       Application Description:         Shaff Installation Direction       Intermittent       Grease       Oil         Usage **       Continuous       Intermittent       Grease       Oil         Cycle Time:       1       2       3       4       5	(0-500) (	500-750) (750-1	750) (1750	-4000) (400	00-up)	Processie	(DSI) **			
Reciprocating         Oscillating         Standard         Med/Low         Med         High           Stroke Length:         Degrees of Arc         (0-10)         (10-50)         (500-1000)         (< 1000)						riessole	(rəi)			
Stroke Length:         Degrees of Arc         (0-10)         (10-50)         (500-1000)         (< 1000)           Normal         Max         Fluid / Lubrication         Grease         Oil           Assembly         Rare         Often         Type:         VI Index:         Sump Fill Level:         VI Index:         Sump Fill Level:         VI Index:         Sump Fill Level:         VI Index:         VI Index:<	Recipr	rocating	Oscillo	ating		Star	ndard	Med/Low	Med	High
Normal         Max         Fluid / Lubrication           Cycle / Min:         Grease         Oil           Assembly         Type:         Type:           Removal:         Rare         Often         VI Index:           Space Restrictions:         Yes         No         Sump Fill Level:           Pilot Gap: **         Yes         No         Application Description:           Shaft Installation Direction         Intermittent         Continuous         Intermittent           Cycle Time:         1         2         3         4           Down Time:         1         2         3         4	Stroke Len	gth:	Degrees o	of Arc		(0-	10)	(10-50)	(500-1000)	(< 1000)
Assembly         Rare         Often         Type:           Removal:         Rare         Often         VI Index:           Space Restrictions:         Yes         No         Sump Fill Level:           Pilot Gap: **         Yes         No         Application Description:           Shaft Installation Direction         Installation Direction into Bore         Installation Direction into Bore         Intermittent           Quege **         Continuous         Intermittent         Grease         Oil           Cycle Time:         1         2         3         4         5	Cycle / N	Normal Min:	Μ	lax		Fluid / L	ubrication			
Assembly Image Structure   Removal: Rare   Space Restrictions: Yes   Yes No   Pilot Gap: ** Yes   Yes No   Shaft Installation Direction   Installation Direction into Bore   Usage ** Continuous   Continuous Intermittent   Cycle Time: 1   1 2   2 3   4 5	, .					Gre	ase		Oil	
Removal: Rare Offen VI Index:   Space Restrictions: Yes No Sump Fill Level:   Pilot Gap: ** Yes No Application Description:   Shaft Installation Direction Intermittent Intermittent   Installation Direction into Bore Intermittent   Continuous Intermittent   Cycle Time: 1 2 3   1 2 3 4	Assembly		-			Type:				
Space Restrictions: Yes No Sump Hill Level:   Pilot Gap: ** Yes No Application Description:   Shaft Installation Direction Intermittent Intermittent   Installation Direction into Bore Intermittent   Continuous Intermittent   Cycle Time: 1 2 3   1 2 3 4 5	Removal:		Rare	Offe	n	VI Inde>				
Pilot Gap: ** Yes No Application Description: Shaft Installation Direction Installation Direction into Bore Usage ** Continuous Intermittent Cycle Time: 1 2 3 4 5 Down Time: 1 2 3 4 5	Space Res	strictions:	Yes	No		Sump Fi	II Level:			
Shaft Installation Direction   Installation Direction into Bore   Installation Direction into Bore   Image **   Continuous   Intermittent   Cycle Time:   1   2   3   4   5   Down Time:   1   2   3   4   5	Pilof Gap:	**	Yes	No		Applico	ition Descrip	otion:		
Installation Direction into Bore	Shaff Insta	llation Direction		-						
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Usage **ContinuousIntermittentCycle Time:1234Down Time:1234	Installation Direction into Bore									
Usage **ContinuousIntermittentCycle Time:1234Down Time:1234										
Cycle Time:         1         2         3         4         5           Down Time:         1         2         3         4         5	Usage ** Continuous Intermittent					1				
Down Time: 1 2 3 4 5	Cycle Time	e: 1	2	3 4	5					
	Down Time	e: 1	2	3 4	5					