

FlexiCase™

Introduction

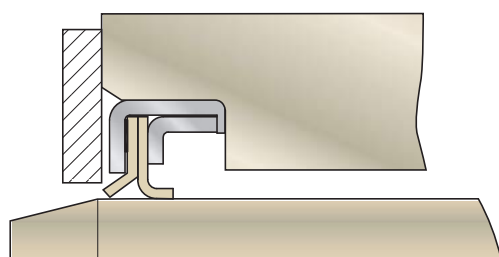
Catalog EPS 5350/USA

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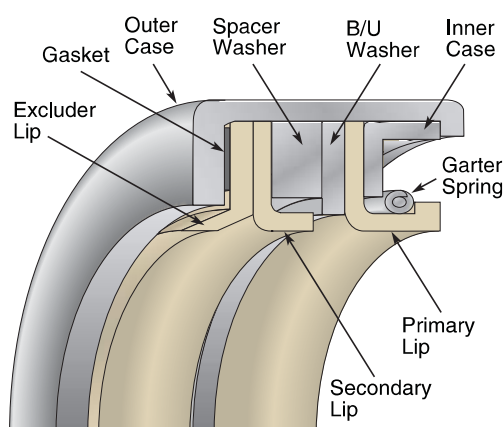
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FlexiCase



FlexiSeal Application



FlexiCase Components



What Is a FlexiCase and How Does It Work?

The Parker FlexiCase is a rotary lip seal that features an ID lip that seals dynamically on a shaft and metal casing on its OD to seal statically press-fit into a bore. A gasket is sandwiched between layers of sealing lips and the can to seal off the potential leak path. Since the lip is not spring-energized, the radial lip contact forces are lower than a rotary FlexiSeal, which allows the seal to function at much higher surface speeds (up to 10,000 sfpm [51 m/s]).

The seals are manufactured from a wide variety of PTFE composites and other machinable plastic materials. Standard gasket choices are fluorocarbon, nitrile, EPDM and Armstrong reinforced paper. Users can choose between stainless steel, cold-rolled steel, zinc plated cold-rolled steel and aluminum. This broad foundation of standard gasket, metal and PTFE materials can be tailored to suit nearly all applications. Standard and Nonstandard FlexiCase profiles are precision machined to fit inch and metric gland geometries. FlexiCase seals are used in demanding applications where the operating conditions exceed the capabilities of elastomeric seals.

Applications

The FlexiCase's versatility makes it suitable for a wide range of applications including:

- | | | |
|--------------|---------------|------------|
| • Motors | • Compressors | • Blowers |
| • Gear Boxes | • Cryogenics | • Spindles |
| • Pumps | • Extruders | • Robotics |
| • Bearings | • Valves | • Mixers |

Markets

FlexiCase's low costs and high production capability make the FlexiCase an appealing choice for customers in a variety of markets including:

- | | | |
|--------------------|-------------------|-------------------|
| • Aerospace | • Medical | • Food Processing |
| • Automotive | • Pharmaceutical | • Electronic |
| • Chemical Process | • Military | • Oil & Gas |
| • Appliances | • Heavy Machinery | • Steel Mill |
| • Machine Tools | • Pulp & Paper | • Plastics |
| • Marine | • Hydraulic | |

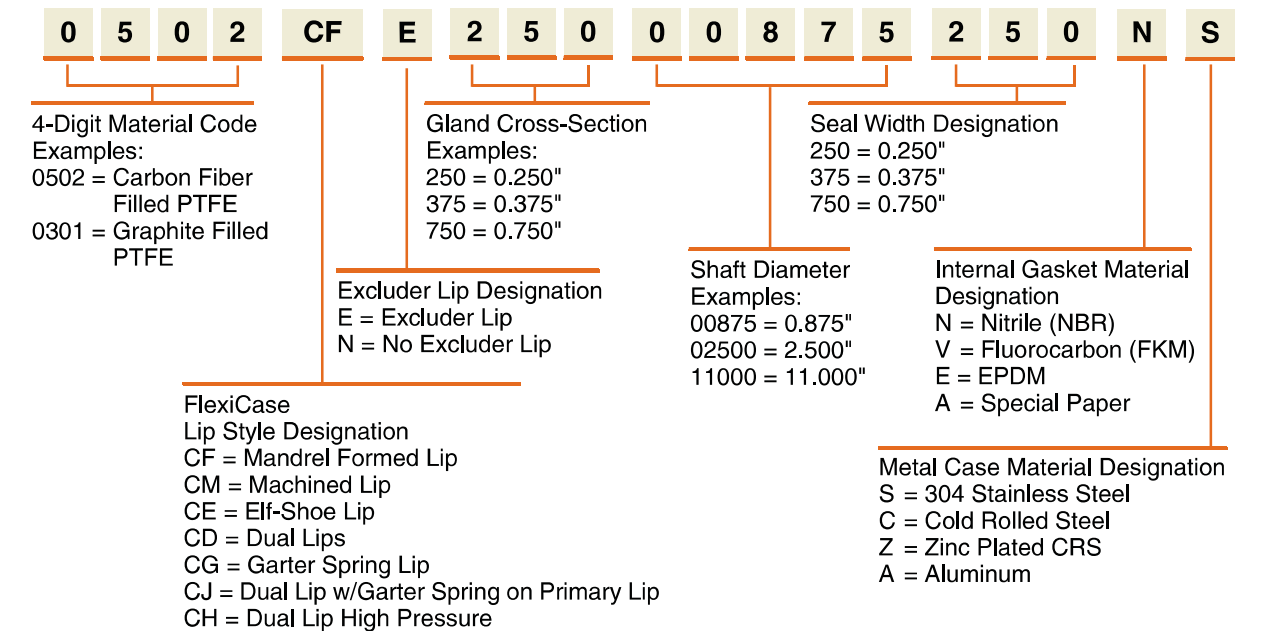
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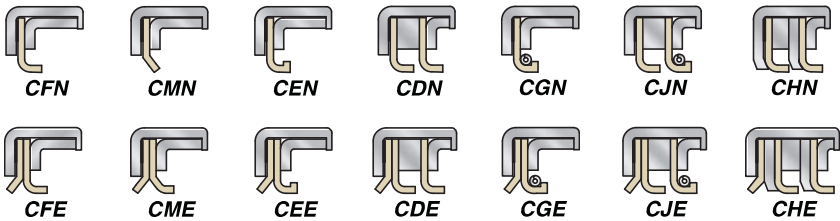
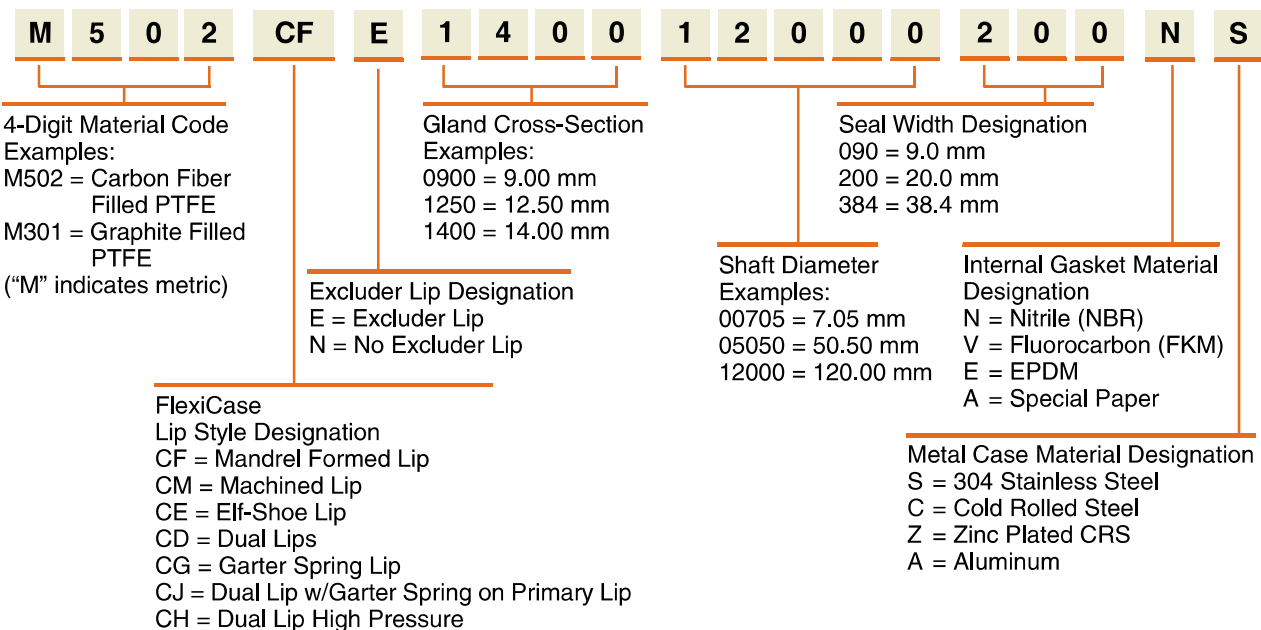
Part Number Nomenclature — FlexiCase

Table 10-1. FlexiCase Part Number Nomenclature

English



Metric



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FlexiCase™ Engineering

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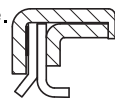
Choosing the Right Design

From Gland Dimensions to Part Number

Step 1 — Choose profile. Choose the best profile for your application from the decision tree and table on **Pages 10-7 through 10-9**, and place the 3-character profile description into the part number as shown here in this example.

Choice: CFE profile

XXXXCFEXXXXXXXXXXXX



Step 2 — Choose material. Choose the best material for the application and place the 4-digit material code into the part number as shown here:

Choice: 0301 — Graphite Filled PTFE

0301CFEXXXXXXXXXXXX

Step 3 — Choose gasket material. Choose the best gasket material after considering the chemicals and temperatures it will be exposed to. Consult the *Parker O-Ring Handbook* (ORD 5700A/US Section II) as a general reference and choose the most appropriate material family. Place in the part number as shown here:

Choice: Nitrile gasket (N code)

0301CFEXXXXXXXXXXXXN

Step 4 — Choose metal can material. Consult **Page 10-6** and choose the best fit for the application. Place the choices in the part number as shown here:

Choice: Cold rolled steel can (C code)

0301CFEXXXXXXXXXXXXNC

Step 5 — Fill in the size portion of the part number. Choose the optimal size of the part based on the limitations of the cross-section and diameter (**Pages 10-8 to 10-9**) and place into the part number as shown:

Choice: 2.250" shaft x 3.125 ± .0015 bore Ø x 0.500" bore depth

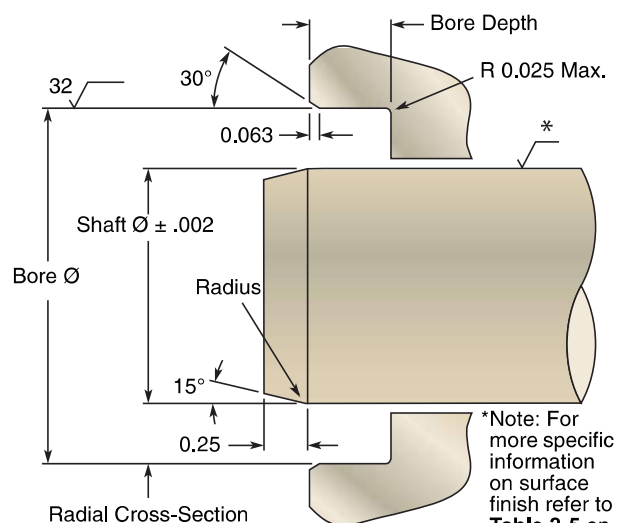
Calculate Radial Gland Cross-Section and input into part number:

$(3.125" \text{ Bore} - 2.250" \text{ Shaft}) \div 2 = 0.4375"$, rounds to 0.438"

0301CFE438XXXXXXXXNC

Input shaft diameter into part number:

0301CFE43802250XXNC



Step 6 — Find minimum seal width from **Pages 10-8 to 10-9** and input into part number. Minimum seal width is always the most economical, but you can choose any width between the minimum recommended seal width and the actual bore depth. In this case you could choose any width between 0.200" and 0.500".

Minimum seal width = 0.200"

0301CFE43802250200NC

From Part Number to Gland Dimensions

Step 1 — Extract shaft dimensions from part number:

0301CGN50001125437VS

01125 = 1.125" shaft diameter

Apply tolerance according to **Table 10-2**

For 1.125" shaft tolerance = ±.003" plunge grind shaft to achieve low surface finish

Step 2 — Extract bore diameter from part number:

0301CGN50001125437VS

500 = 0.500" cross-section

Bore Ø = Shaft Ø + (2 x cross-section)

Bore Ø = 1.125" + (2 x .500) = 2.125"

Apply tolerance according to **Table 10-2**

For 2.125" bore, tolerance = ±.001"

Step 3 — Extract bore depth from part number:

0301CGN50001125437VS

437 = 0.437" seal height

min. bore depth = seal height

min. bore depth = 0.437"

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Table 10-2. Bore Tolerance

Bore Ø	Bore Tolerance	Max. Housing Radius	Metric Bore Ø	Bore Tolerance	Max. Housing Radius
Up to 3"	±.001"	0.045"	Up to 75 mm	±.025 mm	1.14 mm
3.001 to 6"	±.0015"	0.054"	75.01 to 150 mm	±.038 mm	1.37 mm
6.001 to 8"	±.002"	0.072"	150.01 to 200 mm	±.050 mm	1.83 mm
8.001 to 9"	±.002"	0.090"	200.01 to 230 mm	±.050 mm	2.29 mm
9.001 to 10"	±.002"	0.125"	230.01 to 254 mm	±.050 mm	3.18 mm

Table 10-3. Part Number Examples

	Profile	Shaft Ø	Bore Ø	Min. Bore Depth	Gasket Material
0204CEN43702750375VCN	CEN	2.750 ± .002"	3.624 ± .0015"	0.385"	FKM
0301CJE50104548525NSP	CJE	4.548 ± .002"	5.550 ± .0015"	0.535"	Nitrile
M127CDN091004800140NSZ	CDN	48.0 ± .08 mm	66.2 ± .025 mm	14.25 mm	Nitrile
M615CFE125013500200EAG	CFE	135.0 ± .08 mm	160.0 ± .050 mm	20.25 mm	EPDM

FlexiCase Installation

Proper installation tools and techniques must be used to install the seal without damaging the critical sealing areas.

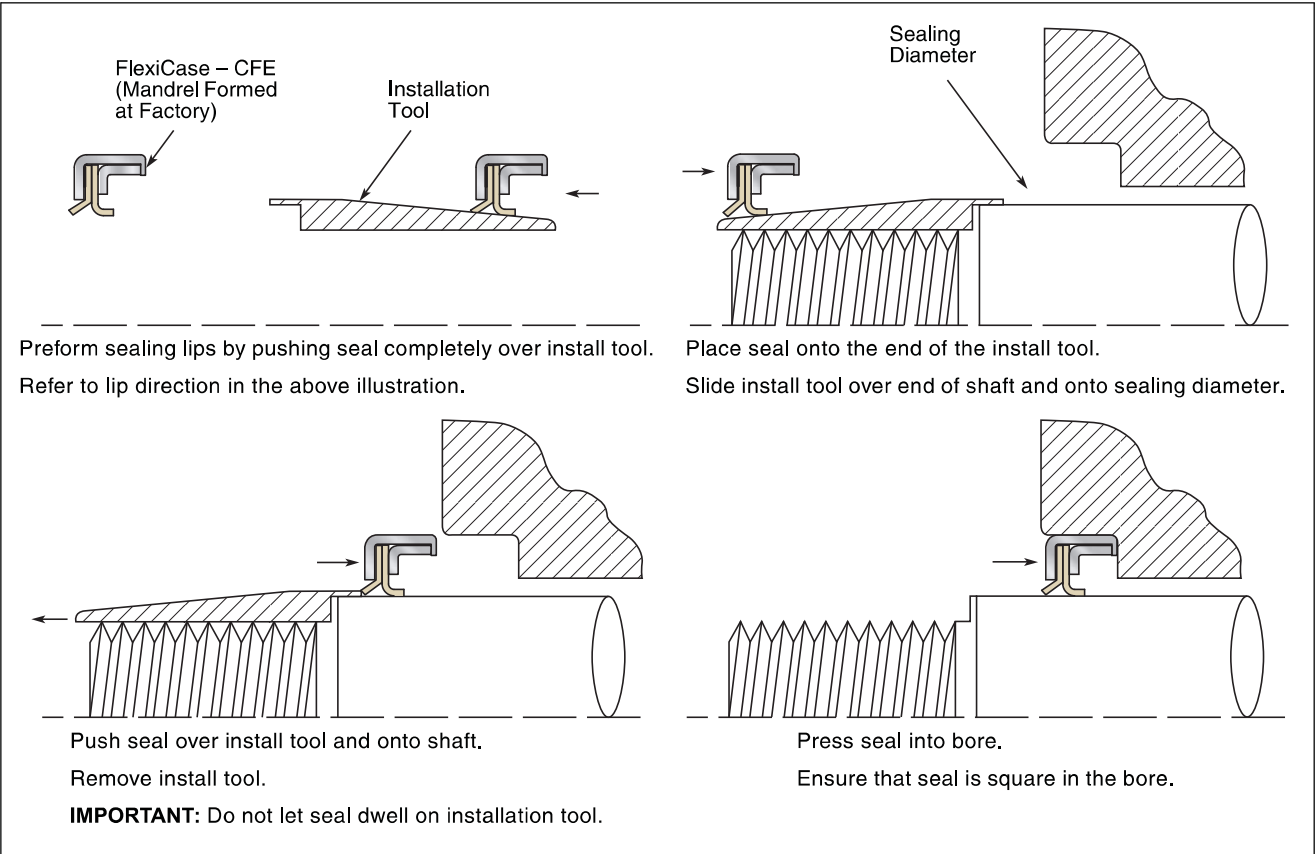


Figure 10-1. FlexiCase Installation

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FlexiCase Installation Tool

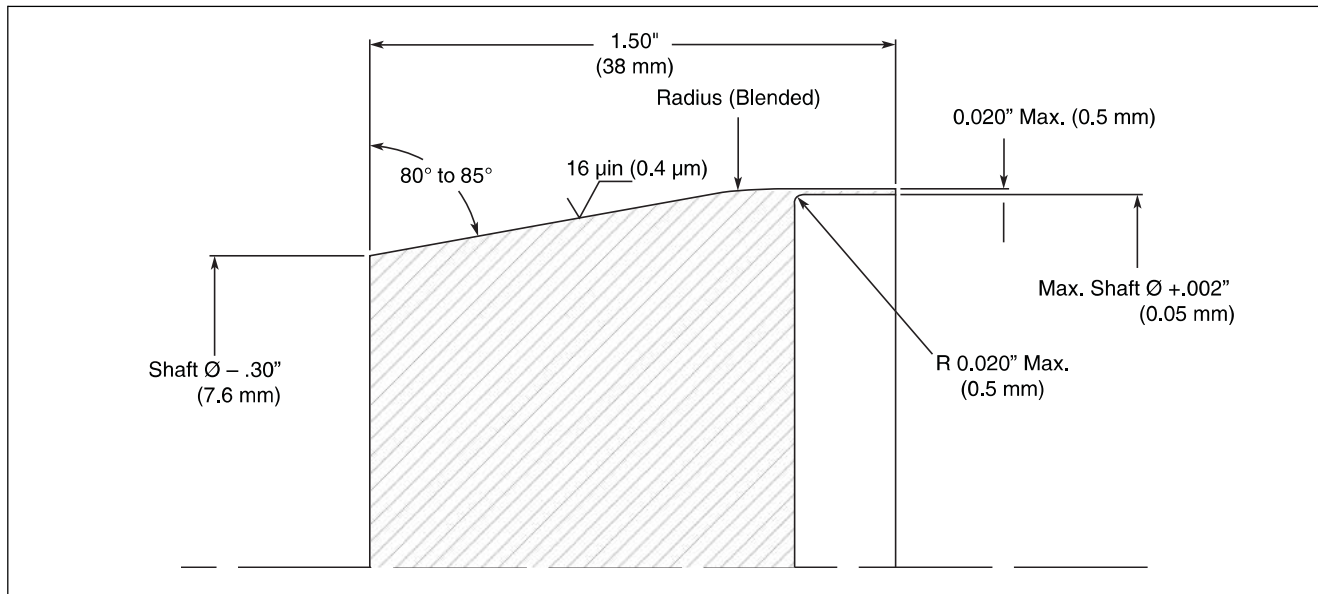


Figure 10-2. Installation Tool Dimensions

Common Materials Used in this Product

The most popular fillers for FlexiCase products are graphite, fiberglass/molybdenum disulfide, carbon fiber and mineral.



A complete listing of material properties and limitations appears on **Pages 9-7** and **9-8**. Feel free to contact the EPS Division PTFE Engineering Team at (801) 972-3000 for more guidance on material selection.

0301 — Graphite Filled

Since graphite is often used as a lubricant, it does not significantly increase the coefficient of friction of PTFE when used as a filler. The low friction allows the compound to be used when both shaft speed and pressure are high. Graphite also is chemically inert which enables its use in corrosive medias.

0615 — Proprietary Low Wear PTFE

This proprietary filled PTFE offers low wear and friction properties, used in general applications where long life is required. Not recommended for applications with abrasive media.

0204 — Molybdenum Disulfide and Fiberglass Filled

Molybdenum disulfide increases the hardness of the seal surface while decreasing friction. It is normally used in small proportions combined with other fillers such as glass. MoS₂ is inert towards most chemicals.

0502 — Carbon Fiber Filled

Carbon fiber lowers creep, increases flex and compressive modulus and raises hardness. Coefficient of thermal expansion is lowered and thermal conductivity is higher for compounds of carbon fiber filled PTFE. Ideal for automotive applications in shock absorbers and water pumps.

0127 — Mineral Filled

Mineral is ideal for improved upper temperatures and offers low abrasion to soft surfaces. PTFE with this filler can easily be qualified to FDA and other food-grade specifications.

Metal Can Materials

S — Stainless Steel

Good chemical resistance properties up to 600 °F (315 °C). Resists corrosive media up to 400 °F (205 °C).

C — Cold-Rolled Steel

Good in oils and other media friendly to ferrous metals up to 600 °F (315 °C). Excellent value for cost-sensitive projects.

Z — Zinc-Plated Cold-Rolled Steel

Good in oils and mildly corrosive media up to 450 °F (230 °C) . A lower cost alternative to stainless steel.

A — Aluminum

Excellent lightweight, high-strength material. Should be used with aluminum housing when thermal cycling is likely.

FlexiCase™ Product Offering

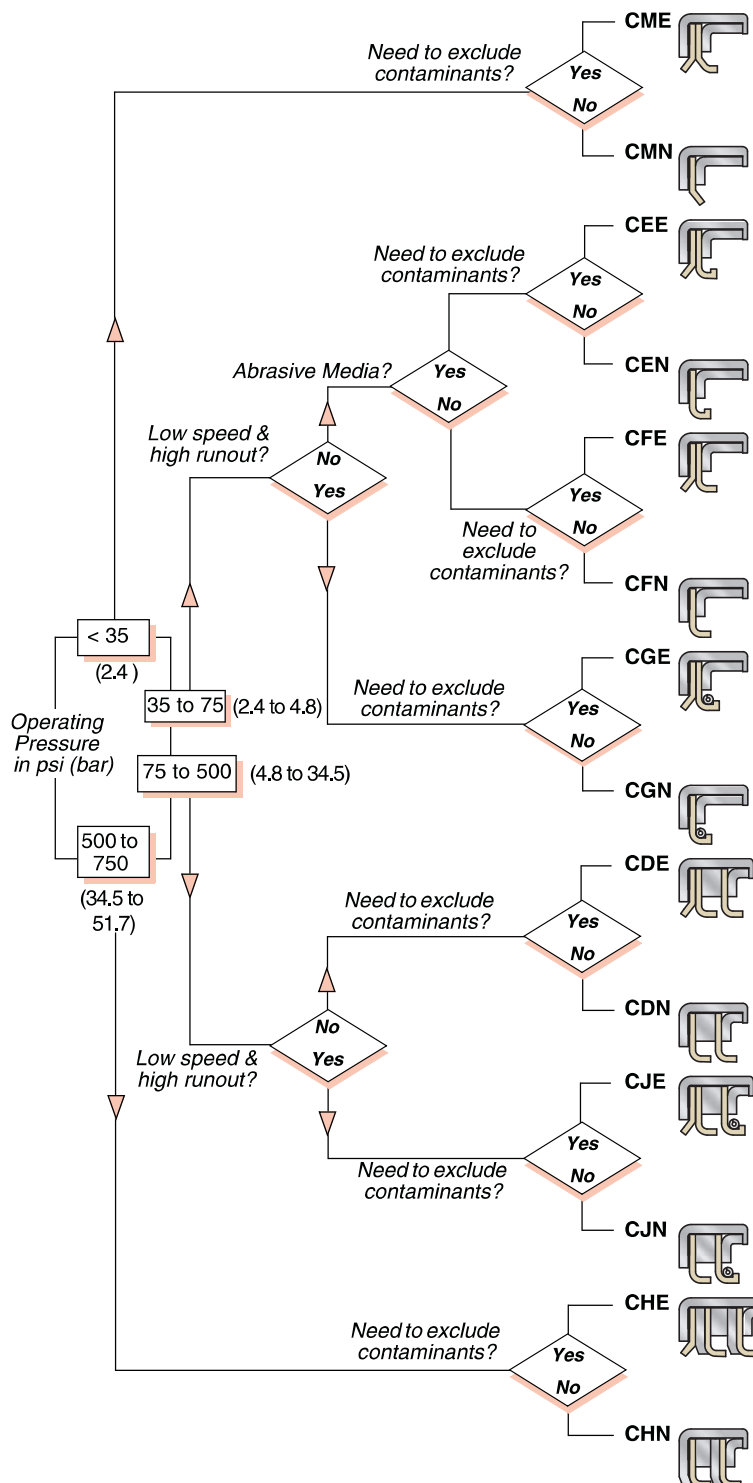
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The key application considerations that help in the selection of the right FlexiCase profile are operating temperature, media abrasiveness, pressure, external contamination, friction requirements, shaft diameter and Total Indicator Runout (TIR). Also see **Table 10-4** for more information on temperatures, pressures, speeds and friction.

Total Indicator Runout (TIR) is how far the shaft is misaligned with the bore during rotation. This is fully characterized in the general engineering section on **Page 2-25**. Four FlexiCase profiles are able to handle continuous service with runout conditions up to 0.010" (0.25 mm) if speeds are slower than 200 RPM: the CGN, CGE, CJN and CJE. Keep in mind that the faster a shaft spins, the less TIR the seal can withstand.

These decision trees are to be used as an engineering guide only. Often several other parameters must be considered to optimize seal design. Contact Parker's PTFE Engineering Team for confirmation of your choice or further recommendations. Parker also recommends that any seal be tested in the application conditions before releasing for production.

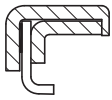
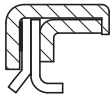
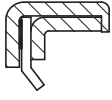

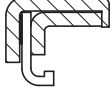



Decision Tree



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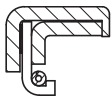
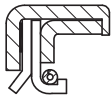
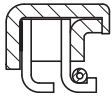



Profiles

Table 10-4. Product Profiles

Profile	Features	Recommended Applications	Shaft Diameter Limits	Cross-Section Limits	Min. Width Limits*	Pressure Limit at Room Temp.	Surface Speed Max.	Friction Rating
CFN 	Formed Primary Lip	General purpose rotary shaft seal.	0.125" to 6" (3 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.175" (4.5 mm)	250 psi (17 bar)	5000 sfpm (25 m/s)	2
CFE 	Formed Primary Lip w/ Excluder Lip	Ideal to keep oil in and water & dirt out.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.200" (5 mm)	125 psi (9 bar)	5000 sfpm (25 m/s)	3
CMN 	Machined Primary Lip	General purpose rotary shaft seal w/ low breakaway torque.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.175" (4.5 mm)	125 psi (9 bar)	6000 sfpm (30 m/s)	1
CME 	Machined Primary Lip w/ Excluder Lip	Ideal to keep oil in and water & dirt out. Low Breakaway torque.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.200" (5 mm)	125 psi (9 bar)	6000 sfpm (30 m/s)	2
CEN 	Elf-Toe Primary Lip	General purpose rotary shaft seal where shaft runout is 0.005" to 0.010" or abrasive media.	0.125" to 6" (3 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.175" (4.5 mm)	250 psi (17 bar)	5000 sfpm (25 m/s)	2
CEE 	Elf-Toe Primary Lip w/ Excluder Lip	Ideal to keep oil in and water & dirt out where shaft runout is 0.005" to 0.010" or abrasive media.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.200" (5 mm)	125 psi (9 bar)	5000 sfpm (25 m/s)	3
CDN 	Dual Primary Lips	Redundant sealing for aircraft or other low leakage systems.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	250 psi (17 bar)	5000 sfpm (25 m/s)	3
CDE 	Dual Primary Lips w/ Excluder Lip	Redundant sealing for aircraft or other low leakage systems. Keeps water & dirt out.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	250 psi (17 bar)	5000 sfpm (25 m/s)	4

* Minimum width requirements can be reduced significantly if pressures are low and diameters are small. Consult PTFE Engineering for recommendations.

Table 10-5. Product Profiles (Continued)

Profile	Features	Recommended Applications	Shaft Diameter Limits	Cross-Section Limits	Min. Width Limits*	Pressure Limit at Room Temp.	Surface Speed Max.	Friction Rating
CGN 	Primary Lip Energized with Garter Spring	Use when shaft runout is 0.010" to 0.020" or abrasive media.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.200" (5 mm)	125 psi (9 bar)	2000 sfpm (10 m/s)	3
CGE 	Primary Lip Energized with Garter Spring w/ Excluder Lip	Use when shaft runout is 0.010" to 0.020" or abrasive media. Keeps water & dirt out.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.200" (5 mm)	125 psi (9 bar)	2000 sfpm (10 m/s)	4
CJN 	Dual Lip Seal w/ Primary Lip Energized with Garter Spring	Use when redundant sealing is needed & shaft runout is 0.010" to 0.020" or abrasive media.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	125 psi (9 bar)	2000 sfpm (10 m/s)	4
CJE 	Dual Lip Seal w/ Primary Lip Energized with Garter Spring w/ Excluder Lip	Use when redundant sealing is needed & shaft runout is 0.010" to 0.020" or abrasive media. Keeps water & dirt out.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	125 psi (17 bar)	2000 sfpm (10 m/s)	5
CHN 	High Pressure Dual-Lip Seal with Metal Backup Washer	Redundant seal for high pressure aircraft or other low leakage systems.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	500 psi (34 bar)	2000 sfpm (10 m/s)	4
CHE 	High Pressure Dual-Lip Seal with Metal Backup Washer w/ Excluder Lip	Redundant seal for high pressure aircraft or other low leakage systems. Keeps water & dirt out.	0.250" to 6" (6 to 150 mm)	Min 0.250" (50 mm) Max 2" (6 mm)	0.500" (13 mm)	500 psi (34 bar)	2000 sfpm (10 m/s)	5

* Minimum width requirements can be reduced significantly if pressures are low and diameters are small. Consult PTFE Engineering for recommendations.