

Low Pressure Oil and Grease Seals

1. SCOPE

1.1 This standard describes the material specifications of the different types of oil and grease seals and their applications in New Holland NA products.

1.2 This standard does not include seals for high pressure applications. Design applications requiring high pressure sealing should be reviewed with potential suppliers for selection and construction availability.

2. PURPOSE

To provide information to product design for selecting and designing seals.

3. DESIGNATION

3.1 Typical call-out on a drawing shall be:

3.1.1 For an inch seal:

Oil Seal N 1.750
 Name _____
 Lip Material _____
 Shaft Size _____

3.1.2 For a metric seal:

Oil Seal N 50
 Name _____
 Lip Material _____
 Shaft Size _____

NOTE: Either of the above typical descriptions is required for use in all company-wide computer generated documents. The description on hand-drawn assembly drawings should follow the same practice.

3.2 STANDARD DRAWING FORM

For the standard drawing form, see standard 86594952 (FNHA-3-B-182.00).

3.3 Specify standard 86507677 in the Applicable Standards block on the drawing following the procedure described in standard 86511126 (FNHA-3-B-100.00).

3.4 PART NUMBER ASSIGNMENT

Follow the procedure described in standard 86505922 (FNHA 3-A-005.00) for the assignment of new part numbers.

4. RELATED SPECIFICATIONS

4.1 REFERENCE STANDARDS

ES 22.02—Rubber Oil Seals

SAE J200—Classification System for Rubber Materials

SAE J946—Application Guide to Radial Lip Seals 86505922 (FNHA 3-A-005.00)—Assignment of Standard Parts Part Numbers

86511126 (FNHA-3-B-100.00)—Specifying and Referencing Standards Numbers on Drawings

86594952 (FNHA-3-B-182.00)—Standard Drawing Form for Oil and Grease Seals

4.2 This standard replaces the following company standards:

New Holland
Versatile

2.31.3
1-B-162

					NAME	STD OIL & GREASE SEALS		
					 NEW HOLLAND		ENGINEERING SPECIFICATION	
							FRAME 1	OF 14
							PART NUMBER	
							86507677	
B	RE	113762	AUG 99	THE INFORMATION HEREON IS THE CONFIDENTIAL AND PROPRIETARY PROPERTY OF NEW HOLLAND N. V. AND/OR ITS SUBSIDIARIES. ANY USE, EXCEPT THAT FOR WHICH IT MAY BE LOANED, IS PROHIBITED.				
FRAME NO.	REV	BY	ECN NO.					DATE
APP.	DRAWN	RP	MAR 99					
GES 7/99	CHECKED							

5. LIP REQUIREMENTS

5.1 MATERIAL

5.1.1 The following is a description of the four most common industry designations for lip materials.

N—Nitrile Buna-N 70 durometer compound is recommended for the majority of common applications due to its good sealing properties and low cost. It works well within a range of -40°F to 250°F temperatures and provides compatibility with water and most common mineral oils and greases. Specify on drawing: "Lip Material – Nitrile".

P—Polyacrylate (ACM) compounds are recommended for temperature applications ranging from -30°F to 300°F , such as gear boxes in which oils with EP (Extreme Pressure) additives are used and higher temperatures are encountered. However, they offer poor sealing in dry running conditions and cost more than Nitrile. Specify on drawing: "Lip Material – Polyacrylate".

S—Silicone compounds offer the widest range of normal operating temperatures ranging from -58°F to 365°F . However, they do not perform

well in dry running conditions and should not be used with EP compounds. Specify on drawing: "Lip Material – Silicone".

V—Fluoroelastomers (Viton) compounds are premium lip materials offering the widest temperature range and chemical resistance. Viton will handle temperatures from -40°F to over 400°F . Viton will resist most special lubricants and chemicals that can destroy nitrile, polyacrylates and silicones. Viton is extremely resistant to abrasion and provides superior wear and performance. Viton works in dry running applications, but only for intermittent periods. Viton is a registered trademark of E.I. DuPont. Specify on drawing: "Lip Material – Fluoroelastomer".

Other compounds are available from individual suppliers.

5.1.2 It is important to consider the environment in which a seal will operate when selecting the lip compound. The most important factors are:

Temperature
Medium being sealed
Pressure
Shaft speed and finish

Table 1 provides general information to help select the compound according to its physical properties.

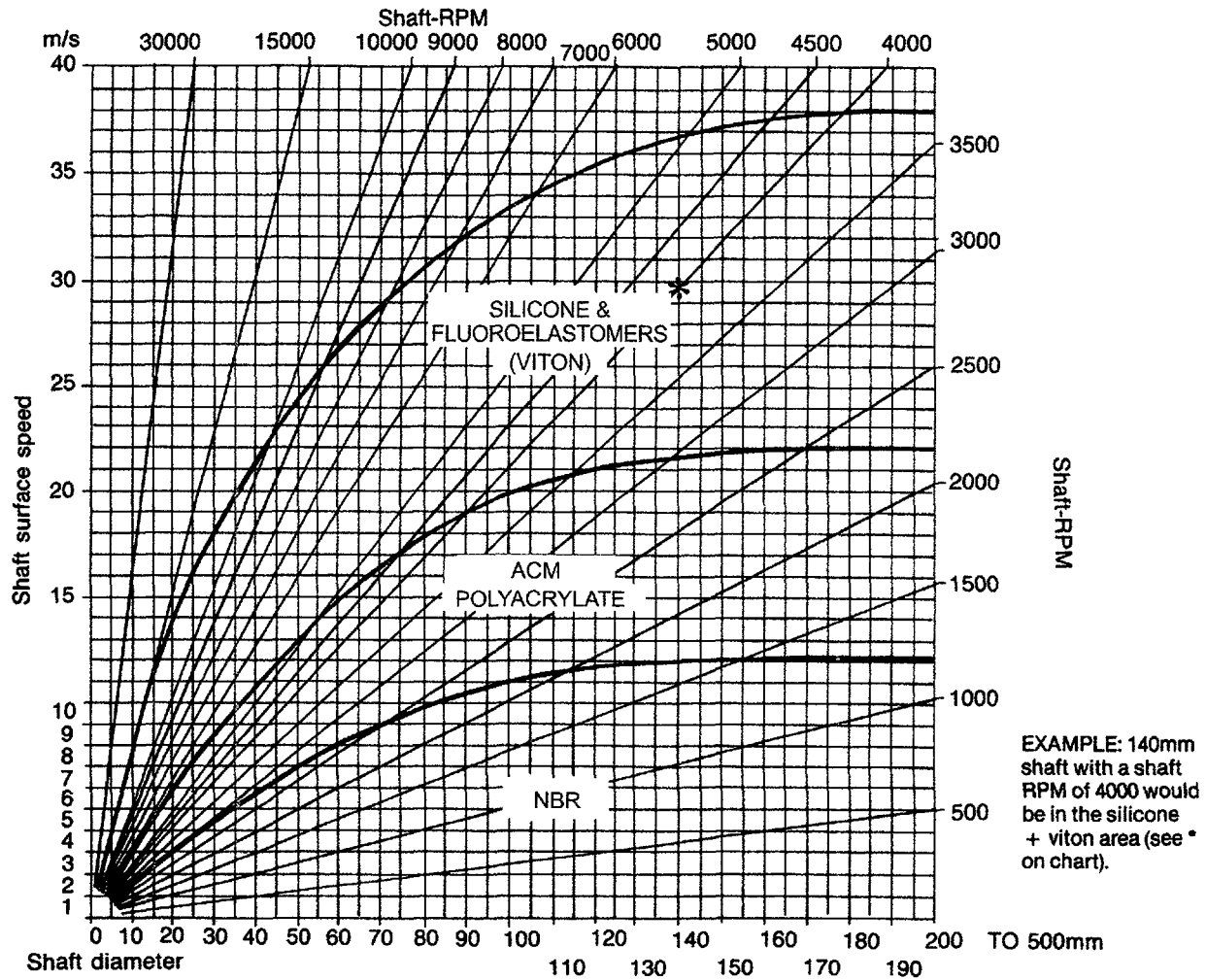
TABLE 1—Physical Properties of the Four Major Sealing Lip Compounds

Compound	Nitrile (N)	Polyacrylate (P)	Silicone (S)	Fluoroelastomer (V)
Temperature Range	-40 to 250°F (-40 to 121°C)	-30 to 300°F (-34 to 149°C)	-58 to 365°F (-50 to 185°C)	-40 to 400°F (-40 to 204°C)
Abrasion Resistance	2	3	4	2
Compression Set	2	3	2	2
Cracking Resistance	3	3	1	2
Cut Growth Resistance	2	2	4	4
Flex Cracking Resistance	3	3	2	2
Impact Strength	2	4	3	3
Oxidation Resistance	2	1	1	1
Sunlight Resistance	3	1	1	1
Tear Resistance	2	4	4	3
Weathering Resistance	2	1	1	1

Note: 1 = Excellent, 2 = Good, 3 = Fair, 4 = Poor

 NEW HOLLAND	NAME				PART NUMBER	
	STD OIL & GREASE SEALS ENGINEERING SPECIFICATION				REV. B	FRAME 2
				OF 14	 86507677	

FIGURE 1—Recommended Shaft Speeds Under Non-pressure Conditions



Temperature ranges may vary depending on the operating conditions. For further information on the characteristics of each compound see SAE J200 and SAE J946.

Figure 1 provides information about shaft speeds related to the lip material compounds.

5.2 METHOD OF LIP RETENTION

B—Bonded: Generally requires less space and is cheaper than assembled seals.

^—Assembled: Held between metal stampings or linched in a channel formed by the outer case.

5.3 SEAL LIP LOADING

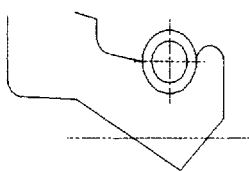
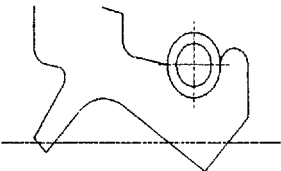
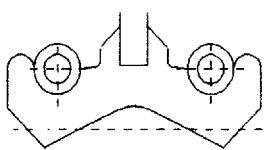
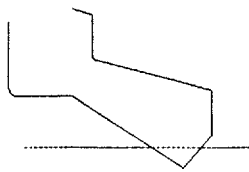
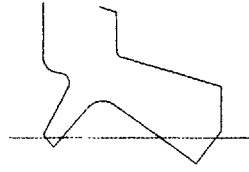
Spring-loaded seals apply more pressure between the seal lip and the shaft and are required if shaft runout can be greater than .005 TIR.

5.4 LIP DESIGN

There are five principal lip designs which are illustrated in Figure 2. For more specific application requirements, consult supplier catalogs for specialized designs.

	NAME				PART NUMBER	
	STD OIL & GREASE SEALS				Documents	
ENGINEERING SPECIFICATION				REV. B	FRAME 3	OF 14
				36507677		

FIGURE 2—Lip Design

Cross Section View	Type	General Application
	Single Lip with a Garter Spring	Generally used for sealing lower pressure applications up to 7 psi. However, not recommended for use in applications where the surrounding environment contains any dirt or contaminants.
	Dual Lip with a Garter Spring	Generally used for sealing lower pressure applications up to 7 psi. The additional dust lip provides increased protection for the primary lip. The cavity between the two lips can also be filled with grease to limit shaft corrosion and allow brief operation without media lubrication.
	Double Lip with Two Garter Springs	Designed to separate two media.
	Single Lip without a Garter Spring	Generally used for sealing a non-pressure medium, especially for sealing grease or viscous fluids. These seals are also used for dust and dirt exclusion.
	Dual Lip without a Garter Spring	Similar to the above design, but the additional dust lip provides increased protection for the primary lip. The cavity between the two lips can also be filled with grease to limit shaft corrosion and allow brief operation without media lubrication.

	NAME				PART NUMBER	
	STD OIL & GREASE SEALS				Documents	
	ENGINEERING SPECIFICATION	REV. B	FRAME 4	OF 14	86507677	

TABLE 2—Specifications of Metal Case and Garter Spring

Standard	SAE No.	DIN No.	Material
Metal Case	1008–1010	1624	Carbon Steel
	30304	17 224	Stainless Steel
Garter Spring	1070–1090	17 223	Piano Wire
	30304	17 224	Stainless Steel

6. METAL CASE AND SPRING REQUIREMENTS

6.1 For standard applications, a carbon steel metal case and carbon steel garter springs are supplied. For applications involving corrosion or extreme working conditions, a stainless steel alternative can be used. Refer to Table 2 for material specifications.

6.2 Figure 3 shows the five basic types of case and seal O.D construction. Other more specific designs are also available from individual suppliers.

SHAFT REQUIREMENTS

7.1 SHAFT MATERIAL

For the best results from shaft seals, consider the shaft material, hardness, roughness, eccentricity and tolerance according to the following points:

7.1.1 Seals perform best on a medium carbon steel or stainless steel shaft. Heat treatment or nitriding is especially recommended. Stainless steel is more suitable to seal water at low surface velocity.

7.1.2 Shaft Hardness

In the area where the sealing lip contacts the shaft, a minimum hardness of 45 Rc is recommended. Where lubrication is doubtful, abrasive matter is present or shaft speed is greater than 14 m/sec, 55 Rc is preferred.

7.1.3 Shaft Roughness

We recommend the shaft be machined to a surface roughness of $R_a = 10$ to 20 ($R_a = 0.2$ to $0.8 \mu m$). In the area of the contact surface, any rifling marks are not permitted.

7.1.4 Shaft Eccentricity

Two types of shaft eccentricity affect seal performance. They are dynamic runout (double dynamic eccentricity) and offset (shaft to bore misalignment or static eccentricity). The allowable eccentricity is referred to in Figure 4 and Figure 5.

7.1.5 Shaft Speed

The recommended shaft speed corresponding to various lip material compounds is shown in Figure 1.

7.1.6 Shaft Tolerance

The recommended shaft tolerances are listed in Table 3 and Table 4.

 NEW HOLLAND	NAME				PART NUMBER	
	STD OIL & GREASE SEALS ENGINEERING SPECIFICATION				REV. B	FRAME 5
				OF 14	 36507677	