

# **SUGGESTED FERROUS METALS IN CONTACT WITH BAL SEAL® SPRING-ENERGIZED SEALS IN DYNAMIC APPLICATIONS**

Technical Report  
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## 1.0 DISCUSSION

The type of material that the seals come in contact with in a dynamic service substantially affects life of BAL™ Seals and careful consideration should be given to maximize BAL Seal performance. The main factors that affect BAL Seal performance are: hardness of the shaft or bore; surface finish of this shaft or bore; and type of material in contact with the seal dynamically.

## 2.0 MATERIALS MOST COMMONLY USED IN CONTACT WITH BAL™ SEALS

Generally, the harder the material, the lower the molecular adhesion that occurs between the seal and the sealing surface and the lower the friction and wear of the BAL Seal. Therefore, harder materials are always preferred.

The following chart shows some of the most common steel materials used and some of their properties.

MATERIAL	ROCKWELL HARDNESS C SCALE HEAT TREATED	CORROSION RESISTANCE	ABRASION TO BAL SEAL
Tool Steel	50-65	Fair	Low
High Alloy Steel	45-68	Medium	Low
Precipitation Hardening Steel	41-43	Good	Low
Austenitic Stainless Steel Series 300	25-30	Good to Very Good	High
Low-Carbon Steel	25-30	Poor	High

## 3.0 ABRASION TO THE BAL™ SEAL

Abrasion occurs due to the intimate contact between the seal and the sealing surface, which causes the metal surface irregularities to plow into the soft BAL Seal and wear it away. Materials with hard particles in a soft matrix tend to wear the soft seal much faster than materials that have a hard uniform surface.

## 4.0 SURFACE FINISH AND ABRASION

Generally, the better the surface finish the lower the abrasion, especially under conditions of high pressure, high temperature or very high speeds.

At low speeds and low pressures, it is sometimes desirable to have a coarser finish. Generally, for high pressure or high temperature, a 2 to 8 RMS (0.046 to 0.183 micron) finish should be used. For low speeds or low pressures, a 4 to 12 RMS (0.091 to 0.275 micron) is suggested.

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