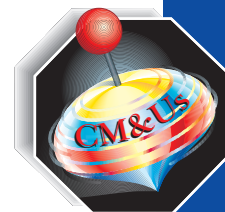


SEAL ELEMENTS MADE OF LEAD BRONZE FOR HIGH PRESSURE RECIPROCATING COMPRESSORS



RECIPROCATING COMPRESSORS

INTRODUCTION

Starting in the 1920s with ammonia synthesis compressors having a discharge pressure of 1000 bar and arriving at today's polyethylene compressors with pressures up to 3500 bar, Nuovo Pignone has acquired a wealth of experience in the field of high pressure compressors. For these machines, the most critical elements are the cylinder components and the seal elements in particular. When pressures in the cylinders exceed 400 bar, it is no longer possible to successfully utilize plastic materials for seal elements and it becomes necessary to use metal rings instead. For years Nuovo Pignone has successfully utilized a very special type of bronze for the seal rings of polyethylene compressors, achieving extraordinary results in terms of life and efficiency. The utilization of this material in the high pressure field results in **a dramatic increase in life with consequent dramatic increase in maintenance intervals, resulting in lower operating costs and increased plant productivity.**

TECHNICAL DESCRIPTION

The bronze utilized is a special self-lubricating copper alloy, characterized by a particular composition and processing which makes it an absolutely unique material in terms of life and mechanical strength.

The normal bronze for seal elements subjected to high pressure is characterized by the presence of copper, tin and lead (plus very low percentages of other elements). In lead bronze of the "conventional" type, the lead is distributed in the form of a film in the copper - tin matrix, making it brittle and impairing mechanical and creep properties.

The special bronze utilized by Nuovo Pignone instead, has lead nodules of extremely small size distributed in perfectly homogeneously within the copper-tin matrix. This is achieved through a special casting procedure with continuous control of chemical composition and intergranular distribution.

This unique structure imparts the following properties to the alloy.



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- A rate of wear 2 to 12 times less than that of conventional alloys.
- Usable under severe lubrication conditions since the material is self-lubricating.
- Low friction coefficient and thus less heat produced. The friction coefficient is also stable with respect to changes in temperature.
- Resistance to corrosion.
- Resistance to temperature.

BENEFITS

The resulting benefits are:

- Dramatic increase in life; increase in maintenance intervals, longer MTBF, lower operating costs.
- Increased reliability and operating safety of machines.
- Flexibility and safety: these materials are capable of surviving even under extreme operating conditions such as intermittent lubrication thus avoiding or minimizing the risk of damage.

SUMMARY

- These special lead bronze sealing elements for high pressure compressors, deliver extended life compared to other seals.

- Examples over 20,000 hours of continuous service on polyethylene compressors at over 3000 barg of discharge pressure
- Include: 60,000 hours of continuous service on the same compressors at over 1700 barg of discharge pressure.

APPLICATION

This modification is applicable to all polyethylene compressors and to all conventional compressors where there are critical conditions and especially those having discharge pressure of over 400 bar.

SCOPE OF SUPPLY

For polyethylene compressors, the supply consists of the following items:

- 6 pairs of radial tangential seals
- 1 plunger bush
- 1 pressure breaker ring

In conventional compressors with pressures of over 400 bar the supply consists of the same number of seal elements, with the same geometry, but using the above described material.



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