



**IMM** Laboratorio di  
Metallurgia e  
Materiali



# COMPARATIVE STUDY OF SPARE PARTS MATERIALS FOR SEPARATORS AND FRESH WATER GENERATORS

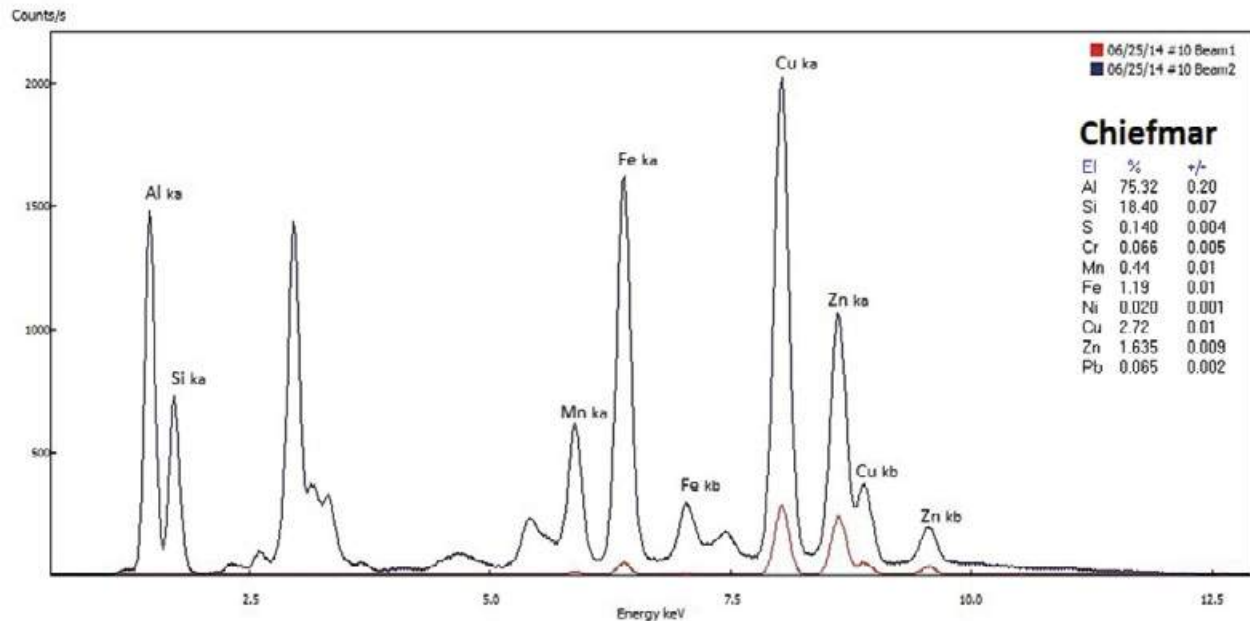
Mr. Andrea Pecunia - Prof. Paolo Piccardo

# CHIEFMAR®

SINCE 1982

Neck bearing cover (part no: 571405-80)

Chiefmar's neck bearing covers are made of AISI B390.0, a hypereutectic aluminium-silicon alloy made of a solid solution of silicon in aluminium and pure silicon. The significant presence of pure silicon provides excellent wear resistance and increased hardness that ensures better pressure tightness than the originals. The B390.0 also performs better at high temperatures: the hot cracking resistance is higher and the shrinkage tendency is lower thanks to the solid solution of silicon in aluminium that lowers the thermal expansion coefficient.

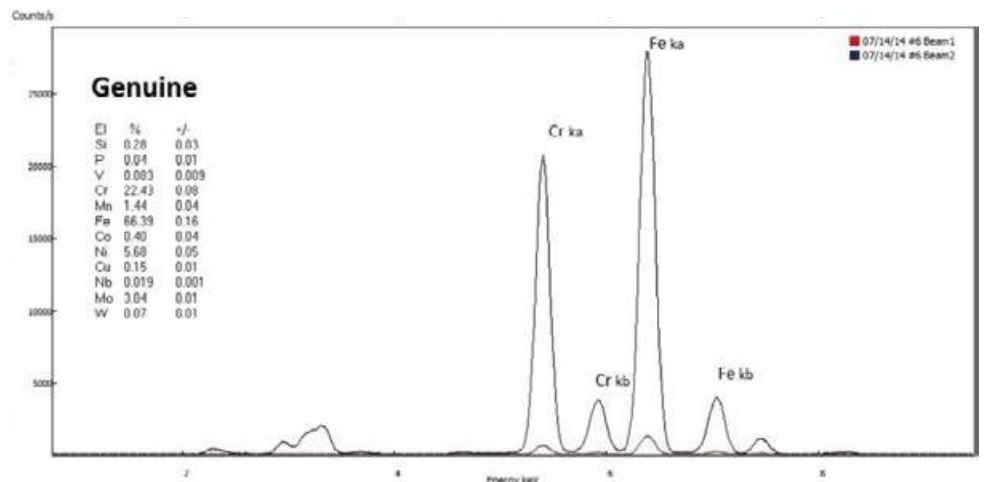
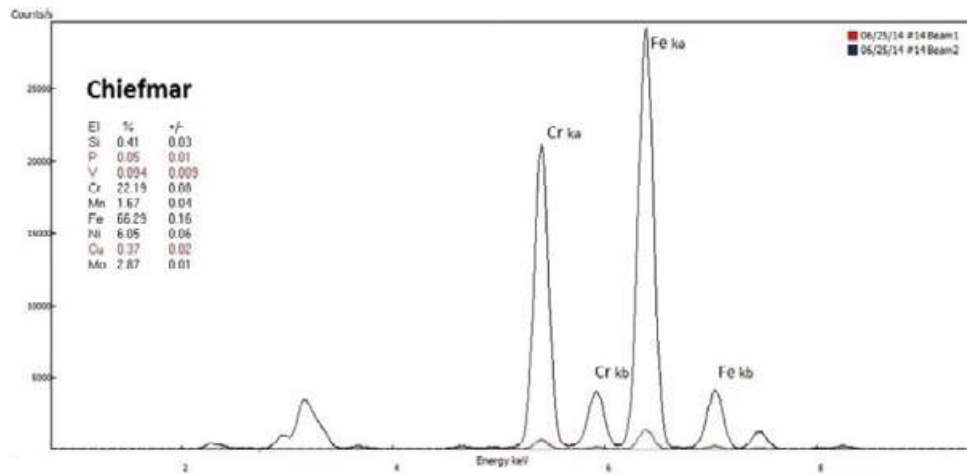


Lock ring (part no: 561876-80)

Chiefmar uses the same material as the original to produce its AISI 2205 lock rings of duplex stainless steel with a 50/50 mixed microstructure of austenite and ferrite. The ferrite portion provides excellent resistance to stress corrosion cracking in chloride-rich environments (typical of seawater) and protection against erosion corrosion and corrosion fatigue; the austenite portion ensures resistance to general and localized corrosion (pitting and crevice corrosion). The double metallic component also allows for optimum performance in all harsh environments and improves the mechanical property of the material: it has twice the yield

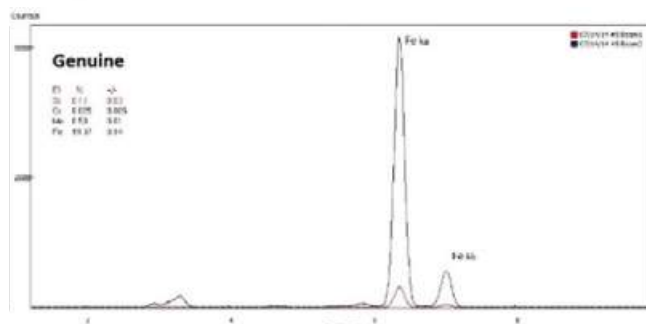
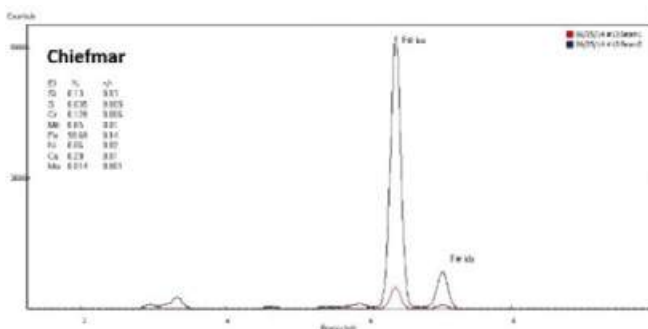


strength of traditional austenite stainless steels. AISI 2205 is today's standard for duplex stainless steel, combining high mechanical resistance and excellent corrosion resistance.



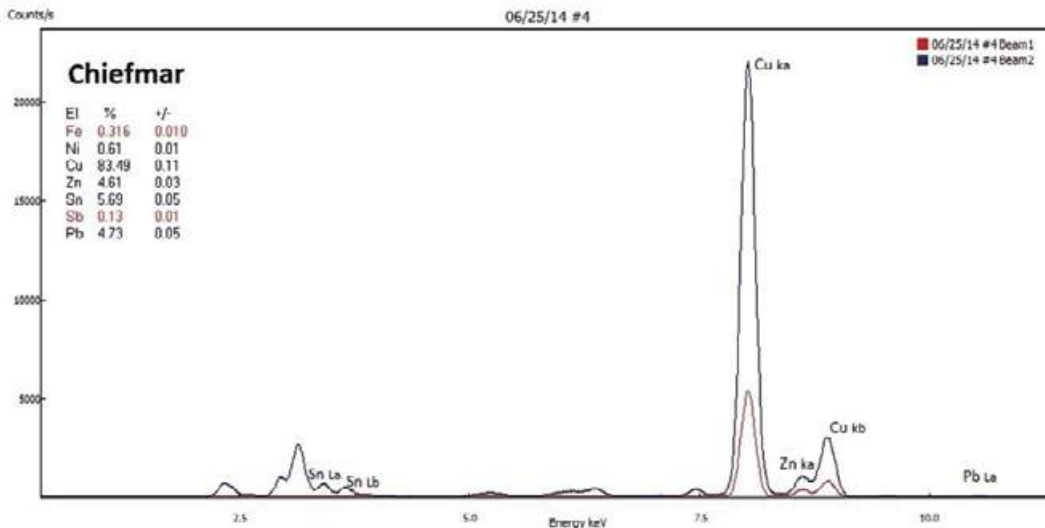
**Oil pump (part no: 563212-01)**

Chiefmar's oil pumps are the same low-alloy steel as the originals. The chosen material is suitable for oil pumping and shows no issues in working conditions. This part can work for a long time with great efficiency.

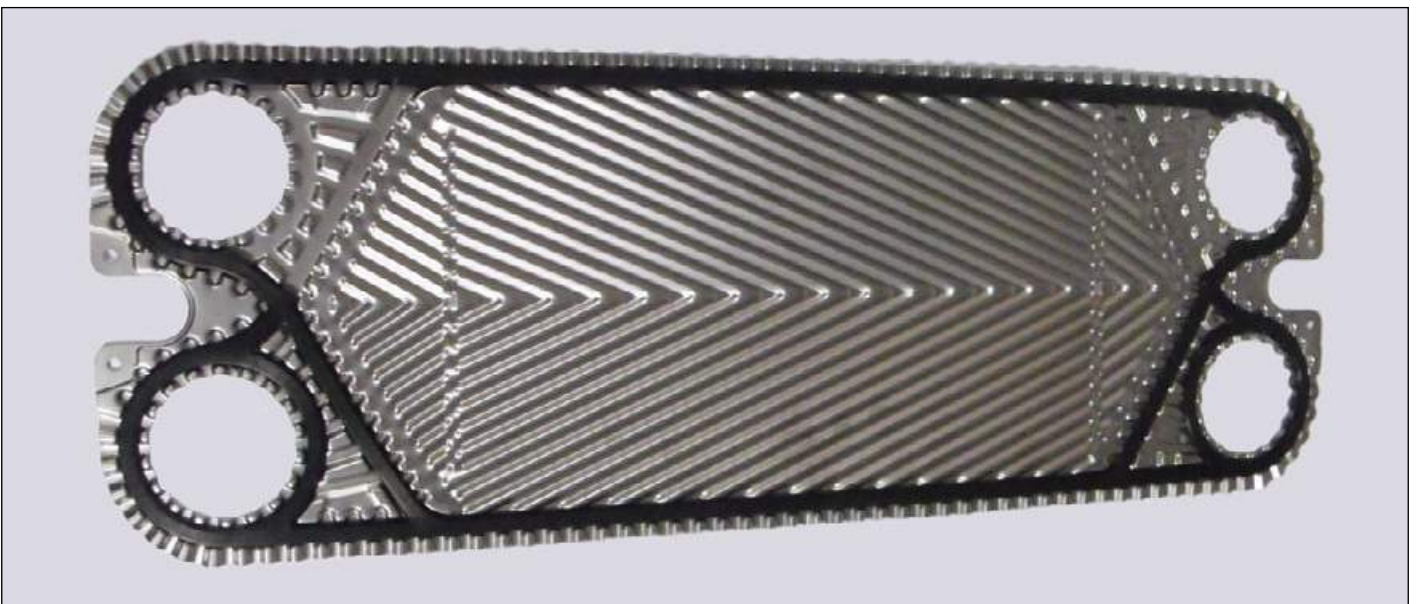


## Ejector Nozzle Ø41.5 (part no: 984-12264-50)

The UNS C83600 leaded red brass required by the original spare parts book and used by Chiefmar for production is an alloy with a composition of Cu 85%, Sn 5%, Zn 5%, Pb 5%. This material was chosen for its suitability for low pressure seawater passage working conditions: The alloy with tin ensures good corrosion resistance in seawater conditions; zinc and lead improve wear resistance and toughness. The part perfectly matches the original in composition and behaviour.

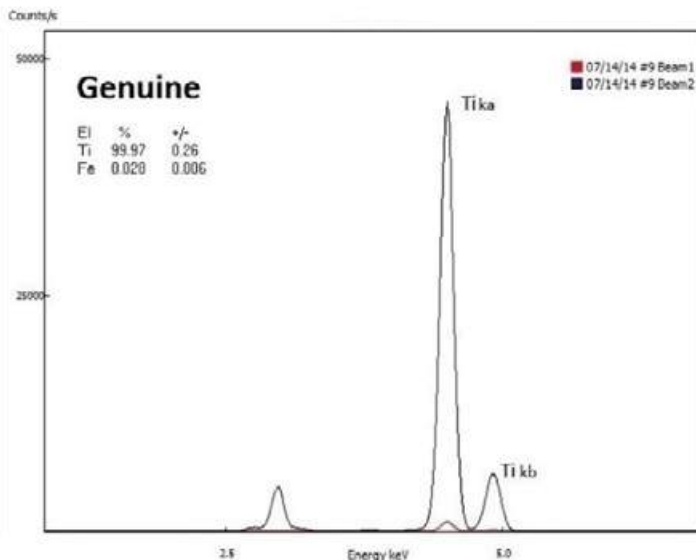
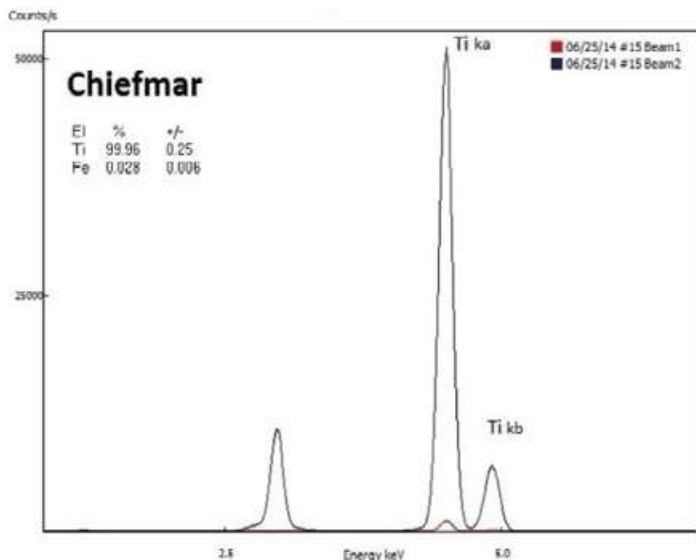


## Titanium plate (part no: 119291-2183)



Chiefmar provides ASTM grade 1 titanium plates; the material is pure titanium above 99%. Pure titanium has the best behaviour in seawater conditions: Even if it is exposed to or immersed in seawater for long periods of time, the erosion rate is practically zero.





Corrodent	Plate composition	Temperature	Corrosion rate
Seawater	Ti > 99%	25 °C	0 µm/year

Reference: **Metals Handbook**, Vol. 2 - Properties and Selection: Nonferrous Alloys and Special-Purpose Materials, ASM International

### Mechanical seal (part no: 984-10230-08)

The faces of Chiefmar's mechanical seals are carbon/graphite impregnated with a thermoset resin. This type of graphite guarantees stability in any type of aggressive environment from strong acids, to strong bases and hydrocarbons. Its hardness is due to the presence of silicon carbide and aluminium oxide; the modulus can withstand pressure distortions. Chiefmar's mechanical seals have high frictional, impact and thermal shock resistance. The part has optimal performance during use and is very versatile.



Element	Weight%	Atomic%
C	83.97 +/- 1.72	90.69
O	9.38 +/- 0.69	7.60
Al	1.00 +/- 0.07	0.48
Si	2.07 +/- 0.09	0.95
S	0.47 +/- 0.06	0.19
K	0.25 +/- 0.05	0.08
Totals	97.13	100.00

Properties	
Hardness	95 HV
Modulus	24 Gpa
Chemical resistance (to acids, bases and hydrocarbons)	+++
Impact resistance	+++
Thermal shock resistance	++++
Versatility	++++

++++=excellent +++=good ++=fair +=poor

Refence: **Material selection for mechanical seals**, Michael Huebner



## Properties summary

Parts	Properties
<b>Neck bearing cover (part no: 571405-80):</b>	<ul style="list-style-type: none"> <li>• High wear resistance</li> <li>• High temperature resistance</li> <li>• High corrosion resistance</li> <li>• Low thermal expansion</li> </ul>
<b>Lock ring (part no: 561876-80):</b>	<ul style="list-style-type: none"> <li>• Duplex composition</li> <li>• Strong resistance to all types of corrosion</li> <li>• Superior mechanical properties</li> </ul>
<b>Oil pump (part no: 563212-01):</b>	<ul style="list-style-type: none"> <li>• Low-alloy steel</li> <li>• Optimum performance in working conditions</li> </ul>
<b>Ejector Nozzle Ø41.5 (part no: 12264-50):</b>	<ul style="list-style-type: none"> <li>• Good corrosion resistance</li> <li>• Good mechanical properties</li> <li>• Good wear resistance</li> </ul>
<b>Titanium plate (part no: 119291-2183):</b>	<ul style="list-style-type: none"> <li>• High purity</li> <li>• Excellent corrosion resistance</li> </ul>
<b>Mechanical seal (part no: 10230-08):</b>	<ul style="list-style-type: none"> <li>• High wear and impact resistance</li> <li>• High chemical resistance</li> <li>• Excellent thermal shock resistance</li> <li>• Excellent versatility</li> </ul>

## Conclusions

Thanks to its suitable materials, equal to the originals or with equivalent properties, Chiefmar manufactures high-quality spare parts that guarantee the same performance as the originals. Chiefmar's continuous quality control of spare parts guarantees constant reliability for all types of materials.

N.B. THE USE OF ORIGINAL MANUFACTURER PART NUMBERS IS PROVIDED FOR REFERENCE ONLY AND IS NOT INTENDED THAT CHIEFMAR PARTS ARE SUPPLIED BY ORIGINAL MAKER.

