Hydrolubricated Rubber Bearings

SPECIFIC LOAD

Rubber, by nature, is an incompressible material and keeps, under pressure, its original volume by changing its geometrical shape.
As regards bearings with inside rubber lining, this property is made easier by lubrication channels; the rubber yelding depends on static load, rubber hardness and wall-thickness of rubber lining.
It is normally considered that the load is distributed on 7/10 of the bearing total inner surface.
The specific load results to be:

$$Cs = \frac{P}{0{,}7 \times d \times L}$$

Cs =	Specific Load	(in N/cm^2)
P =	Total Load	(in N)
d =	Shaft Diameter	(in cm.)
L =	Bearing Length	(in cm.)

maximum Cs = 35 (advised Cs 20÷25)

LUBRICATION

Water lubrication has a double aim:

1 - To reduce the friction coefficient by forming a water film.
2 - To reduce the heating produced by friction.

Because of the poor thermal conductivity of rubber, the lack of an efficient heat-exchange by means of water would soon cause the distruction of the bearing, or, at least, would spoil the surface of the rubber.

In order to guarantee a lubricating water film, the speed of the shaft rotation must be at least **0,25 Mt/sec.**
The maximum shaft rotation speed consented is **10 Mt/sec.**

Diagram n. 2 shows the minimum quantity of water that is necessary to lubricate Caravel *bearings in relation to the shaft diameter. The above mentioned consumptions are well-grounded for lubrication with water having the following peculiarities:*

Degree of filtration	< o = 40 microns
Presence of abrasives	< o = 40 mg./Lt

The shaft rotation inside the bearing must start only at the presence of a lubricant fluid. Were the bearings not continuously lubricated by water, it would be necessary to activate a fluid circulation before the starting of the machine, and to stop it at the end of the shaft rotation.
Please note that the rubber lining would be completely destroyed even by a very short working without lubricating fluid.

CLEARANCE BETWEEN SHAFT AND BEARING

The clearance between shaft and bearing is the most important factor to allow the forming of a lubricating water-film. The peculiar physical characteristics of rubber require larger clearances than the ones normally used for metal bearings.
Experience and specialized bibliography recommend clearances between shaft and bearing from 0,3% to 0,6% of the shaft diameter
Diagram n. 1 indicates the minimum and maximum diametral clearances normally used for Caravel *rubber bearings.*
The above mentioned clearances refer to bearings working in water having a maximum temperature of **+40°C**.

HOW TO USE AND MAINTAIN CARAVEL BEARINGS

During their working life Caravel bearings do not require any particular care.
It is important to know that:
- every kind of industrial rubber is hygroscopic. When soaked into marine water the rubber enlarges its volume. This may already happen after fifteen days. The shaft should run at least a few minutes every twenty days. Such a care avoids the overheating of the rubber and its detaching from the outer shell;
- this precaution also prevent dangerous calcareous formations which could obstruct the passage of the water into the channels, with a consequent decrease of its lubricating effects.

STORE PRESERVATION

Rubber is a perishable material because it feels the effects of the environment conditions.
In order to keep them in a good state, Caravel *recommends to protect rubber bearings from light and from unsteady temperature.*
In fact the advised temperature is **15÷23°C**.
Moreover, there should not be traces of oxidative, acid or noxious substances in the store.

Diagramma n° 1

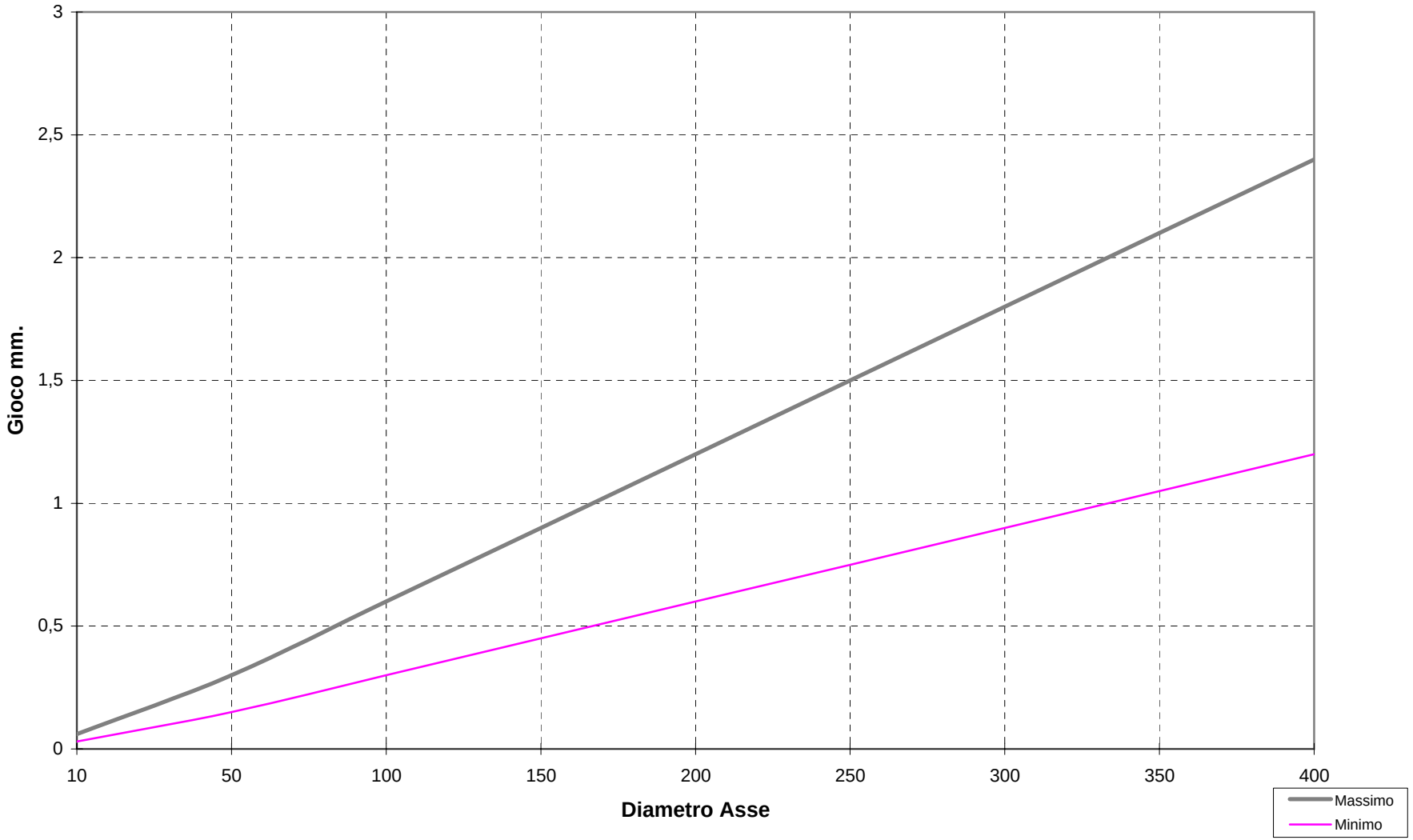

Diagramma n° 2

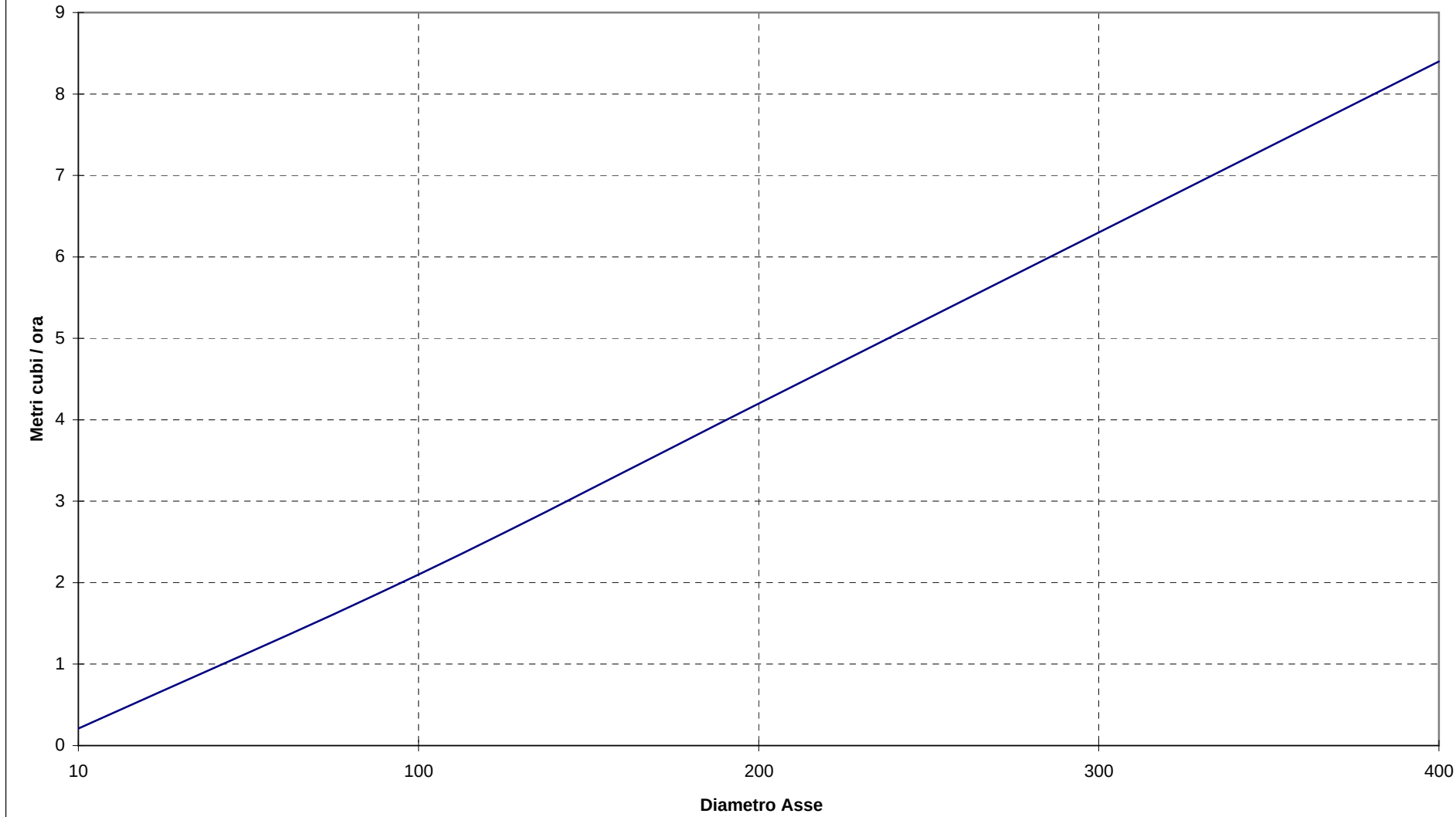

Diagramma n° 3

Limite massimo ammissibile :
Cs · V = 250 (per L/d < o = 4)