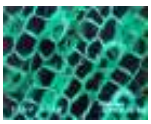
Sylomer® : Alternative to "Cork" Isolation at Pump Plinth

Bulletin 07/09 from **Mason Industries (HK) Ltd**

If you have been in trouble with pump vibration isolation problem, it is worth for you to spend a minute to go through this article, particularly our scientific findings on unsatisfactory isolation efficiency of cork material.

* bottle stopper



* enlarged structure of cork

History of Cork Isolation

Facts on Cork

Cork is a bark of Cork Oak (Quercus Suber). The cork cells are similar to a polygon of five sides, with two sides are completely impermeable to fluid, water and air. Its remarkable impermeability and stoppage qualities have made it a good bottle stopper.

As a Vibration Isolator in Pump Installation

Over fifty years ago, the control of vibration was in its infancy and cork is uncommon to be used as vibration control isolation. Due to natural polygon-cell structure of cork, it makes itself too stiff for most applications but no other choice at that period. Until the introduction of rubber material, the whole concept of vibration control has changed. Engineers start adopting rubber and substituting cork in majority applications. Up to recent decades, engineers are still utilizing natural rubber and synthetic rubber (eg. neoprene) for majority vibration control applications due to its superior isolation efficiency and durability.

Mythology Behind the Cork

Pump Installation contractors think "CORK" is the ultimate choice as isolations between the concrete curb and inertia base (as Figure 1 shown) in majority applications. **Is it really true?**

Figure 1 shows the typical vibration isolation detail for multi-stage vertical pump vibration isolation. Mechanical engineers normally put a piece of Cork as vibration isolation pad to tackle the vibration from pump set to structural plinth. However, many cases proved that CORK is not the ultimate mean for these systems due to Cork's stiffness.

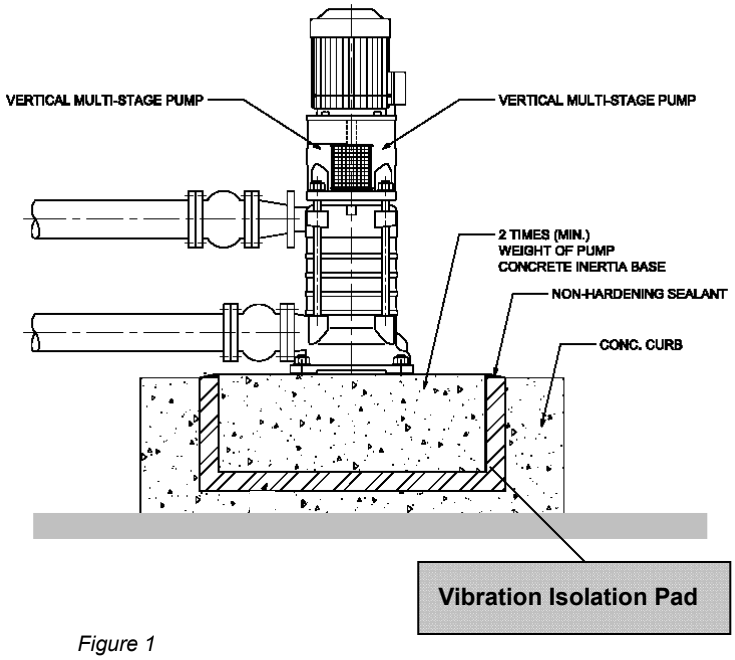


Figure 1

Typical installation detail for High C.G. vertical pump vibration isolation

Revolutionary material option – "Getzner"

Development in material technology never stops, a superior material micro-cellular polyurethane elastomer is introduced by technical material supplier – Getzner (Austria). Getzner has proved as reliable vibration control material for over twenty years.

We are not concluding this material is the best substitution of cork, rubber and synthetic rubber material, but it definitely is good material choice when above options is considered too stiff in application.

Discussion on Cork & Getzner's Sylomer® Pad

Consider a pump sitting on a concrete inertia base and isolated from the concrete plinth with isolating material (As in Figure. 1). Majority mechanical engineers place a piece of 25mm to 50mm so called isolation "cork" to isolate the vibration from pump sets to structural plinth. But for most case, the vibration control doesn't work effectively, as the problem is from the stiffness of material they used.

Illustration 1 – Cork Vs Getzner Sylomer ®

This is an example for a typical 15kW water pump setup with two different layers of isolation mat underneath the inertia concrete layer. Then you will see the differences in isolation performance between a 25mm thick cork layer isolation mat and our identical thickness Getzner Sylomer® isolation pad. Following illustration shows the isolation efficiency between Cork material and Getzner's Sylomer® isolation pad in a vertical pump system, mainly the unsatisfactory -216% magnified isolation efficiency from Cork.

1. Specification Data

Pump system

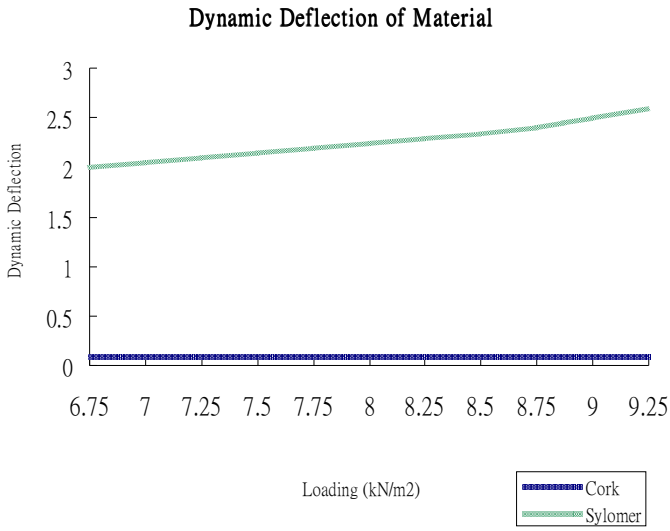
System	15W water pump
Weight	350 kgs (pump & motor) + 60 kgs (water) = 410 kgs
Motor Speed	1,450 rpm

Concrete Inertia Base

Base Plinth Weight	= 2 times of operating weight of pump = 820 kgs
Base Size	2,000(L) x 800(W) x 210(H) mm
Static Load on Isolating Material	(820+ 410)kgs / (2m x 0.8m) = 7.541 kN per m²

2. Comparison of Isolation Efficiency

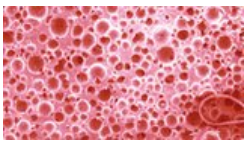
	Cork	Sylomer®
Material	170 kgs/m³ (density)	Sylomer W®
Thickness	25mm	25mm
Static Load	7.541 kN/m²	7.541 kN/m²
Modulus of Elasticity	3 N/mm²	0.09 N/mm²
Est. Dynamic Deflection	0.06 mm	2.09 mm
Input Frequency	24 Hz (1450 rpm)	24 Hz (1450 rpm)
Est. Natural Frequency	64.5 Hz	10.9 Hz
Isolation Efficiency	**- 216% (Magnified)**	**74%**



3. Key Findings

Scientific test found that proved that Sylomer W ® material gives 74% isolation efficiency against the 216% magnification in vibration transmission for the Cork material.

Illustration 2 – Isolation of Pump with Getzner "Sylomer ®"



** enlarged material structure*

Sylomer® is a technical innovation from Getzner. The material is mixed-cellular structured poly-urathane. By controlling the close and open cells percentage and density of the material, its modulus of elasticity is controlled. There are 9 types of standard material range available with load capacity ranging from 0.005N/mm² to 0.8N/mm² (i.e.510 kg/m² to 81,550 kgs/m²). All these materials accept a short-term overload up to 60 times of its rated static load capacity.

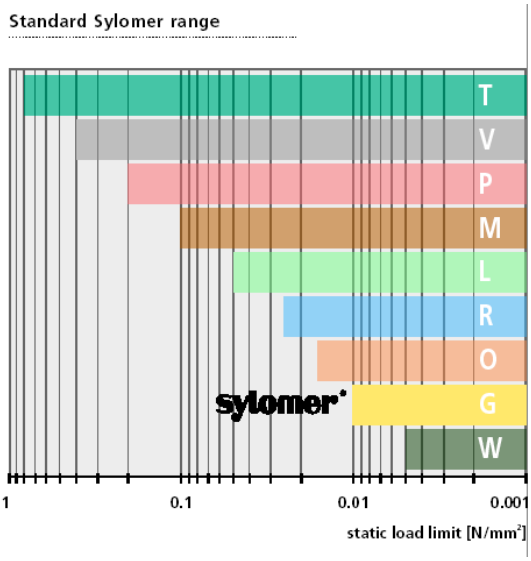
Pump installation with "Sylomer®" in replacement to the original Cork pad (for reducing vibration transmission to structure)

Close-up showing exposed 2 layers 25mm Sylomer® R pad edge at concrete plinth

Sylomer® from Getzner

Sylomer® Standard Range

Getzner offers 9 types of standard material ranging from loading capacity 0.005N/mm² to 0.8N/mm² (i.e. 510 kgs/m² to 81,550 kgs/m^2).



Technical Compliance

Since dynamic performance for a vibration control material is critical to its performance. All materials have been tested in accordance with international standard to DIN or EN ISO. In particular to the dynamic performance of the material, they have been tested at "Static", 10Hz and 30Hz dynamic load, and every piece of technical catalogue contains a useful "Modulus of Elasticity" chart for engineers to identify the material physical response at various load and input frequency(see chart 2).

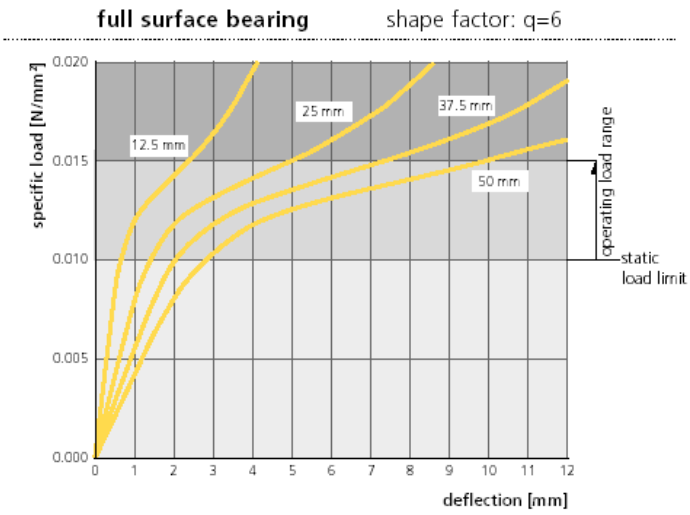


Chart 1. Load Deflection Curve

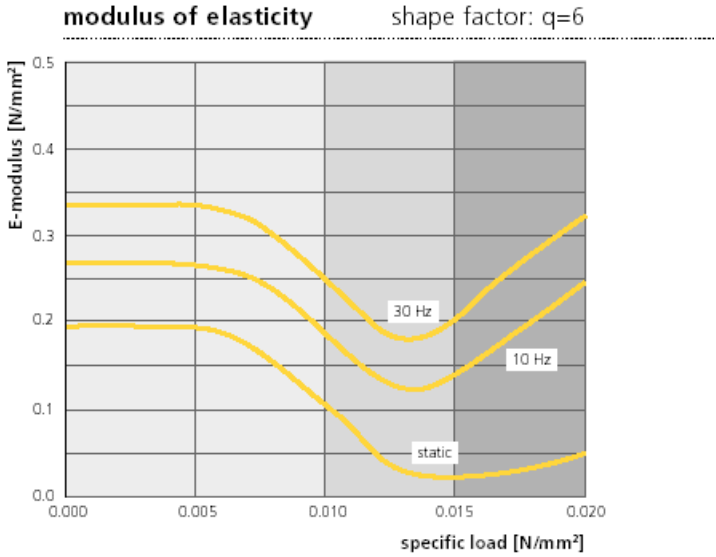


Chart 2. Modulus of Elasticity

From Our Technical Data Sheet, you will be supplied with:

- ✓ Load Deflection Curve (at different shape factors)
- ✓ Modulus of Elasticity, Dynamic & Static (at different shape factors)
- ✓ Natural Frequency (at different shape factors)
- ✓ Vibration Isolation Efficiency
- ✓ Creep Behaviour (Permanent Deflection due to Load)
- ✓ Dynamic E-modulus at Long Term Loading
- ✓ Temperature Dependency (Operating temperature effect on the Dyn. E-modulus)

Enquiry to

Our professional engineers could easily predict the performance and behavior of material under designed operating conditions. Should you require more information on Getzner Sylomer® products or selection assistance, feel free to contact **Mason Industies (Hong Kong) Limited – Marketing Department** at (852) 2967 9639 or email to mail@mason-hk.com for further discussion.