

# Reference Calculation: Aquarium Pump

## Material Selection Process

The selection of the elastic layer is done in two easy steps. First the proper Sylomer material grade is selected according to the existing static loads and in accordance with the stability criteria under short circuit loads. In the second step the thickness of the elastic layer is selected according to the targeted performance. In the case of the aquarium pumps, the responsible consultant (Wilson, Ihrig & Associates) gave a target frequency ratio (excitation to natural frequency) of 1.6. Taking this ratio into consideration and the excitation frequency of 19.2 Hz the target natural frequency was given at 12 Hz.

The entire calculations for this aquarium pump project was done using Getzner's new FreqCalc online calculation tool which available free of charge at [www.getzner.com](http://www.getzner.com). All you need to get started is a user name and password. Click here to get yours today.

## Input values:

- Type of pump: ISO-PFIL01-001
- Weight: 2435 pounds
- Base dimension: 10" X 30" X 88"
- Excitation frequency: 19.2 Hz
- Weight inertia pad (6" thick): 1375 pounds

## The simple steps for the calculation are as follows:

- 1) Insert the project specifics (e.g. project name and remarks)



		5			
4	4	546-324-154-4	INSUL, LOWER DOOR PANELS	546-32	
2	3	546-324-154-3	INSUL, LEFT & RIGHT DOOR	546-32	
1	2	546-324-154-2	INSUL, FRONT	546-32	
2	1	546-324-154-1	INSUL, FRONT & BACK PANEL	546-32	
QTY REQD		FN	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	

THE INFORMATION HEREIN IS THE PROPERTY OF SOUNDOWN CORP. ANY COPYING TRANSMITTAL TO OTHERS AND ANY USE EXCEPT THAT



## 2) Insert the dimensions as well as the appropriate loading into the interface

By selecting the load type, it is possible to switch between the input values specific loadings, gravity loads, and forces. In this example the total static load applied is calculated by adding up the weight of the 6" thick inertia pad and the weight of the pump

$$2,435 \text{ lbs} + 1,375 \text{ lbs} = 3810 \text{ lbs}$$

All PUR materials produced by Getzner show their best performance at the static load limit. Simply by increasing the slab thickness or decreasing the bearing area (i.e. point wise support) materials can be loaded at their optimal loading point. Static load limits of the material are given with:

Sylomer SR Cheat Sheet

The screenshot shows the FreqCalc web interface. The top header includes the 'FreqCalc' logo and the 'getzner' logo with the tagline 'the good vibrations company'. Below the header, there are navigation links for 'Back to Getzner Website' and 'Settings'. The main content area is divided into sections: 'Project | By: Brian Thompson', 'Project: Aquarium Pumps', and 'Remarks: Full Surface Bearing'. The 'Input' section contains several fields: 'Material' (Sylomer), 'Shape' (Rectangle), 'Length' (88 in), 'Width' (30 in), 'Thickness' (0.12 in), and 'Load Type' (Mass) with a value of 3810 lb. There are also checkboxes for 'Holes' and 'Secret'. A 'Calculation' button and a 'Restart' button are visible at the bottom right of the input section. The 'Results' section is currently empty.

## 3) Choose the thickness of the material (numbers can be filled in manually)

This is an iterative process in a first iteration a 1" thick material was used. This thickness was selected because standard Sylomer materials are made in 1/2" increments. If the natural frequency of 12 Hz is unable to be reached using this thickness it is necessary to increase the material thickness to achieve a lower natural frequency.

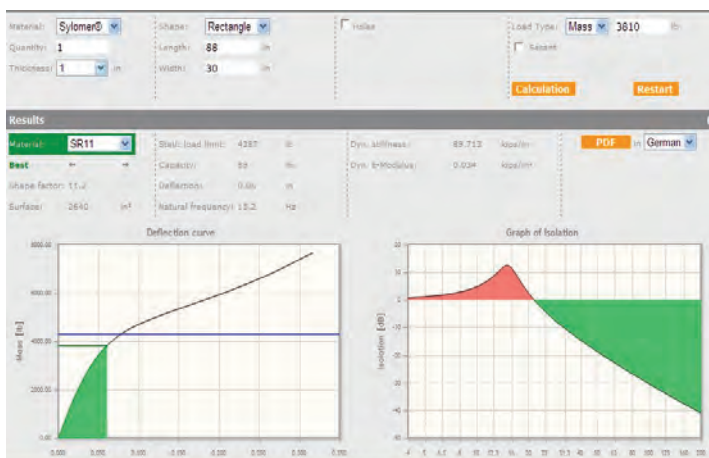
This screenshot is similar to the previous one, but the 'Thickness' field in the 'Input' section is now set to '1' in. The 'Load Type' remains 'Mass' at 3810 lb. The 'Calculation' and 'Restart' buttons are still present.

## 4) Push the calculation button.

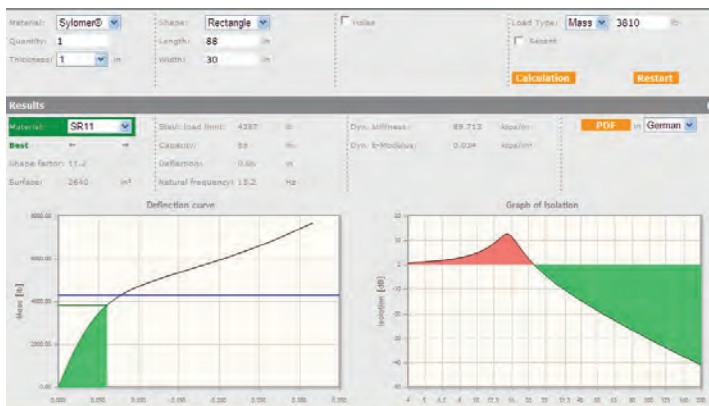
This screenshot shows the 'Results' section of the FreqCalc interface. The 'Input' section is still visible at the top. The 'Results' section displays various material properties and calculated values. The 'Material' dropdown is set to 'Material'. The 'Static load limit' is 0 lb, 'Dyn. stiffness' is 0, 'Modulus' is 0, 'Shape factor' is 1.2, and 'Surface' is 2640 in<sup>2</sup>. The 'Natural frequency' is 0 Hz. There are also fields for 'Capacity', 'Deflection', 'Dyn. E-Modulus', and 'Naschit'. A 'Print' button and a language dropdown set to 'German' are also visible.

5) Compare results with the target values.

In this example the target frequency of 12 Hz could not be reached with 1" material as a frequency of 15.2 Hz was calculated, Therefore, the thickness of the bearings was adjusted to 1.5 inches.



6) Recalculate with the adjusted thickness.



7) Print results in a PDF File (be sure to select English)

