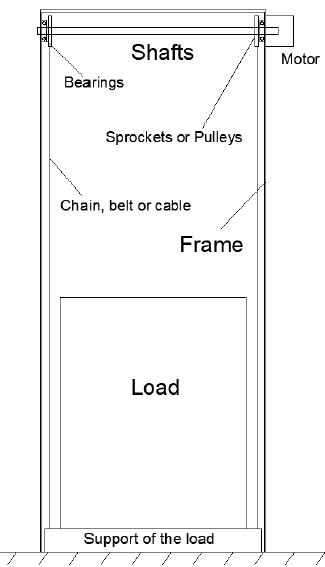
Specifications

Height to raise the load: H = 2m

Load: Mass = 1 ton

1.2m x 1.2m x 1.5m

Time to run: t=2m



Bearings

1. **Bearings definition**

Bearing is a machine component which supports another machine element (known as journal).

It permits relative motion between the contact surfaces of the members, which carrying the load.

1. **Bearings classification**

Radial Bearing: Load acting perpendicular to the direction of motion of moving element.

1. **Bearing type**

From doc.1 we chose cylindrical roller bearings because it’s good for radial loads.

1. **Some Calculations**

After calculating the mass of the shaft = 104.472 kg , its weight is :

Knowing that the force of the cable is taken ***6664.765 N***;

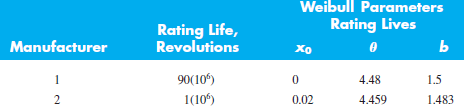
1. **Bearing design**

We already know that our elevator has 3 phases: accelerating, constant and decelerating. Let’s consider the second phase that has the maximum velocity.  
Note: All calculations are the maximum values that we can use.

* Referring to *Table 11-4*, we can choose a recommended bearing life according to the type of application.
* Referring to *Page 574*, for cylindrical roller bearings.
* Referring to *Table 11-3 of 02-series* and having , we can determine the rated data below:

|  |  |
| --- | --- |
| ***Outside diameter*** |  |
| ***Width*** |  |
| ***Load Rating C10*** |  |

* Using *eq. 11-3* with 90% reliability and rating 10 million revolutions, we can find the desired speed (maximum speed) in rev/min.
* Knowing that the desired load isn’t the manufacturer’s test load or catalog entry, we should use other formulas. Let’s consider 99% reliability and using *eq. 11-7*,

  
  
In addition, referring to *Table 11-5*: ;



On the other hand,

Besides,

When velocity is constant,

**First conclusion:** (Assumption)  
Our work is safe enough because the height in question is equal to 2 meters and the maximum distance is equal to 1.93585 meters in the second phase, therefore 1.93585 will be never achieved since we have also phase 1 and 3 so we use a speed less than 0.1382 m/s.

**Second conclusion:** (Real calculation)

Consider the three phases function below,

Let :



From phase 2:

From phase 1:



acceptable because <

Using *eq. 11-7* again, and

Having the rating load , it’s safe.

The variation of velocity during the three phases can be found in the function below,

To conclude:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Phase 1 | Phase 2 | Phase 3 |
|  | increasing |  | decreasing |
|  | increasing |  | decreasing |
|  |  |  |  |
|  | increasing |  | decreasing |

Finally, we choose a cylindrical roller bearing with the properties mentioned below:

|  |  |
| --- | --- |
| ***Outside diameter*** |  |
| ***Width*** |  |
| ***Load Rating C10*** |  |