**Rudder Calculation:**

LBP = 70.8 m

LWL = 73.75

T/L = .0621 m

T =4.4 m

L/B = 6.2

B = 11.4 m

Rudder Area:

Yield Strength of mild steel = 235 N/m2

Aspect ratio=

Since = 86% of the draft but the mean height should be as much as 60%-70% of the draft

Again, Aspect Ratio= 1.3

Now, = 80% of the draft

Now, considering aspect ratio as 1.2,

Rudder Force and Torque:

Rudder force,

k1=

k2= 1.1(ahead condition)

k3= 0.8

kt=1   
CR

CR

Rudder Torque, QR=CR x r

Again, r=

Now,

r = 1.616 x (.33 x .2)

= .11 m

QR= 56041.94 x .11

=6164.61 Nm

Rudder Stock:

Dt =

=

= 128.4 mm

Couplings:

Db=

Kr= 0.95

n= total no of bolts

kb= metal factor for flanges

e= mean distance of of the bolt axis from the center of the bolt system

=

=84

Db=

= 20.27 mm

=21 mm

Thickness of the coupling flanges:

tr= 0.9 x db

= 0.9 x 21

= 18.9 mm

Thickness of coupling flange clear of the bolt hole,

Ts= (.65 x 21)mm

= 13.65 mm

Rudder Plating:

tp=

a= unsupported width

= 0.34 m

Design Pressure, Pr=

=

=25.11 kN/mm2

Thickness of rudder plating, tp=

= 5.46 mm

=6 mm

Thickness of the web is not to be less than, tw= .7 x 6mm= 4.2 mm

Rudder Bearings:

Tmin= 8 mm(since metallic material would be used)

Projected Surface, Ab=

Bi= 56041.94 N = support reaction at carrier bearing

q= 7 N/mm2

Again, Abn= bearing height x external diameter of liner

External diameter of the liner= (Dt x tmin x 2)

= (80 + 18.9 x 2)

= 117. 8 mm

The diameter of the pintle, dp=

Bi= 56041.94= support reaction at the pintle

dp=80.75 mm

=81 m