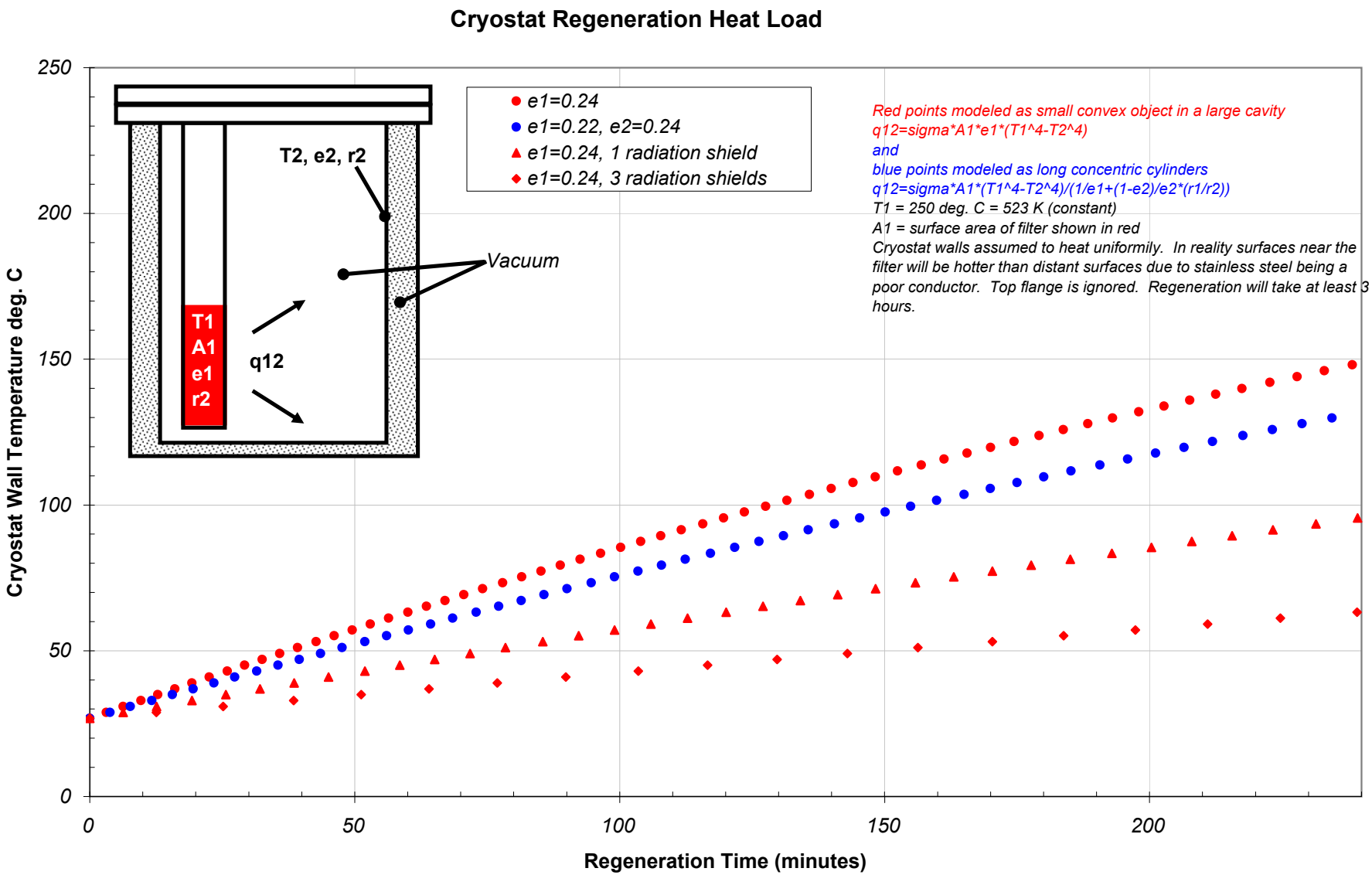
Cryostat Regeneration Heat Load
Cryostat Wall Temperature deg. C
Regeneration Time (minutes)
0
50
100
150
200
250
e1=0.24
e1=0.22, e2=0.24
e1=0.24, 1 radiation shield
e1=0.24, 3 radiation shields
T2, e2, r2
Vacuum
T1
A1
e1
r2
q12
Red points modeled as small convex object in a large cavity
q12=sigma*A1*e1*(T1^4-T2^4)
and
blue points modeled as long concentric cylinders
q12=sigma*A1*(T1^4-T2^4)/(1/e1+(1-e2)/e2*(r1/r2))
T1 = 250 deg. C = 523 K (constant)
A1 = surface area of filter shown in red
Cryostat walls assumed to heat uniformily. In reality surfaces near the filter will be hotter than distant surfaces due to stainless steel being a poor conductor. Top flange is ignored. Regeneration will take at least 3 hours.