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c                                     HEAT EXCHANGER ANALYSIS
c
  implicit real*8 (a-h,o-z)
  data Cws,Qdot,pi/0.01417,4.386e9,3.1415927/
  data dip,dop,aN,Ao/0.654,0.75,8485.,90007.00/
  data Tpl,Tp2,akw/604.,550.,10.80/
  data fi,fo/0.0,0.0002437/
  data Avlv/1.1/
  data hin/500.00/

c
  di=dip/12.00
  do=dop/12.00
  areai=pi*di*di*aN/4.00

c
  Tavg=0.5*(tp1+tp2)
  DTP=Tp1-Tp2
c ---- Read Tube-side properties from the T_av = (T_HL + T_CL)/2
  call intrpl(Tavg,cpp,cpg,amufp,amug,akfp,akg,prpl,prg,sigf,
1          betaf,rof,rog,anuf,anug,vf,vfg,vg)
c ---- Calculate C3:
  Wp=Qdot/DTP
  Rep=4.*Wp/(pi*amufp*di*aN)
  hi=0.023*akfp*(Rep**0.8)*(Prpl**0.333333)/di
  terma=do/(di*hi)
  termb=do*alog(do/di)/(2.*akw)
  C3=terma+termb+(do*fi/di)
c ---- We begin the loop at this point:
  Ps=840.00
1000 continue
  i=i+1
  call PRP(Ps, HIN ,HFs ,HG, ,KSTAT ,Tsdum ,VSs ,Xs ,ALPHAs,
1          VFs ,VGs ,DVDHP ,DVDPH ,TS,SFs,SGs)
  hfg=hgs-hfs

c
  tw=0.5*(tavg+ts)
  call intrpl(ts,cps,cpg,amufs,amug,akfs,akg,prs,prg,sigfs,
1          betaf,rofs,rogs,anuf,anug,vf,vfg,vg)

c
  termb=sqrt(sigfs/(rofs-rogs))
  terma=(termb/(amufs*hfg))*0.333333
  Z1=Cws*hfg*(Prs**1.7)*terma/Cps
  C2=Z1/(Qdot**0.66666)
  C1=(C3+C2*(Ao**0.66666))/Ao
  Z2=Wp*cpg*C1
  eff=1.-exp(-1/Z2)
  Tcold=Tpl-eff*DTP
  eps=(Tcold-Ts)/Ts
  if(eps.le.0.001) go to 1001
  Ps=Ps+1.0
  Ws=Qdot/hfg
  write(*,2) Ps,Ts,Tcold,eff,c1,c2,c3
  if(i.gt.20) stop
  go to 1000
1001 continue
  z3=alog((Tp1-Ts)/(Tp2-Ts))
  aLMTD=(Tp1-Tp2)/z3

c
  cmin=Wp*cpg
  aNTU=-alog(1.-eff)
  Rp=terma
  Rfp=fi+fo
  Rw=do*alog(do/di)/(2.*akw)
  Rs=C2*(Ao**0.66666)
  sigR=Rp+Rfp+Rw+Rs
  U=aNTU*Cmin/Ao
  Up=Qdot/(Ao*aLMTD)
  Upp=1./sigR
2   format(f8.1,1x,f8.1,1x,f8.1,1x,f10.4,1x,3E10.3)
  stop
  end

c.....
  subroutine intrpl(t,cpf,cpg,amuf,amug,akf,akg,prf,prg,sigf,betaf,
1          rof,rog,anuf,anug,vf,vfg,vg)
  implicit real*8 (a-h,o-z)
  dimension tt(54),cpff(54),cpgg(54),amuff(54),amugg(54),
1          akff(54),akgg(54),sigff(54),betaff(54),vff(54),vgg(54)

c.....
c~~~~~K3.FOR Begins Here~~~~~

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$!LARGE
      SUBROUTINE PRP(P, HIN ,HF ,HG ,KSTAT ,T ,VS ,X ,ALPHA,
1          VF ,VG ,DVDHP ,DVDPH ,TSAT,SF,SG)
      implicit real*8(a-h,o-z)
C
CCCCC STEAM TABLE
C

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