Table 92 Optimum design of the **unstiffened imperfect** equivalent ellipsoidal shell with the thick apex (Shell Segment 1) of uniform thickness 0.6 inch. **The design in this table is the same as that in Table 78 except that the thickness of the spherical apex (cap = Shell Segment no. 1 in Fig. 2) is t(apex) = 0.6 inch instead of t(apex) = 0.4 inch,** as is the case in Table 78. This output is an abridged and edited version of the output file from GENOPT called "eqellipse.OPM", where "eqellipse" is the user-selected name of the specific case. The critical margins are in bold face.

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  STRUCTURAL ANALYSIS WITH UNPERTURBED DECISION VARIABLES
 VAR.  CURRENT          DEFINITION
  NO.   VALUE
   1  6.0000E-01  skin thickness at xinput: THKSKN(1 )
   2  6.0000E-01  skin thickness at xinput: THKSKN(2 )
   3  6.0418E-01  skin thickness at xinput: THKSKN(3 )
   4  3.1405E-01  skin thickness at xinput: THKSKN(4 )
   5  3.6261E-01  skin thickness at xinput: THKSKN(5 )
   6  3.6471E-01  skin thickness at xinput: THKSKN(6 )
   7  3.0622E-01  skin thickness at xinput: THKSKN(7 )
   8  3.1319E-01  skin thickness at xinput: THKSKN(8 )
   9  2.8240E-01  skin thickness at xinput: THKSKN(9 )
  10  2.4984E-01  skin thickness at xinput: THKSKN(10)
  11  2.0428E-01  skin thickness at xinput: THKSKN(11)
  12  1.7857E-01  skin thickness at xinput: THKSKN(12)
  13  2.4628E-01  skin thickness at xinput: THKSKN(13)

  14  1.0000E-06  height of isogrid members at xinput: HIGHST(1 )
  15  1.0000E-06  height of isogrid members at xinput: HIGHST(2 )
  16  1.0000E-06  height of isogrid members at xinput: HIGHST(3 )
  17  1.0000E-06  height of isogrid members at xinput: HIGHST(4 )
  18  1.0000E-06  height of isogrid members at xinput: HIGHST(5 )
  19  1.0000E-06  height of isogrid members at xinput: HIGHST(6 )
  20  1.0000E-06  height of isogrid members at xinput: HIGHST(7 )
  21  1.0000E-06  height of isogrid members at xinput: HIGHST(8 )
  22  1.0000E-06  height of isogrid members at xinput: HIGHST(9 )
  23  1.0000E-06  height of isogrid members at xinput: HIGHST(10)
  24  1.0000E-06  height of isogrid members at xinput: HIGHST(11)
  25  1.0000E-06  height of isogrid members at xinput: HIGHST(12)
  26  1.0000E-06  height of isogrid members at xinput: HIGHST(13)

  27  3.0000E+00  spacing of the isogrid members: SPACNG
  28  1.0000E-05  thickness of an isogrid stiffening member: THSTIF
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******************** DESIGN OBJECTIVE ********************
   CURRENT VALUE OF THE OBJECTIVE FUNCTION:
VAR.   CURRENT
NO.      VALUE            DEFINITION
 1    1.289E+02  weight of the equivalent ellipsoidal head: WEIGHT
              (Compare with WEIGHT = 127.1 lb in Table 78)

***** RESULTS FOR LOAD SET NO.  1  (+mode 1 and +mode 2) ******
MARGINS CORRESPONDING TO CURRENT DESIGN (F.S.= FACTOR OF SAFETY)
MARGIN CURRENT
NO.      VALUE            DEFINITION
 1   -1.310E-01 (CLAPS1(1 )/CLAPS1A(1 )) / CLAPS1F(1 )-1; F.S.=1.00
 2   -1.928E-02 (GENBK1(1 )/GENBK1A(1 )) / GENBK1F(1 )-1; F.S.=1.00
 3    3.344E+01 (SKNBK1(1,1)/SKNBK1A(1,1))/SKNBK1F(1,1)-1;F.S.=1.00
 4    2.205E+01 (SKNBK1(1,2)/SKNBK1A(1,2))/SKNBK1F(1,2)-1;F.S.=1.00
 5    1.087E+04 (STFBK1(1,1)/STFBK1A(1,1))/STFBK1F(1,1)-1;F.S.=1.00
 6    6.322E+03 (STFBK1(1,2)/STFBK1A(1,2))/STFBK1F(1,2)-1;F.S.=1.00
 7   -2.456E-01 (SKNST1A(1,1)/SKNST1(1,1))/SKNST1F(1,1)-1;F.S.=1.00
 8   -4.762E-01 (SKNST1A(1,2)/SKNST1(1,2))/SKNST1F(1,2)-1;F.S.=1.00
 9    2.373E-02 (STFST1A(1,1)/STFST1(1,1))/STFST1F(1,1)-1;F.S.=1.00
10   -4.048E-01 (STFST1A(1,2)/STFST1(1,2))/STFST1F(1,2)-1;F.S.=1.00
11    5.572E-01 (WAPEX1A(1 )/WAPEX1(1 )) / WAPEX1F(1 )-1; F.S.=1.00

12   -8.753E-02 (CLAPS2(1 )/CLAPS2A(1 )) / CLAPS2F(1 )-1; F.S.=1.00
13   -1.560E-01 (GENBK2(1 )/GENBK2A(1 )) / GENBK2F(1 )-1; F.S.=1.00
14    3.763E+01 (SKNBK2(1,1)/SKNBK2A(1,1))/SKNBK2F(1,1)-1;F.S.=1.00
15    2.127E+01 (SKNBK2(1,2)/SKNBK2A(1,2))/SKNBK2F(1,2)-1;F.S.=1.00
16    2.808E+04 (STFBK2(1,1)/STFBK2A(1,1))/STFBK2F(1,1)-1;F.S.=1.00
17    8.418E+03 (STFBK2(1,2)/STFBK2A(1,2))/STFBK2F(1,2)-1;F.S.=1.00
18   -7.025E-02 (SKNST2A(1,1)/SKNST2(1,1))/SKNST2F(1,1)-1;F.S.=1.00
19   -2.398E-01 (SKNST2A(1,2)/SKNST2(1,2))/SKNST2F(1,2)-1;F.S.=1.00
20    5.055E-01 (STFST2A(1,1)/STFST2(1,1))/STFST2F(1,1)-1;F.S.=1.00
21   -2.075E-01 (STFST2A(1,2)/STFST2(1,2))/STFST2F(1,2)-1;F.S.=1.00
22    9.693E-01 (WAPEX2A(1 )/WAPEX2(1 )) / WAPEX2F(1 )-1; F.S.=1.00


***** RESULTS FOR LOAD SET NO.  2  (-mode 1 and -mode 2) ******
MARGINS CORRESPONDING TO CURRENT DESIGN (F.S.= FACTOR OF SAFETY)
MARGIN CURRENT
NO.      VALUE            DEFINITION
 1    2.462E-01 (CLAPS1(2 )/CLAPS1A(2 )) / CLAPS1F(2 )-1; F.S.=1.00
 2    2.182E-01 (GENBK1(2 )/GENBK1A(2 )) / GENBK1F(2 )-1; F.S.=1.00
 3    6.408E+01 (SKNBK1(2,1)/SKNBK1A(2,1))/SKNBK1F(2,1)-1;F.S.=1.00
 4    2.061E+01 (SKNBK1(2,2)/SKNBK1A(2,2))/SKNBK1F(2,2)-1;F.S.=1.00
 5    2.835E+04 (STFBK1(2,1)/STFBK1A(2,1))/STFBK1F(2,1)-1;F.S.=1.00
 6    7.589E+03 (STFBK1(2,2)/STFBK1A(2,2))/STFBK1F(2,2)-1;F.S.=1.00
 7    8.319E-01 (SKNST1A(2,1)/SKNST1(2,1))/SKNST1F(2,1)-1;F.S.=1.00
 8   -4.132E-01 (SKNST1A(2,2)/SKNST1(2,2))/SKNST1F(2,2)-1;F.S.=1.00
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9	1.669E+00	(STFST1A(2,1)/STFST1(2,1))/STFST1F(2,1)-1;F.S.=1.00
10	**-2.855E-01**	**(STFST1A(2,2)/STFST1(2,2))/STFST1F(2,2)-1;F.S.=1.00**
11	1.227E+00	(WAPEX1A(2)/WAPEX1(2)) / WAPEX1F(2)-1; F.S.=1.00
12	**-7.665E-02**	**(CLAPS2(2)/CLAPS2A(2)) / CLAPS2F(2)-1; F.S.=1.00**
13	**1.543E-01**	**(GENBK2(2)/GENBK2A(2)) / GENBK2F(2)-1; F.S.=1.00**
14	4.927E+01	(SKNBK2(2,1)/SKNBK2A(2,1))/SKNBK2F(2,1)-1;F.S.=1.00
15	2.193E+01	(SKNBK2(2,2)/SKNBK2A(2,2))/SKNBK2F(2,2)-1;F.S.=1.00
16	9.984E+03	(STFBK2(2,1)/STFBK2A(2,1))/STFBK2F(2,1)-1;F.S.=1.00
17	1.113E+04	(STFBK2(2,2)/STFBK2A(2,2))/STFBK2F(2,2)-1;F.S.=1.00
18	**-2.740E-01**	**(SKNST2A(2,1)/SKNST2(2,1))/SKNST2F(2,1)-1;F.S.=1.00**
19	**-9.780E-02**	**(SKNST2A(2,2)/SKNST2(2,2))/SKNST2F(2,2)-1;F.S.=1.00**
20	**-6.002E-02**	**(STFST2A(2,1)/STFST2(2,1))/STFST2F(2,1)-1;F.S.=1.00**
21	**4.794E-02**	**(STFST2A(2,2)/STFST2(2,2))/STFST2F(2,2)-1;F.S.=1.00**
22	5.927E-01	(WAPEX2A(2)/WAPEX2(2)) / WAPEX2F(2)-1; F.S.=1.00

NOTE: The design margins listed above are divided into two groups of 11 margins each: Margins 1 – 11 and Margins 12 – 22. The first group of 11 margins are obtained with use of the axisymmetric mode 1 imperfection, and the second group of 11 margins are obtained with use of the axisymmetric mode 2 imperfection.