

SECONDARY CONSTANTS OF LOADED CABLE
19 GAUGE CNB, ENB, FNB
D88 LOADING

AT 68° F.*

| Freq. Hertz | Propagation Constant Per Mile | | | Mid-Section Impedance | | | |
|----------------|-------------------------------|------|-----------------------------------|-----------------------|---------------------|-----------|----------------------------|
| | Attenuation | | Phase Shift β Radians | R Ohms | X Ohms (Neg.) | Z Ohms | Angle Degrees (Neg.) |
| | α Nepers | dB | | | | | |
| 1 | .00544 | .047 | .00468 | 10185 | 8639 | 13355 | 40.3 |
| 50 | .03021 | .262 | .04210 | 1593 | 1135 | 1956 | 35.5 |
| 100 | .03670 | .319 | .06934 | 1311 | 690 | 1482 | 27.8 |
| 200 | .04087 | .355 | .1247 | 1179 | 384 | 1240 | 18.1 |
| 300 | .04214 | .366 | .1817 | 1148 | 264 | 1177 | 13.0 |
| 500 | .04301 | .374 | .2981 | 1134 | 162 | 1145 | 8.1 |
| 800 | .04353 | .378 | .4757 | 1141 | 102 | 1146 | 5.1 |
| 1000 | .04378 | .380 | .5959 | 1153 | 83 | 1156 | 4.1 |
| 1200 | .04402 | .382 | .7177 | 1169 | 70 | 1171 | 3.4 |
| 1400 | .04427 | .384 | .8416 | 1190 | 61 | 1191 | 2.9 |
| 1600 | .04454 | .387 | .9680 | 1215 | 54 | 1217 | 2.6 |
| 1800 | .04486 | .390 | 1.097 | 1247 | 49 | 1248 | 2.3 |
| 2000 | .04524 | .393 | 1.230 | 1285 | 46 | 1286 | 2.1 |
| 2200 | .04572 | .397 | 1.368 | 1332 | 44 | 1333 | 1.9 |
| 2400 | .04634 | .402 | 1.511 | 1389 | 43 | 1390 | 1.8 |
| 2500 | .04671 | .406 | 1.585 | 1424 | 44 | 1424 | 1.8 |
| 2600 | .04715 | .410 | 1.660 | 1462 | 44 | 1462 | 1.7 |
| 2700 | .04767 | .414 | 1.738 | 1505 | 45 | 1506 | 1.7 |
| 2750 | .04796 | .417 | 1.778 | 1529 | 46 | 1529 | 1.7 |
| 2800 | .04827 | .419 | 1.819 | 1554 | 47 | 1555 | 1.7 |
| 3000 | .04988 | .433 | 1.988 | 1676 | 52 | 1677 | 1.8 |
| 3200 | .05230 | .454 | 2.173 | 1844 | 63 | 1845 | 1.9 |
| 3500 | .05926 | .515 | 2.493 | 2273 | 104 | 2275 | 2.6 |
| 3900 | .1061 | .922 | 3.129 | 4550 | 832 | 4626 | 10.4 |

* Temperature Variation per Degree F.

| Hz | dB | Rad. | R | X |
|------|-------|--------|-------|-------|
| 300 | .0008 | .00006 | -.019 | -.505 |
| 1000 | .0008 | .00013 | -.102 | -.179 |
| 3000 | .0005 | .00053 | .226 | -.117 |

Notes: Nominal cutoff frequency = 4000 Hz.
Phase delay = 94.84×10^{-6} seconds/mile at 1000 Hz.
Velocity of propagation = 10.54×10^3 miles/second at 1000 Hz.

END-SECTION IMPEDANCE

| End Section \ Frequency (Hz) | 300 | | 1000 | | 1600 | | 2000 | |
|------------------------------|------|------|------|------|------|------|------|-------|
| | R | X | R | X | R | X | R | X |
| 0 (Full Coil) | 1145 | -179 | 1086 | +200 | 1027 | +400 | 971 | + 523 |
| .1 | 1147 | -196 | 1111 | +149 | 1090 | +331 | 1069 | + 453 |
| .2 | 1148 | -213 | 1130 | + 93 | 1144 | +248 | 1157 | + 357 |
| .3 | 1149 | -230 | 1144 | + 36 | 1184 | +153 | 1228 | + 237 |
| .4 | 1149 | -247 | 1152 | - 23 | 1209 | + 52 | 1274 | + 100 |
| .5 (Mid Section) | 1148 | -264 | 1153 | - 83 | 1215 | - 54 | 1285 | - 46 |
| .6 | 1147 | -281 | 1149 | -141 | 1204 | -158 | 1265 | - 190 |
| .7 | 1145 | -297 | 1138 | -198 | 1175 | -256 | 1214 | - 322 |
| .8 | 1143 | -313 | 1123 | -253 | 1132 | -344 | 1141 | - 433 |
| .9 | 1140 | -329 | 1102 | -304 | 1079 | -421 | 1054 | - 519 |
| 1.0 (Full Section) | 1137 | -345 | 1077 | -352 | 1018 | -484 | 961 | - 582 |

| End Section \ Frequency (Hz) | 2500 | | 2750 | | 3000 | | 3500 | |
|------------------------------|------|------|------|------|------|------|------|-------|
| | R | X | R | X | R | X | R | X |
| 0 (Full Coil) | 877 | +674 | 817 | +748 | 745 | +823 | 551 | + 976 |
| .1 | 1024 | +621 | 989 | +717 | 941 | +821 | 771 | +1075 |
| .2 | 1173 | +523 | 1178 | +630 | 1174 | +756 | 1102 | +1133 |
| .3 | 1305 | +374 | 1358 | +469 | 1420 | +593 | 1569 | +1047 |
| .4 | 1397 | +178 | 1490 | +234 | 1614 | +310 | 2074 | + 641 |
| .5 (Mid Section) | 1424 | - 44 | 1529 | - 46 | 1676 | - 52 | 2273 | - 104 |
| .6 | 1382 | -262 | 1467 | -319 | 1580 | -404 | 1964 | - 789 |
| .7 | 1282 | -446 | 1324 | -536 | 1372 | -658 | 1451 | -1097 |
| .8 | 1148 | -580 | 1145 | -676 | 1132 | -794 | 1024 | -1132 |
| .9 | 1004 | -665 | 965 | -748 | 913 | -841 | 732 | -1059 |
| 1.0 (Full Section) | 866 | -708 | 806 | -771 | 735 | -835 | 539 | - 959 |