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Errata to IEEE Guide for Temporary Protective Grounding Systems Used in Substations

Developed by the

Substations Committee

of the

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Correction Sheet
29 October 2021

STANDARDS

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Insert new figure number and title to the figure that is missing a title, labeled as Figure C.10 as follows:

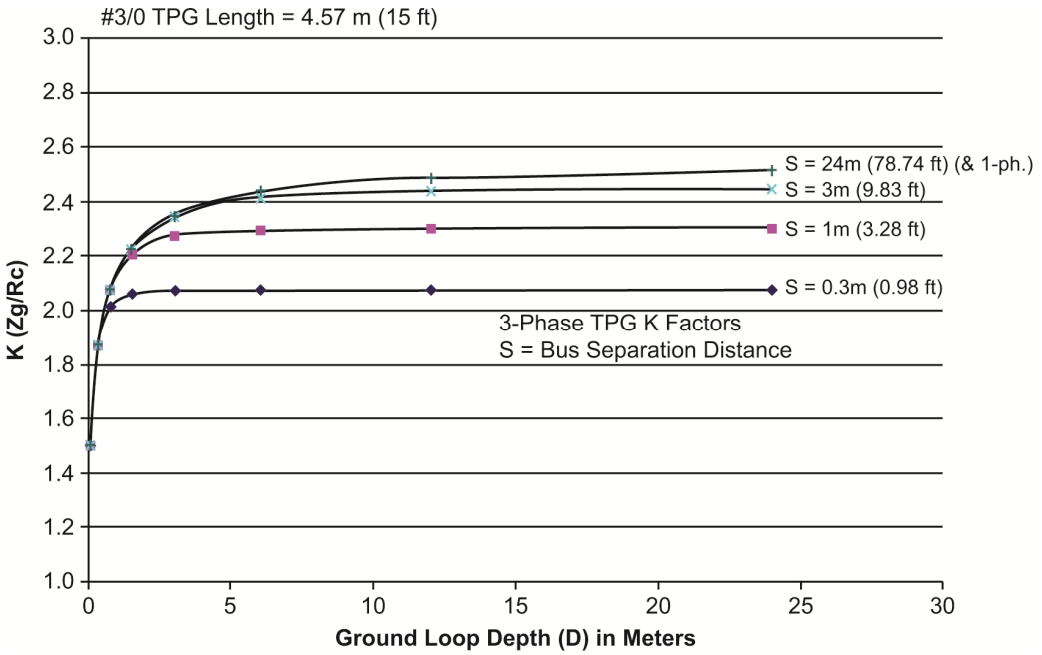
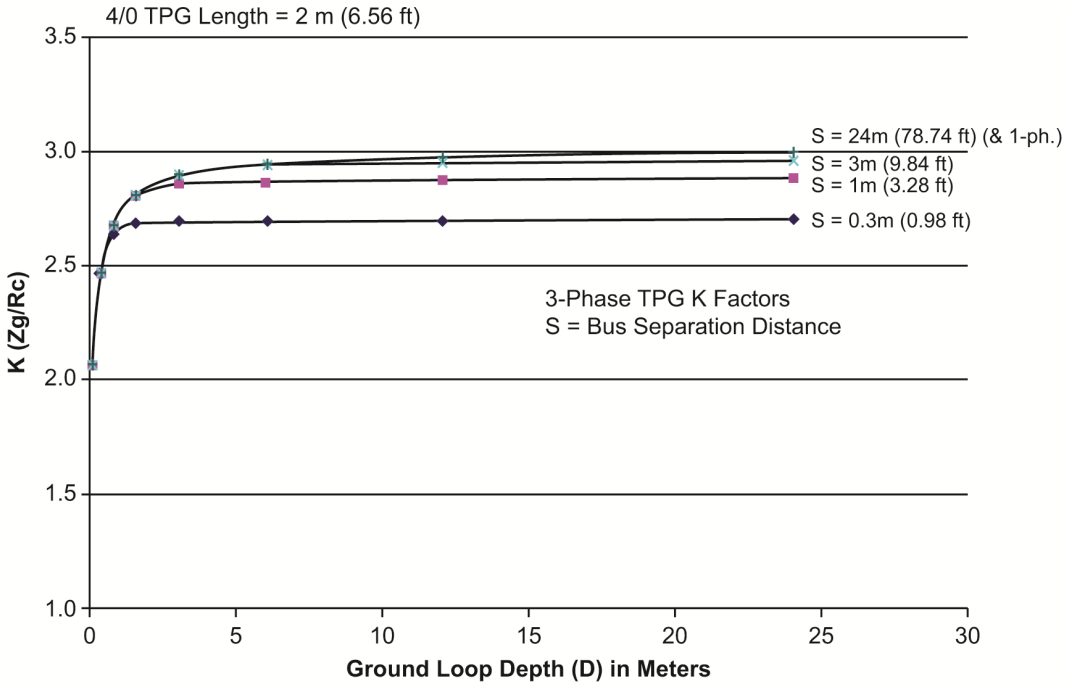
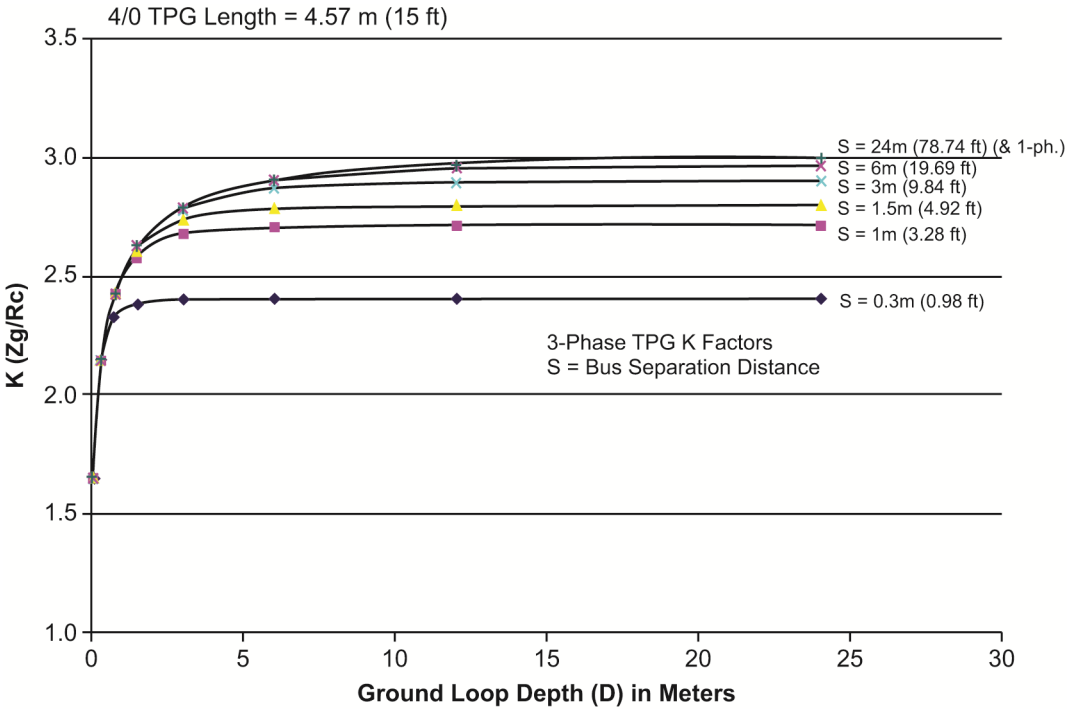


Figure C.10—3/0 AWG copper TPG length = 4.57 m (15 ft)

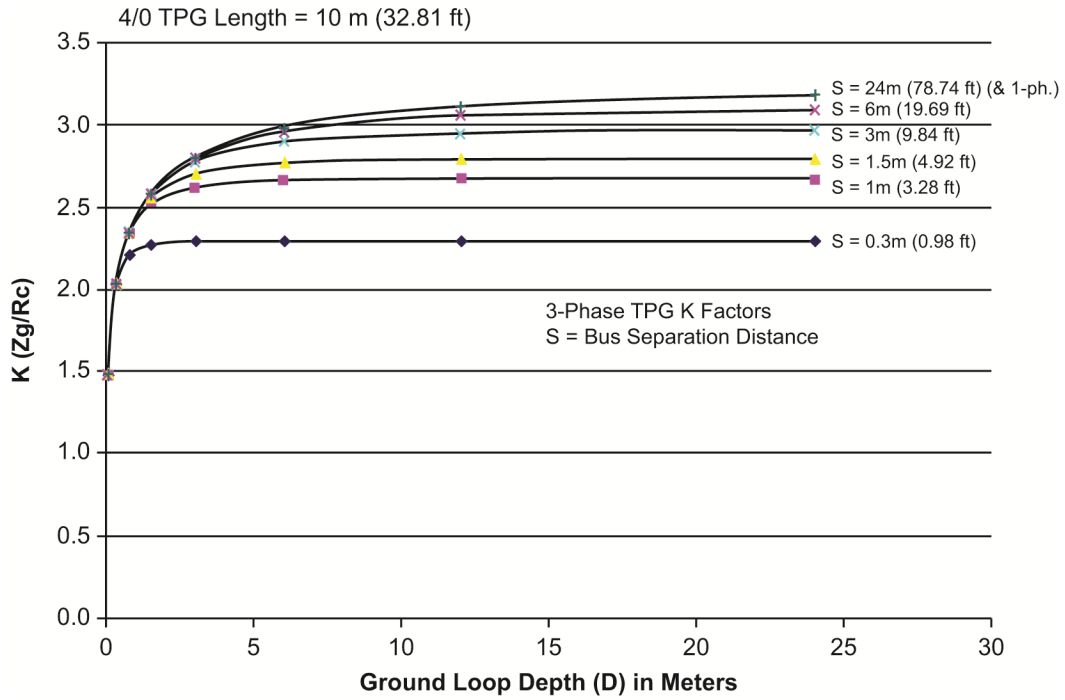
Renumber the remaining figure titles as follows:



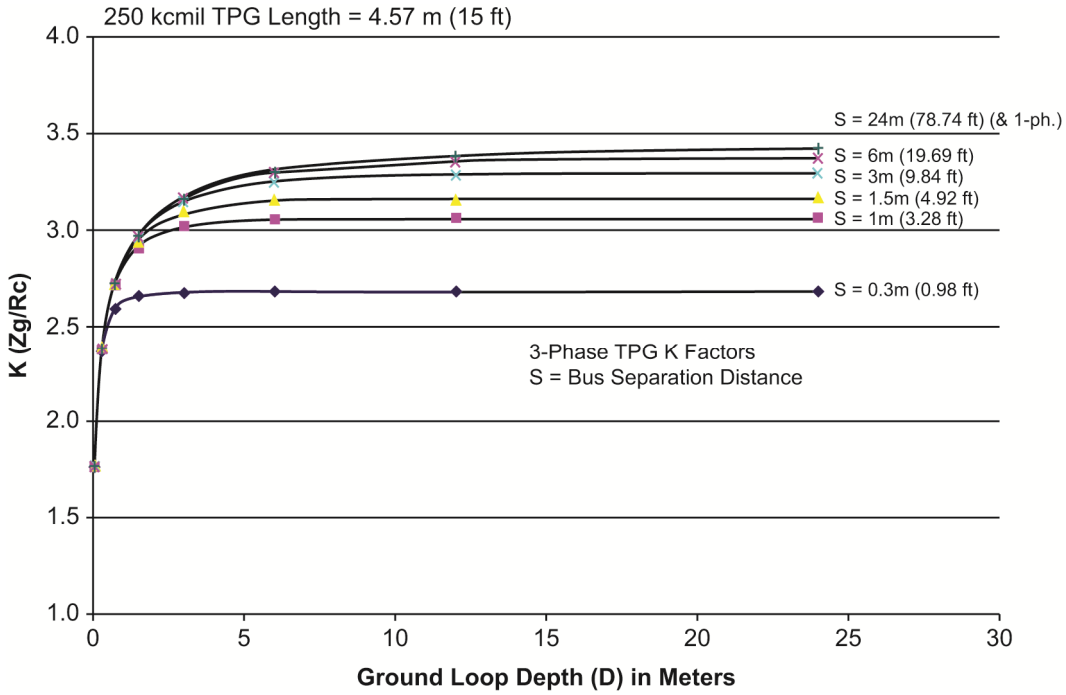
~~Figure C.10~~Figure C.11—4/0 AWG copper TPG length = 2 m (6.56 ft)



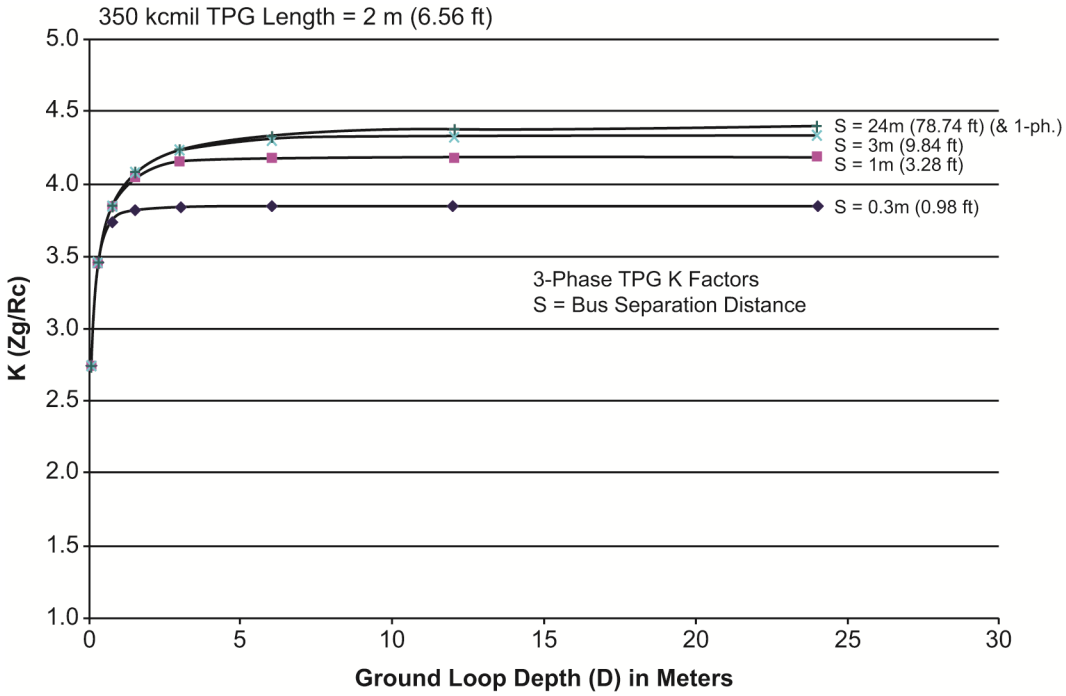
~~Figure C.11~~Figure C.12—4/0 AWG copper TPG length = 4.57 m (15 ft)



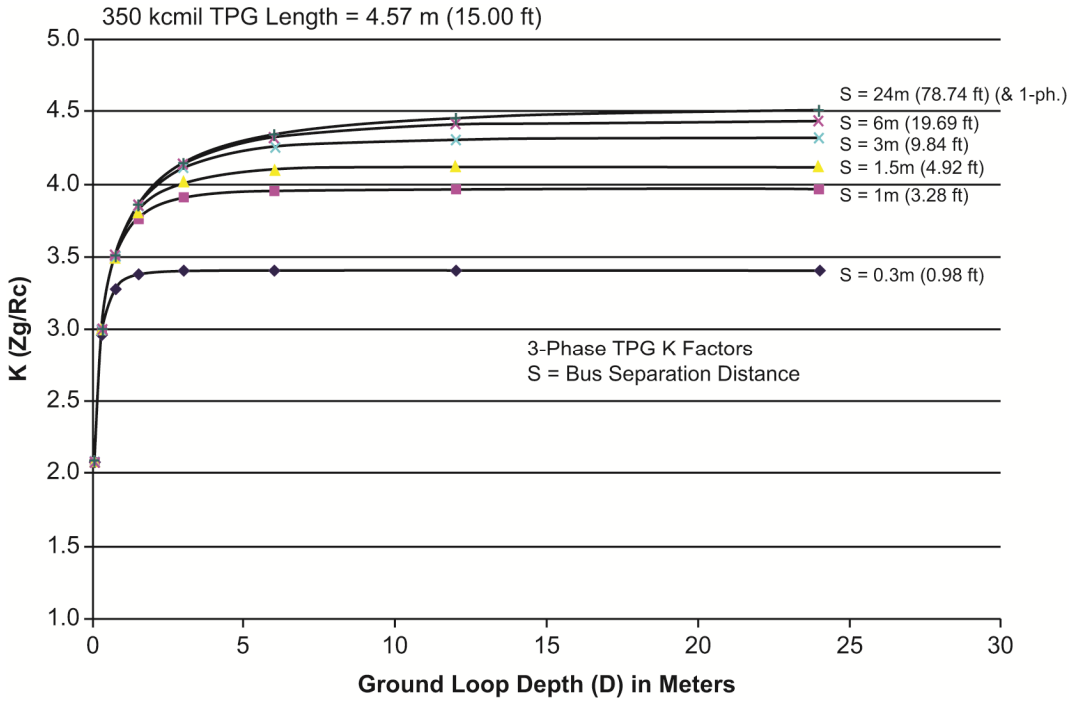
~~Figure C.12~~Figure C.13—4/0 AWG copper TPG length 10 m (32.81 ft)



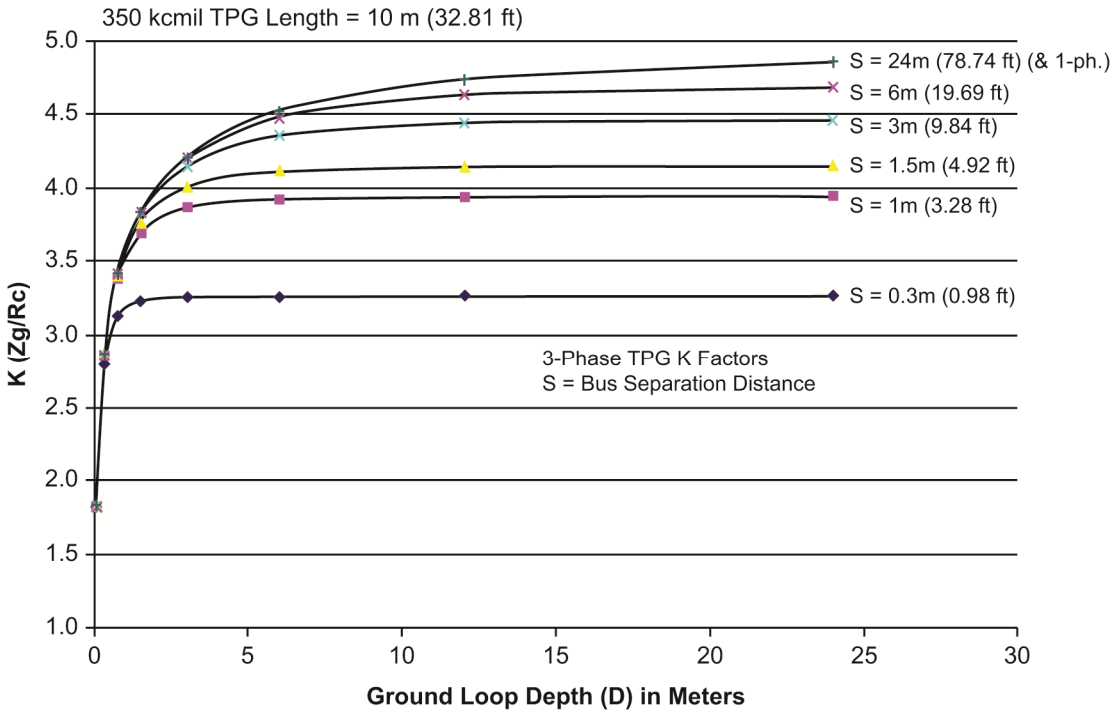
~~Figure C.13~~Figure C.14—250 kcmil copper TPG length = 4.57 m (15 ft)



~~Figure C.14~~Figure C.15—350 kcmil copper TPG length = 2 m (6.56 ft)



~~Figure C.15~~Figure C.16—350 kcmil copper TPG length = 4.57 m (15 ft)

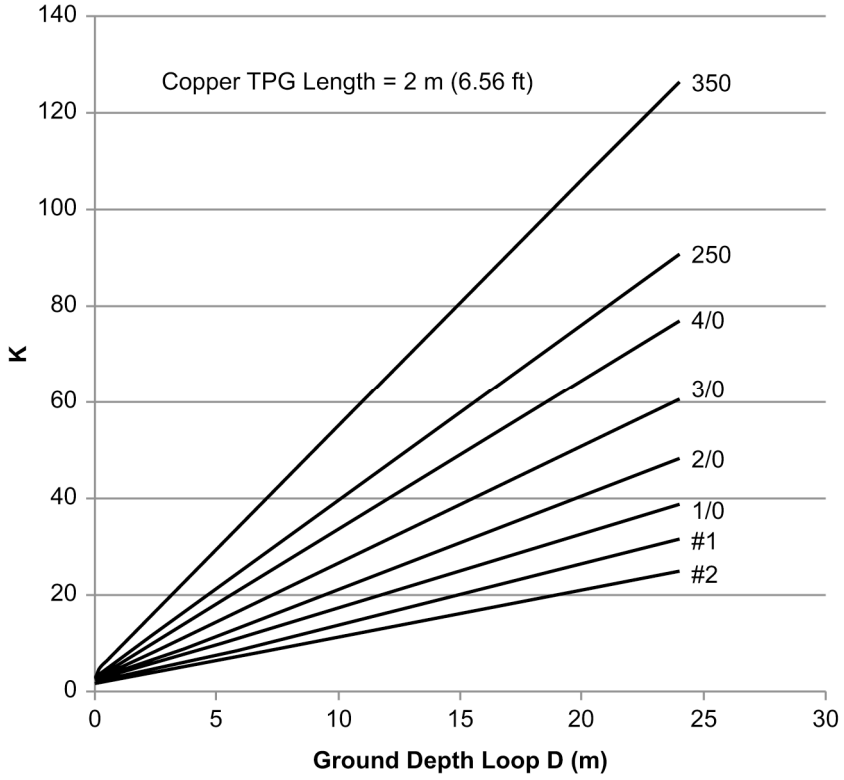


~~Figure C.16~~Figure C.17—350 kcmil copper TPG length = 10 m (32.81 ft)

C.3.2 Single–point grounded worksite, worker positioned between TPGs and energy source

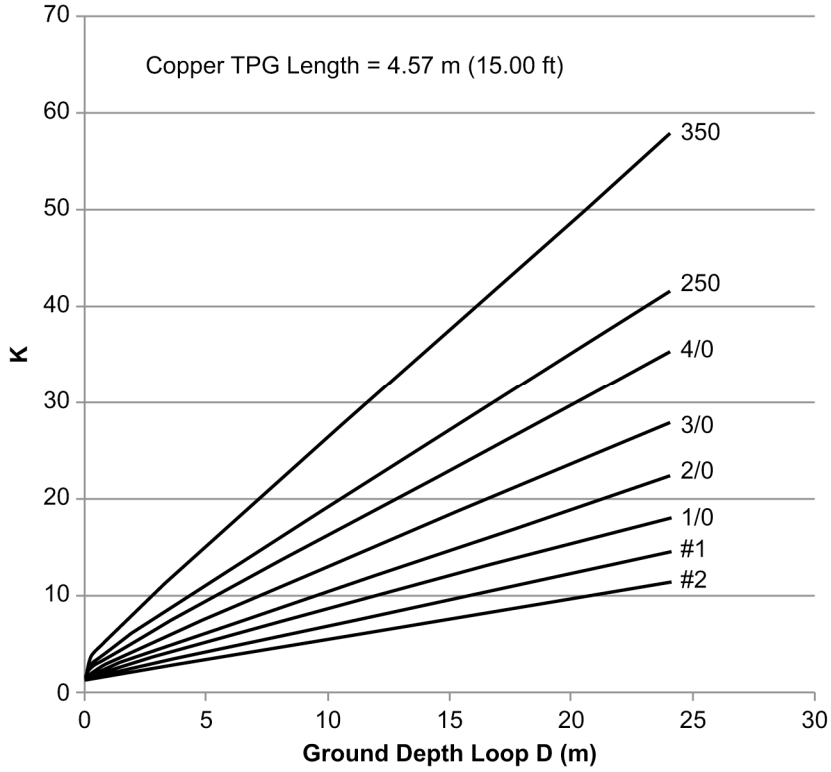
Families of TPG impedance *K* curves are shown below for TPG lengths of 2 m (6.56 ft), 4.57 m (15 ft), and 10 m (32.81 ft) as depicted in Figure C.1, except the worker is now positioned to the left of the TPGs (between source and TPGs). Values of *K* for other lengths of TPGs between 2 m (6.56 ft) and 10 m (32.81 ft) may be interpolated from the curves. Ground loop depth *D* is the distance from TPG to worker (toward source). These *K* curves account for impedance of the section of station bus[14] of length *D* and the same length of an assumed 4/0 AWG station ground grid conductor that together form the ground loop with the worker and conduct the short-circuit current. These curves are derived for single-phase, single-point worksite grounding but are applicable to three-phase grounding as well. The observation here is that the value of *K* and worker exposure voltage rises significantly as the distance between worker and TPG increase. Refer to C.1.3.2.

Figure C.18 through Figure C.20 show 60 Hz TPG impedance *K* factor curves for single-phase, single-point grounding with worker positioned between the TPG and the energy source.

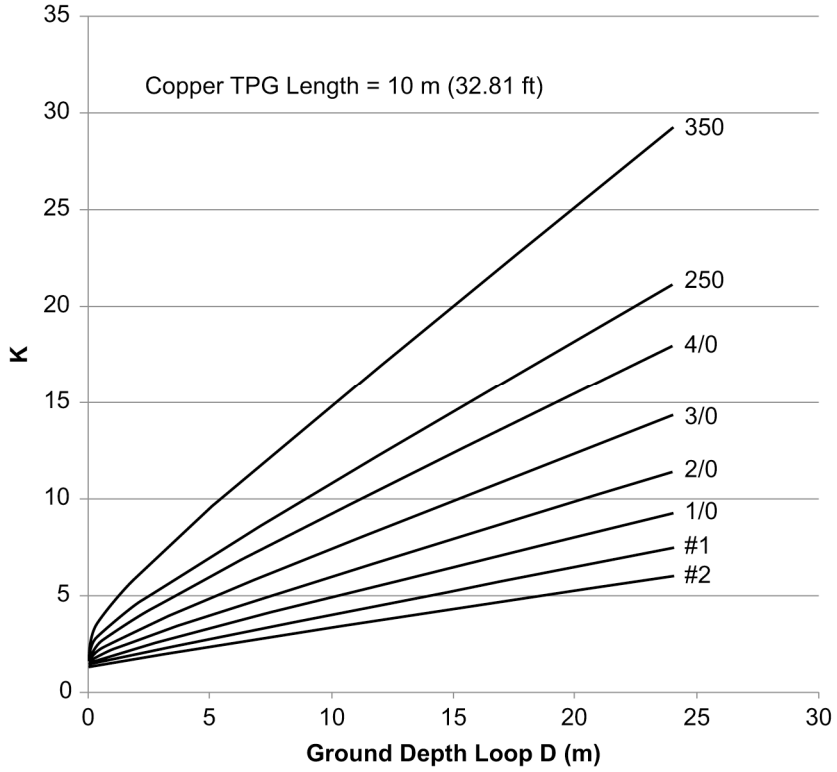


~~Figure C.17~~Figure C.18—2 m (6.56 ft) length TPGs

[14]Station bus is assumed schedule 40 seamless bus pipe, 3-inch nominal size, 88.9 mm O.D. (3.5-inch), 77.7mm I.D. (3.06-inch), ac resistance at 70 °C: 8.126 μΩ/ft. Larger bus sizes should result in slightly lower *K* factors.



~~Figure C.18~~Figure C.19~~—~~4.57 m (15 ft) length TPGs

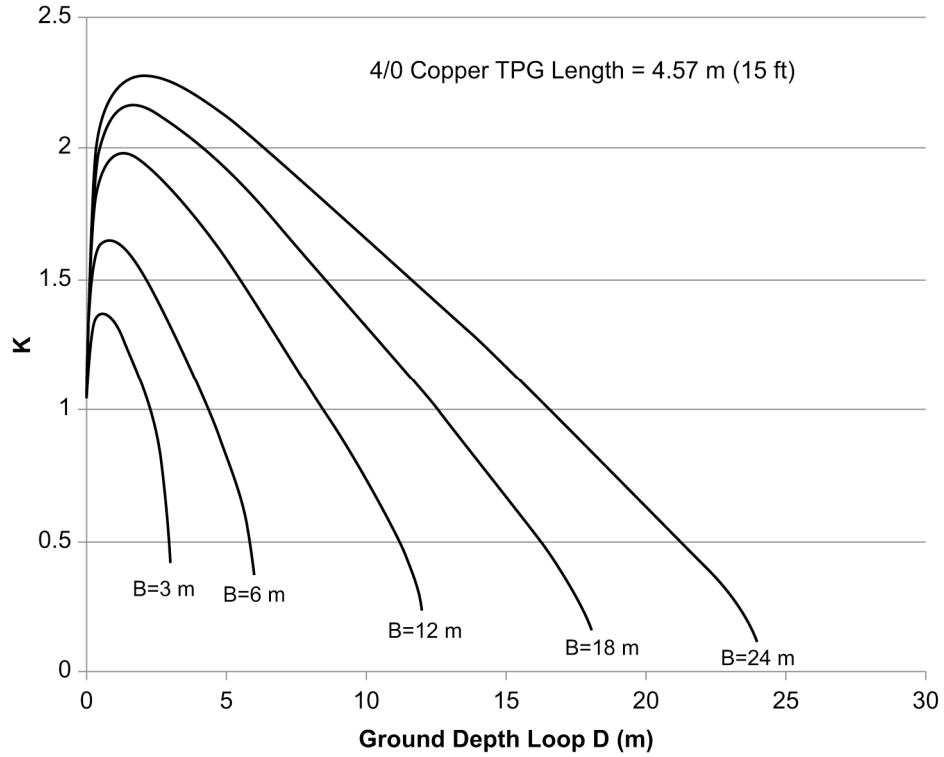


~~Figure C.19~~Figure C.20—10 m (32.81 ft) length TPGs

C.3.3 Single-phase bracket grounded worksite

Refer to C.1.3.3 for discussion of TPG impedance *K* factors for bracket grounding. Figure C.21 illustrates impedance *K* factor model data curves for only one TPG cable size and length. This data and similar data for all other TPG model data are plotted in another form of curves showing maximum *K* values versus TPG bracket spacing in Figure C.22 through Figure C.24. These curves may be used to approximate worst-case worker exposure voltage for a given TPG bracket spacing (see Figure C.2). These *K* factor curves account for impedance of the section of station bus (see footnote 14) and an assumed single 4/0 AWG station ground grid conductor that together form the ground loop with the worker and conduct the short-circuit current.

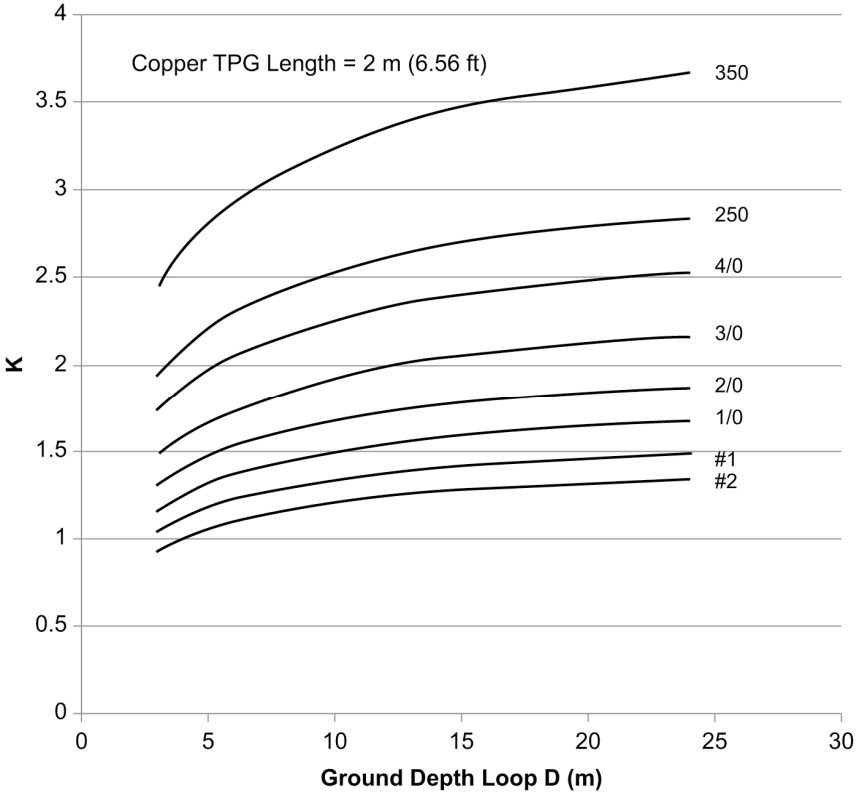
These single-phase TPG bracket maximum value *K* curves are applicable for three-phase grounding for bus spacing *S* (Figure C.1) greater than 1.5 m and become conservative (high *K* values) for bus spacing less than 1.5 m.



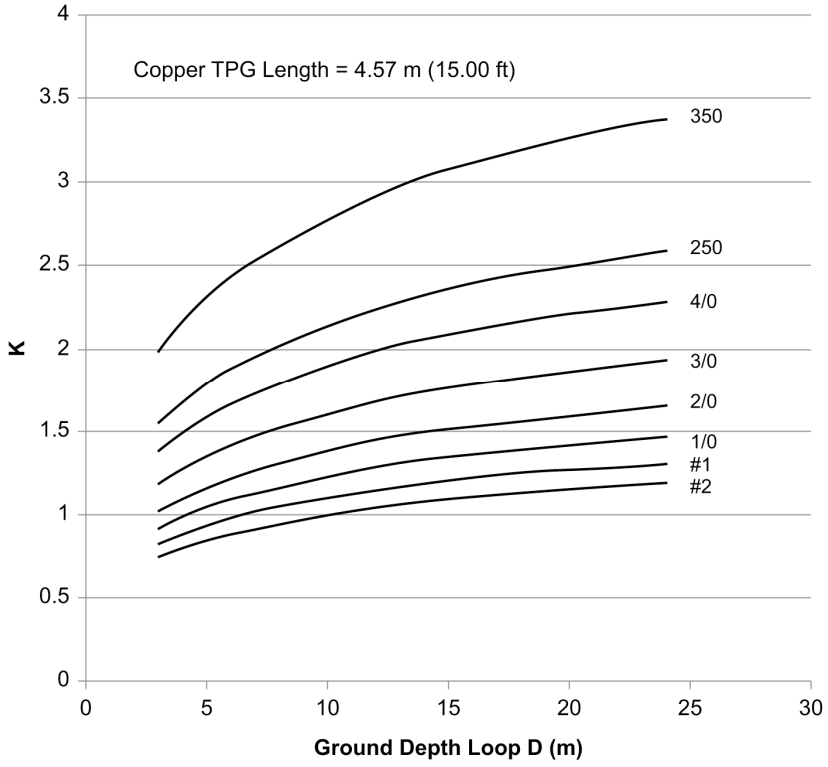
NOTE—Curves include effect of impedance for a single 4/0 AWG station ground grid conductor current return path below the overhead bus (Figure C.2). B = bracket separation distance between TPGs.

~~Figure C.20~~Figure C.21—Example 60 Hz TPG Impedance *K* factor curves for single-phase bracket grounding with 4/0 copper TPGs

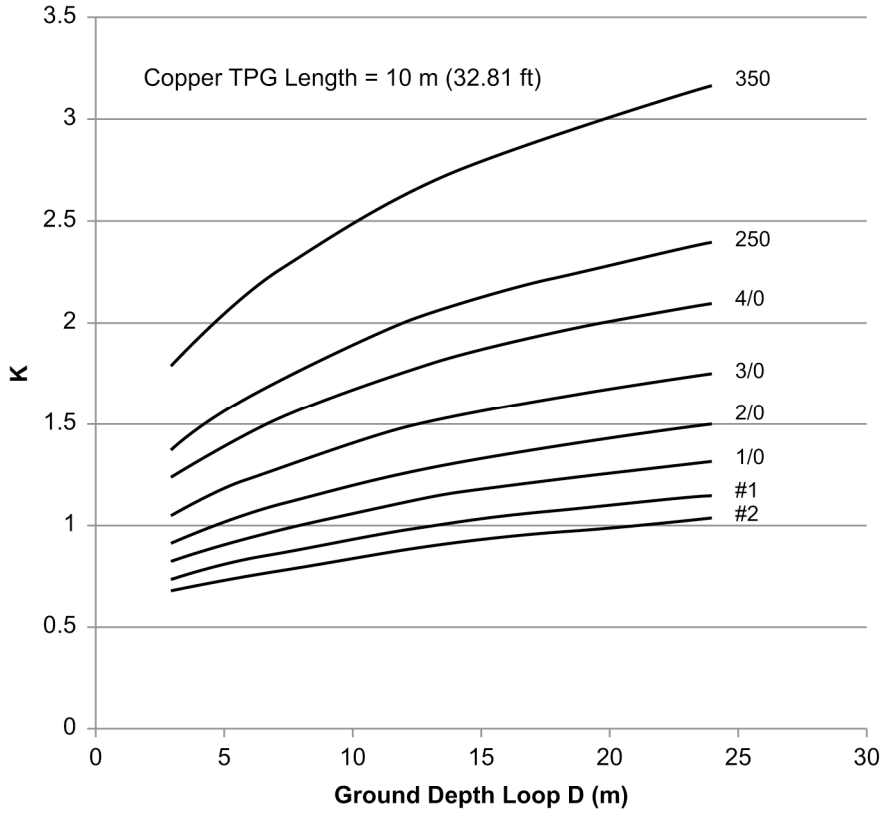
Figure C.22 through Figure C.24 show curves for 60 Hz TPG maximum impedance *K* factors for single-phase bracket grounding, as shown in Figure C.2. The curves represent the highest value of *K* obtained at an unspecified worker position between bracket TPGs.



~~Figure C.21~~Figure C.22—2 m (6.56 ft) TPGs



~~Figure C.22~~Figure C.23—4.57 m (15 ft) TPGs



~~Figure C.23~~Figure C.24~~—~~10 m (32.81 ft) length TPGs