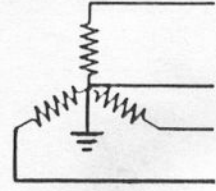


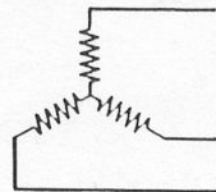


# WORLD ELECTRICITY SUPPLIES

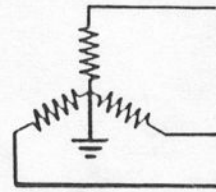
## A SURVEY OF SUPPLY VOLTAGES IN 148 COUNTRIES



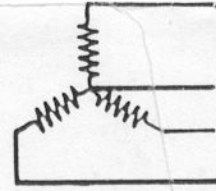
(A) THREE-PHASE STAR;  
FOUR-WIRE; EARTHED  
NEUTRAL



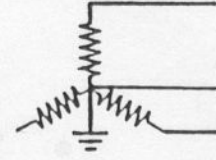
(B) THREE-PHASE STAR;  
THREE-WIRE



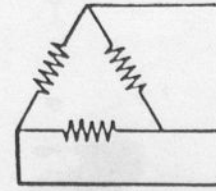
(C) THREE-PHASE STAR;  
THREE-WIRE; EARTHED  
NEUTRAL POINT



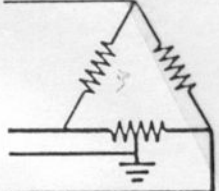
(D) THREE-PHASE STAR  
FOUR-WIRE; NON-  
EARTHED NEUTRAL



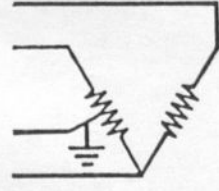
(E) TWO-PHASE STAR;  
THREE-WIRE; EARTHED  
NEUTRAL



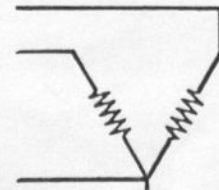
(F) THREE-PHASE DELTA;  
THREE-WIRE



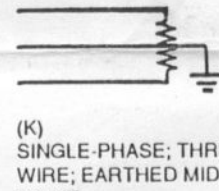
(G) THREE-PHASE DELTA;  
FOUR-WIRE; EARTHED  
MID POINT OF PHASE



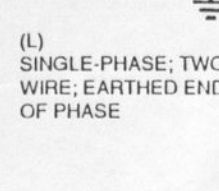
(H) THREE-PHASE OPEN  
DELTA; FOUR-WIRE;  
EARTHED MID POINT  
OF PHASE



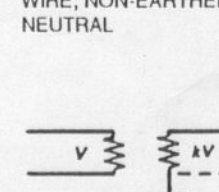
(J) THREE-PHASE OPEN  
DELTA; FOUR-WIRE;  
EARTHED JUNCTION  
OF PHASES



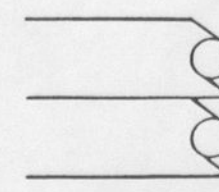
(K) SINGLE-PHASE; THREE-  
WIRE; EARTHED MID  
POINT



(L) SINGLE-PHASE; TWO-  
WIRE; EARTHED END  
OF PHASE



(M) SINGLE-PHASE; TWO-  
WIRE; NON-EARTHED  
NEUTRAL



(P) d.c.; THREE-WIRE

| COUNTRY            | FREQUENCY<br>AND<br>TOLERANCE<br>Hz & % | HOUSEHOLD<br>VOLTAGE<br>V                        | COMMERCIAL<br>VOLTAGE<br>V                                                                                               | INDUSTRIAL<br>VOLTAGE<br>V                                                                                                   | VOLTAGE<br>TOLERANCE<br>% |
|--------------------|-----------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| AFGHANISTAN        | 50                                      | 380/220 (A)                                      | 380/220 (A)                                                                                                              | 380/220 (A) (3)                                                                                                              | (9)                       |
| ALGERIA            | 50 ± 1.5                                | 220 (L) (1)<br>220 (L) (1)<br>220/127 (E)        | 380/220 (A)<br>220/127 (A)                                                                                               | 10kV<br>5.5kV<br>380/220 (A)                                                                                                 | ± 5 to 10                 |
| ANGOLA             | 50                                      | 220 (L) (1)                                      | 380/220 (A)                                                                                                              | 380/220 (A) (3)                                                                                                              | (9)                       |
| ANTIGUA            | 60                                      | 230 (L) (1)                                      | 400/230 (A)                                                                                                              | 400/230 (A) (3)                                                                                                              | (9)                       |
| ARGENTINA          | 50 ± 1.0                                | 225 (L) (1)<br>220 (L) (1)                       | 390/225 (A)<br>380/220 (A)                                                                                               | 13.2kV<br>6.6kV<br>390/225 (A)<br>380/220 (A)                                                                                | ± 10                      |
| AUSTRALIA          | 50 ± 0.1                                | 415/240 (A) (E)<br>240 (L)                       | 415/240 (A)<br>440/250 (A)<br>440 (N) (6)                                                                                | 22kV<br>11kV<br>6.6 kV<br>415/240 (A)<br>440/250 (A)                                                                         | ± 6                       |
| AUSTRIA            | 50 ± 0.1                                | 380/220 (A) (E)<br>220 (L)                       | 380/220 (A) (B)<br>220 (L)                                                                                               | 20kV<br>10kV<br>5kV<br>380/220 (A)                                                                                           | ± 5                       |
| BAHAMAS            | 60                                      | 240/120 (G)<br>120 (L)                           | 240/120 (G)<br>120 (L)                                                                                                   | 415/240 (A) (3)<br>208/120 (A)                                                                                               | (9)                       |
| BAHRAIN            | 50 & 60                                 | 400/230 (A)<br>230 (L)<br>110 (L)                | 400/230 (A)<br>380/220 (A)<br>230 (L)                                                                                    | 11kV<br>400/230 (A)<br>380/220 (A)                                                                                           | ± 6                       |
| BANGLADESH         | 50 ± 4                                  | 400/230 (A)<br>230 (L)                           | 11kV<br>400/230 (A)                                                                                                      | 11kV<br>400/230 (A)                                                                                                          | ± 5                       |
| BARBADOS           | 50 ± 0.4                                | 230/115 (G) (K)<br>200/115 (A) (E)               | 230/115 (G) (K)<br>200/115 (A) (E)                                                                                       | 11kV<br>3.3kV<br>230/115 (G)<br>200/115 (A)                                                                                  | ± 6                       |
| BELGIUM            | 50 ± 3                                  | 380/220 (A)<br>220/127 (A)<br>220 (F)            | 380/220 (A)<br>220/127 (A)<br>220 (F)                                                                                    | 15 kV<br>6 kV<br>380/220 (A)<br>220/127 (A)                                                                                  | ± 5 (day)<br>± 10 (night) |
| BELIZE             | 60                                      | 220/110 (K)                                      | 220/110 (K)                                                                                                              | 440/220 (A) (3)                                                                                                              | (9)                       |
| BERMUDA            | 60 ± 0.1                                | 240/120 (K)<br>208/120 (A)                       | 240/120 (K)<br>208/120 (A)                                                                                               | 4.16/2.4 kV<br>240/120 (K)<br>208/120 (A)                                                                                    | ± 5                       |
| BOLIVIA            | 50 ± 1                                  | 230/115 (H)<br>220 (L) (1)                       | 230/115 (H)<br>380/220 (A)                                                                                               | 230/115 (H) (3)<br>380/220 (A) (3)                                                                                           | ± 5                       |
| BOTSWANA           | 50                                      | 220 (L) (1)                                      | 380/220 (A)                                                                                                              | 13.8 kV<br>11.2kV<br>380/220 (A)                                                                                             | (9)                       |
| BRAZIL             | 60                                      | 220 (L) (1)<br>127 (L) (1)                       | 380/220 (A)<br>220/127 (A)                                                                                               | 13.8 kV<br>11.2kV<br>380/220 (A)<br>220/127 (A)                                                                              | (9)                       |
| BULGARIA           | 50 ± 0.1                                | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 20 kV<br>15kV<br>380/220 (A)<br>220 (L)                                                                                      | ± 5                       |
| BURMA              | 50                                      | 230 (L) (1)                                      | 400/230 (A)<br>230 (L)                                                                                                   | 11kV<br>6.6 kV<br>400/230 (A)                                                                                                | (9)                       |
| CAMBODIA           | 50                                      | 208/120 (A)<br>120 (L)                           | 380/220 (A)<br>208/120 (A)                                                                                               | 380/220 (A) (3)<br>208/120 (A)                                                                                               | (9)                       |
| CAMEROON (FR)      | 50 ± 2                                  | 220 (L) (1)                                      | 380/220 (A)                                                                                                              | 15kV                                                                                                                         | ± 5                       |
| CANADA             | 60 ± 0.02                               | 240/120 (K)                                      | 600/347 (A)<br>480 (F)<br>240 (F)<br>208/120 (A)<br>240/120 (K)<br>208/120 (A) (G)<br>415/240 (A) (D)<br>240/120 (K) (G) | 12.5/7.2 kV<br>600/347 (A)<br>240 (F)<br>208/120 (A)<br>240/120 (K)<br>208/120 (A) (G)<br>415/240 (A) (D)<br>240/120 (K) (G) | ± 4<br>- 8.3              |
| CAYMAN ISLANDS     | 60 ± 0.01                               | 240/120 (K)                                      | 240/120 (K)                                                                                                              | 480/240 (G)<br>480/227 (A)<br>240/120 (G)<br>208/120 (A)                                                                     | ± 10                      |
| CHAD               | 50                                      | 220 (L) (1)                                      | 220 (L) (1)                                                                                                              | 380/220 (A) (3)                                                                                                              | (9)                       |
| CHILE              | 50                                      | 220 (L) (1)                                      | 380/220 (A) (1)                                                                                                          | 380/220 (A) (3)                                                                                                              | (9)                       |
| CHINA (FR)         | (9)                                     | (9)                                              | (9)                                                                                                                      | (9)                                                                                                                          | (9)                       |
| COLOMBIA           | 60 ± 1                                  | 240/120 (G)<br>120 (L)                           | 240/120 (G)<br>120 (L)                                                                                                   | 13.2 kV<br>240/120 (G)<br>240/120 (G) (3)                                                                                    | ± 10                      |
| COSTA RICA         | 60                                      | 120 (L) (1)                                      | 240/120 (K)                                                                                                              | 120 (L) (1)                                                                                                                  | (9)                       |
| CYPRUS             | 50 ± 2.5                                | 240 (L) (1)                                      | 240 (L) (1)                                                                                                              | 11kV<br>415/240 (A)                                                                                                          | ± 6                       |
| CZECHOSLOVAKIA     | 50 ± 0.1                                | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 22 kV<br>15 kV<br>6 kV<br>3 kV<br>380/220 (A)                                                                                | ± 10                      |
| DENMARK            | 50 ± 0.4                                | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 30 kV<br>10 kV<br>380/220 (A)                                                                                                | ± 10                      |
| DAHOMEY            | 50 ± 1                                  | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 15 kV<br>380/220 (A)                                                                                                         | ± 10                      |
| DOMINICAN REPUBLIC | 60                                      | 110 (L) (1)                                      | 220/110 (K) (1)                                                                                                          | 220/110 (G) (3)                                                                                                              | (9)                       |
| ECUADOR            | 60                                      | 127 (L) (1)<br>120 (L) (1)<br>110 (L)            | 240/120 (K)<br>208/120 (A)<br>220/127 (A)<br>220/110 (K)                                                                 | 240/120 (K)<br>208/120 (A)<br>220/127 (A)<br>220/110 (K)                                                                     | (9)                       |
| EGYPT (AR)         | 50 ± 1                                  | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 11kV<br>6.6 kV<br>3 kV<br>380/220 (A)                                                                                        | ± 10                      |
| EL SALVADOR        | 60 ± 1                                  | 240/120 (K)                                      | 240/120 (K) (G)                                                                                                          | 14.4 kV<br>2.4 kV<br>240/210 (G)                                                                                             | ± 5                       |
| ETHIOPIA           | 50                                      | 220 (L) (1)                                      | 380/220 (A)                                                                                                              | 380/220 (A) (3)                                                                                                              | (9)                       |
| FALKLAND ISLANDS   | 50 ± 3                                  | 230 (L) (1)                                      | 415/230 (A)                                                                                                              | 415/230 (A) (3)                                                                                                              | ± 2.5                     |
| FILIPIN ISLANDS    | 50 ± 1                                  | 415/240 (A)<br>240 (L)                           | 415/240 (A)<br>240 (L)                                                                                                   | 11kV<br>415/240 (A)                                                                                                          | (9)                       |
| FINLAND            | 50 ± 0.1                                | 220 (L) (1)                                      | 380/220 (A)                                                                                                              | 660/380 (A)<br>500 (B)<br>380/220 (A) (D)                                                                                    | ± 10                      |
| FRANCE             | 50 ± 1                                  | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 20 kV<br>15kV<br>380 (B)<br>380/220 (A) (D)                                                                                  | ± 10                      |
| GAMBIA             | 50                                      | 230 (A) (1)                                      | 230 (A) (1)                                                                                                              | 400/230 (A) (3)                                                                                                              | ± 5 (1)                   |
| GERMANY (FR)       | 50 ± 0.3                                | 380/220 (A)<br>220 (L)                           | 380/220 (A)<br>220 (L)                                                                                                   | 20 kV<br>10 kV<br>6 kV<br>380/220 (A)                                                                                        | ± 10                      |
| GERMANY (DDR)      | 50 ± 0.3                                | 380/220 (A)<br>220 (L)<br>220/127 (A)<br>127 (L) | 380/220 (A)<br>220 (L)                                                                                                   | 10kV<br>6kV<br>660/380 (A)<br>380/220 (A)                                                                                    | ± 5                       |

| COUNTRY                    | FREQUENCY<br>AND<br>TOLERANCE<br>Hz & % | HOUSEHOLD<br>VOLTAGE<br>V             | COMMERCIAL<br>VOLTAGE<br>V                | INDUSTRIAL<br>VOLTAGE<br>V                                                                 | VOLTAGE<br>TOLERANCE<br>%   |
|----------------------------|-----------------------------------------|---------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------|
| GHANA                      | 50 ± 5                                  | 250 (L) (1)                           | 250 (L) (1)                               | 440/250 (A) (3)                                                                            | ± 10                        |
| GIBRALTAR                  | 50 ± 1                                  | 415/240 (A)                           | 415/240 (A)                               | 415/240 (A) (3)                                                                            | ± 6                         |
| GREECE                     | 50 ± 1                                  | 220 (L) (1)                           | 380/220 (A)                               | 22 kV<br>20 kV<br>15 kV<br>6.6 kV<br>380/220 (A)                                           | ± 5                         |
| GRENADA                    | 50                                      | 230 (L) (1)                           | 400/230 (A)                               | 400/230 (A) (3)                                                                            | (9)                         |
| GUADALOUPE                 | 50 & 60                                 | 230 (L) (1)<br>220 (L) (1)            | 380/220 (A)<br>380/220 (A)                | 20 kV<br>380/220 (A)                                                                       | (9)                         |
| GUAM                       | 60 ± 1                                  | 240/120 (K)                           | 240/120 (K)                               | 13.8 kV                                                                                    | ± 8                         |
| (Mariana Islands)          | 0 08                                    | 208/120 (A)<br>240 (L)<br>120 (L)     | 208/120 (A)<br>240 (L)<br>120 (L)         | 4.9 kV<br>480/277 (A)<br>480 (D)                                                           | 10                          |
| GUATEMALA                  | 60 ± 1.7                                | 240/120 (K)                           | 240/120 (K)                               | 13.8 kV                                                                                    | ± 10                        |
| HAITI                      | 60                                      | 230 (L) (1)<br>220 (L) (1)<br>115 (L) | 380/220 (A)<br>230/115 (K)<br>220/110 (K) | 380/220 (A)<br>230/115 (K)<br>220/110 (K)                                                  | (9)                         |
| HONDURAS                   | 60                                      | 110 (L)                               | 220/110 (K) (3)                           | 220/110 (K) (3)                                                                            | (9)                         |
| HONG KONG<br>(and Kowloon) | 50 ± 2                                  | 345/200 (A)<br>200 (L)                | 11 kV<br>345/200 (A)<br>200 (L)           | 11kV<br>345/200 (A)<br>200 (L)                                                             | ± 6                         |
| HUNGARY                    | 50 ± 2                                  | 380/220 (A)<br>220 (L)                | 380/220 (A)<br>220 (L)                    | 20 kV<br>10 kV<br>380/220 (A)                                                              | ± 5<br>- 10                 |
| ICELAND                    | 50 ± 0.1                                | 380/220 (A)<br>220 (L)                | 380/220 (A)<br>220 (L)                    | 380/220 (A) (3)                                                                            | (9)                         |
| INDIA (4)                  | 50 ± 1                                  | 440/250 (A)<br>230 (L)                | 440/250 (A)<br>230 (L)                    | 11 kV<br>440/250 (A)                                                                       | ± 4                         |
| Bombay                     | 50 ± 1                                  | 440/250 (A)<br>230 (L)                | 440/250 (A)<br>230 (L)                    | 11 kV<br>440/250 (A)                                                                       | ± 4                         |
| New Delhi                  | 50 ± 3                                  | 400/230 (A)<br>230 (L)                | 400/230 (A)<br>230 (L)                    | 11kV<br>400/230 (A)                                                                        | ± 6                         |
| Ramakrishnapuram<br>(2)    | 50 ± 3                                  | 400/230 (A)<br>230 (L)                | 400/230 (A)<br>230 (L)                    | 22 kV & 11kV<br>(9)                                                                        | ± 6                         |
| INDONESIA                  | 50 ± 1                                  | 460/230 (P)<br>220/127 (A)            | 460/230 (P)<br>380/220 (A)                | 460/230 (P)<br>380/220 (A)                                                                 | ± 5                         |
| IRAN                       | 50 ± 5                                  | 220 (L) (1)                           | 380/220 (A)                               | 20 kV<br>11kV<br>400/231 (A)<br>380/220 (A)                                                | ± 15                        |
| IRAQ                       | 50                                      | 220 (L) (1)                           | 380/220 (A)                               | 11kV<br>380/220 (A)                                                                        | (9)                         |
| IRELAND                    | 50 ± 0.4                                | 230 (L) (1)                           | 400/230 (A)                               | 400/230 (A) (3)                                                                            | ± 6                         |
| NORTHERN IRELAND           | 50                                      | 220 (L) (1)                           | 380/220 (A)                               | 380/220 (A)                                                                                | (9)                         |
| REPUBLIC OF ISRAEL         | 50 ± 0.2                                | 400/230 (A)<br>230 (L)                | 400/230 (A)<br>230 (L)                    | 380/220 (A)<br>22 kV<br>12.6 kV<br>6.3 kV<br>400/230 (A)                                   | ± 6                         |
| ITALY                      | 50 ± 0.4                                | 380/220 (A)<br>220/127 (E)<br>220 (L) | 380/220 (A)<br>220/127 (E)<br>220 (L)     | 20 kV<br>15 kV<br>10 kV<br>380/220 (A)<br>220 (C)                                          | ± 5 (urban)<br>± 10 (rural) |
| IVORY COAST                | 50                                      | 220 (L) (1)                           | 380/220 (A)                               | 380/220 (A) (3)                                                                            | (9)                         |
| JAMAICA                    | 50 ± 1                                  | 220/110 (G) (K)                       | 220/110 (G) (K)                           | 412.3 kV<br>220/110 (G)                                                                    | ± 6                         |
| JAPAN (EAST) (4)           | 50 ± 0.2                                | 200/100 (K)<br>(5)                    | 200/100 (H) (K)<br>200/100 (H)            | 6.6 kV<br>200/100 (H)<br>200 (G) (L)                                                       | ± 10                        |
| JAPAN (WEST) (4)           | 60 ± 0.1<br>(5)                         | 210/105 (K)<br>200/100 (K)<br>100 (L) | 210/105 (H) (K)<br>200/100 (K)<br>100 (L) | 22 kV<br>6.6 kV<br>210/105 (H)<br>200/100 (H)<br>210/105 (H)                               | ± 10                        |
| JORDAN                     | 50                                      | 380/220 (A)<br>220 (L)                | 380/220 (A)<br>220 (L)                    | 380/220 (A) (3)                                                                            | (9)                         |
| KEENYA                     | 50                                      | 240 (L) (1)                           | 415/240 (A)                               | 415/240 (A) (3)                                                                            | (9)                         |
| KOREA                      | 60                                      | 100 (L)                               | 200/100 (K)                               | (9)                                                                                        | (9)                         |
| KUWAIT                     | 50                                      | 240 (L) (1)                           | 415/240 (A)                               | 415/240 (A) (3)                                                                            | (9)                         |
| LAOS                       | 50 ± 8                                  | 380/220 (A)                           | 380/220 (A)                               | 380/220 (A) (3)                                                                            | ± 6                         |
| LEBANON                    | 50                                      | 220 (L) (1)<br>110 (L) (1)            | 380/220 (A)<br>220 (L)                    | 380/220 (A) (3)<br>190/110 (A)                                                             | (9)                         |
| LESOTHO                    | 50                                      | 220 (L) (1)                           | 380/220 (A)                               | 380/220 (A) (3)                                                                            | (9)                         |
| LIBERIA                    | 60 ± 3.3                                | 240/120 (K)                           | 240/120 (K)                               | 12.5/7.2 kV<br>416/240 (B)<br>240/120 (K)<br>208/120 (D)<br>400/230 (A) (3)<br>220/127 (A) | ± 1.7                       |
| LIBYA                      | 50                                      | 230 (L) (1)<br>127 (L) (1)            | 400/230 (A)<br>220/127 (A)                | 400/230 (A) (3)<br>220/127 (A)                                                             | (9)                         |
| LUXEMBOURG                 | 50 ± 0.5                                | 380/220 (A)<br>220 (L)                | 380/220 (A)<br>220 (L)                    | 20 kV<br>15 kV<br>5 kV<br>380/220 (A)<br>220/127 (A)                                       | ± 5 to 10<br>± 3            |
| MALAGASSY REPUBLIC         | 50 ± 2                                  | 220 (L) (1)<br>127 (L) (1)            | 380/220 (A)<br>220/127 (A)                | 380/220 (A)<br>220/127 (A)                                                                 | (9)                         |
| MALAWI                     | 50                                      | 230 (L) (1)                           | 400/230 (A)                               | 400/230 (A) (3)                                                                            | (9)                         |
| MALAYSIA                   | 50 ± 1.0                                | 240 (L) (1)                           | 415/240 (A)                               | 415/240 (A) (3)                                                                            | ± 5<br>- 10                 |
| MALI                       | 50                                      | 220 (L) (1)<br>127 (L) (1)            | 380/220 (A)<br>220/127 (A)                | 380/220 (A) (3)<br>220/127 (A)                                                             | (9)                         |
| MANILA                     | 60 ± 5                                  | 240/120 (H) (K)<br>240/120 (H)        | 240/120 (H) (K)<br>240/120 (H)            | 20 kV<br>6.24 kV<br>3.6 kV<br>240/120 (H)<br>220/127 (A) (3)                               | ± 5                         |
| MARTINIQUE                 | 50                                      | 127 (L) (1)                           | 220/127 (A)                               | 220/127 (A)                                                                                | (9)                         |
| MAURITIUS                  | 50 ± 1.0                                | 230 (L) (1)                           | 400/230 (A)                               | 400/230 (A) (3)                                                                            | ± 6                         |
| MEXICO                     | 60 ± 0.2                                | 220/127 (A)<br>220 (L)<br>120 (M)     | 220/127 (A)<br>220 (L)<br>120 (M)         | 13.8 kV<br>13.2 kV<br>480/277 (A)<br>220/127 (B)                                           | ± 6                         |
| MONACO                     | 50                                      | 380/220 (A)<br>220 (L)                | 380/220 (A)<br>220 (L)                    | 380/220 (A) (3)                                                                            | (9)                         |
| MONTERRAT                  | 60                                      | 230 (L) (1)                           | 400/230 (A)                               | 400/230 (A) (3)                                                                            | (9)                         |

| COUNTRY                 | FREQUENCY<br>AND<br>TOLERANCE<br>Hz & % | HOUSEHOLD<br>VOLTAGE<br>V                                    | COMMERCIAL<br>VOLTAGE<br>V                                                    | INDUSTRIAL<br>VOLTAGE<br>V                                   | VOLTAGE<br>TOLERANCE<br>% |
|-------------------------|-----------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------|
| MUSCAT & OMAN           | 50                                      | 240 (L) (1)                                                  | 415/240 (A)<br>240 (L)                                                        | 415/240 (A) (3)                                              | (9)                       |
| MOROCCO                 | 50                                      | 220/127 (A)<br>200/115 (A)                                   | 380/220 (A)                                                                   | 380/220 (A) (3)                                              | (9)                       |
| NEPAL                   | 50 ± 1                                  | 220 (L) (1)                                                  | 400/220 (A)<br>220 (L)                                                        | 11kV<br>400/220 (A)                                          | ± 10                      |
| NETHERLANDS             | 50 ± 0.4                                | 380/220 (A)<br>220 (E) (L)                                   | 380/220 (A)                                                                   | 10 kV<br>3 kV<br>380/220 (A)                                 | ± 6                       |
| NETHERLANDS<br>ANTILLES | 50 & 60                                 | 220 (L) (1)<br>127 (L) (1)<br>120 (L) (1)<br>115 (L) (1)     | 380/220 (A)<br>230/115 (K)<br>220/127 (A)<br>208/120 (A)                      | 380/220 (A) (3)<br>230/115 (G)<br>220/127 (A)<br>208/120 (A) | (9)                       |
| NEW GUINEA              | 50 ± 2                                  | 240 (L) (1)                                                  | 415/240 (A)<br>240 (L)                                                        | 22 kV<br>11kV<br>415/240 (A)                                 | ± 5                       |
| NEW ZEALAND             | 50 ± 1.5                                | 400/230 (A) (E)<br>230 (L)<br>240 (L)                        | 415/240 (A) (E)<br>400/230 (A) (E)<br>230 (L)                                 | 11kV<br>400/230 (A)<br>415/240 (A)<br>440 (H) (E)            | ± 5                       |
| NICARAGUA               | 60                                      | 240/120 (G) (K)                                              | 240/120 (G) (K)                                                               | 13.2 kV<br>7.6kV<br>240/120 (G)                              | (9)                       |
| NIGERIA                 | 50 ± 1                                  | 230 (L) (1)<br>220 (L) (1)                                   | 400/230 (A)<br>380/220 (A)                                                    | 15 kV<br>11kV<br>400/230 (A)<br>380/220 (A)                  | ± 5                       |
| NIGER                   | 50                                      | 220 (L) (1)                                                  | 380/220 (A)                                                                   | 380/220 (A)                                                  | (9)                       |
| NORWAY                  | 50 ± 0.2                                | 230 (B)                                                      | 380/220 (A)<br>230 (B)                                                        | 20 kV<br>10 kV<br>5kV<br>380/220 (A)<br>230 (B)              | ± 10                      |
| PAKISTAN                | 50                                      | 230 (L) (1)                                                  | 400/230 (A)<br>230 (L)                                                        | 400/230 (A) (3)                                              | (9)                       |
| PANAMA                  | 60 ± 0.17                               | 240/120 (K)                                                  | 480/277 (A)<br>240/120 (K)                                                    | 12kV<br>480/277 (A)<br>208/120 (A)                           | ± 5                       |
| PARAGUAY                | 50                                      | 220 (L) (1)                                                  | 440/220 (K)<br>380/220 (A)                                                    | 440/220 (K) (3)<br>380/220 (A)                               | (9)                       |
| PERU                    | 60                                      | 225 (B) (M)                                                  | 225 (B) (M)                                                                   | 10 kV<br>6 kV<br>225 (B)                                     | (9)                       |
| PHILIPPINES             | 60 ± 0.16                               | 220/110 (K)                                                  | 13.8 kV<br>4.16 kV<br>2.4 kV<br>220/110 (H)                                   | 13.8 kV<br>4.16 kV<br>2.4 kV<br>220/110 (H)                  | ± 5                       |
| POLAND                  | 50                                      | 220 (L) (1)                                                  | 380/220 (A)                                                                   | 15 kV<br>6 kV<br>380/220 (A)                                 | (9)                       |
| PORTUGAL                | 50 ± 5                                  | 380/220 (A)<br>220 (L)                                       | 15 kV<br>5 kV<br>380/220 (A)<br>220 (L)                                       | 15 kV<br>5 kV<br>380/220 (A)                                 | ± 1                       |
| PUERTO RICO             | 60 ± 10                                 | 240/120 (L)                                                  | 480 (F)<br>240/120 (L)                                                        | 8.32 kV<br>4.16kV<br>480 (F)                                 | ± 10                      |
| QATAR                   | 50                                      | 240 (L) (1)                                                  | 415/240 (A)<br>240 (L)                                                        | 415/240 (A) (3)                                              | ± 6                       |
| RHODESIA                | 50 ± 2.5                                | 225 (L) (1)                                                  | 390/225 (A)                                                                   | 11 kV<br>390/225 (A)                                         | ± 6.6                     |
| ROMANIA                 | 50 ± 1                                  | 220(L) (1)                                                   | 380/220 (L)                                                                   | 20 kV<br>10 kV<br>6 kV<br>380/220 (A)                        | ± 5                       |
| RWANDA                  | 50 ± 1                                  | 220 (L)(1)                                                   | 380/220 (A)                                                                   | 15 kV<br>6.6 kV<br>380/220 (A)                               | ± 5                       |
| SABAH                   | 50 ± 0.5                                | 240 (L) (1)                                                  | 415/240 (A)                                                                   | 415/240 (A) (3)                                              | ± 6                       |
| SAUDI ARABIA            | 60 ± 0.5                                | 220/127 (A)<br>127 (L)                                       | 380/220 (A)<br>220/127 (A)<br>127 (L)                                         | 380/220 (A) (3)<br>220/127 (A)                               | ± 5                       |
| SENEGAL                 | 50                                      | 127 (L) (1)                                                  | 220/127 (A)<br>127 (L)                                                        | 220/127 (A) (3)                                              | (9)                       |
| SIERRA LEONE            | 50                                      | 230 (L) (1)                                                  | 400/230 (A)<br>230 (L)                                                        | 11 kV<br>400/230 (A)                                         | (9)                       |
| SINGAPORE               | 50 ± 0.5                                | 400/230 (A)<br>230 (L)                                       | 6.6 kV<br>400/230 (A)                                                         | 22 kV<br>6.6 kV<br>400/230 (A)                               | ± 3                       |
| SOMALI REPUBLIC         | 50                                      | 230 (L)<br>220 (L)<br>110 (L) (1)                            | 440/220 (K)<br>220/110 (K)<br>230 (L)                                         | 440/220 (G) (3)<br>220/110 (G)                               | (9)                       |
| SOUTH AFRICA            | 50 ± 2.5<br>25 (B)                      | 433/250 (A) (7)<br>400/230 (A) (7)<br>380/220 (A)<br>220 (L) | 11kV<br>6.6 kV<br>3.3 kV<br>433/250 (A) (7)<br>400/230 (A) (7)<br>380/220 (A) | 11kV<br>6.6 kV<br>3.3 kV<br>500 (B)<br>380/220 (A)           | ± 5                       |
| SPAIN                   | 50 ± 3                                  | 380/220 (A) (E)<br>220 (L)<br>220/127 (A) (E)<br>127 (L)     | 380/220 (A)<br>220/127 (A)                                                    | 15 kV<br>11 kV<br>380/220 (A)                                | ± 7                       |
| SRI LANKA<br>(CEYLON)   | 50 ± 2                                  | 230 (L) (1)                                                  | 400/230 (A)<br>230 (L)                                                        | 11kV<br>400/230 (A)                                          | ± 6                       |
| ST. KITTS & NEVIS       | 60                                      | 230 (L) (1)                                                  | 400/230 (A)                                                                   | 400/230 (A) (3)                                              | (9)                       |
| ST. LUCIA               | 50                                      | 240 (L) (1)                                                  | 415/240 (A)                                                                   | 11kV<br>415/240 (A)                                          | (9)                       |
| ST. VINCENT             | 50                                      | 230 (L) (1)                                                  | 400/230 (A)                                                                   | 3.3 kV<br>400/230 (A)                                        | (9)                       |
| SUDAN                   | 50                                      | 240 (L) (1)                                                  | 415/240 (A)<br>240 (L)                                                        | 415/240 (A) (3)                                              | (9)                       |
| SURINAM                 | 50 & 60                                 | 115 (L)<br>127 (L) (1)                                       | 230/115 (K)<br>220/127 (A)<br>220/110 (K)                                     | 230/115 (G) (3)<br>220/127 (A)<br>220/110 (G)                | (9)                       |
| SWAZILAND               | 50 ± 2.5                                | 230 (L) (1)                                                  | 400/230 (A)<br>230 (L)                                                        | 11 kV<br>400/230 (A)                                         | ± 6                       |
| SWEDEN                  | 50 ± 0.2                                | 380/220 (A)<br>220 (L)                                       | 380/220 (A)<br>220 (L)                                                        | 20 kV<br>10 kV<br>6 kV<br>380/220 (A)                        | ± 10                      |
| SWITZERLAND             | 50 ± 0.5                                | 380/220 (A)<br>220 (L)                                       | 380/220 (A)<br>220 (L)                                                        | 16kV<br>11kV<br>6 kV<br>380/220 (A)                          | ± 10                      |