Mains Design Instruction

Network Power Quality Limits and Levels

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MDI 0050 – Network Power Quality Limits and Levels

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To enable us to reply to your feedback, please clearly provide your contact details.

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1.0 PURPOSE
To establish the limits and requirements for the management of power quality in Endeavour Energy’s network, and to provide limits and connection guidelines for the management of connected load, generation and/or transmission network service providers and/or their equipment.

2.0 SCOPE
This instruction covers both the distribution and transmission network, and any connected load or generator on Endeavour Energy’s network.

3.0 REFERENCES
- Company Policy 9.1.4 – Network Power Quality
- Company Policy 9.2.5 - Network Asset Design
- Company Policy 9.8.3 - Network Operations
- Company Policy 9.9.1 - Network Asset Maintenance
- Company Policy 9.2.10 - Network Asset Rating
- Network Management Plan December 2013 Review
- Service and Installation Rules of NSW
- Electricity Supply Act 1995
- AS/NZS 3000 Electrical Installations (Known as the SA Wiring Rules)
- AS/NZS 61000.2.2 Electromagnetic Compatibility (EMC) Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public low-voltage power supply systems
- AS/NZS 61000.2.12 Electromagnetic Compatibility (EMC) Environment – Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems
- AS61000.3.100 Electromagnetic Compatibility (EMC) Limits – Steady state voltage limits in public electricity systems
- AS/NZS 61000.3.2 Electromagnetic Compatibility (EMC) Limits – Limits for Harmonic Current Emissions (Equipment input current less than or equal to 16 A per phase)
- AS/NZS 61000.3.6 Electromagnetic Compatibility (EMC) Limits – Assessment of emission limits for distorting loads in MV and HV power systems
- TR IEC 61000.3.7:2012 : Electromagnetic compatibility (EMC)-Limits - Assessment of emission limits for the connection of fluctuating installations to MV, HV and EHV power systems
- SA/SNZ TR IEC 61000.3.13:2013 Electromagnetic Compatibility (EMC) Limits – Assessment of emission limits for the connection of unbalanced installations to MV, HV and EHV power systems
- SA/SNZ TR IEC 61000.3.14:2013 Electromagnetic Compatibility (EMC) Limits – Assessment of emission limits for harmonics, interharmonics, voltage fluctuations and unbalance for the connection of disturbing installations to LV power systems
- AS/NZS 61000.4.7 Electromagnetic Compatibility (EMC) Testing and Measurement Techniques – General guide on harmonics and interharmonics measurements and instrumentation, for power supply systems and equipment connected thereto
- AS/NZS 61000.4.15 Electromagnetic Compatibility (EMC) Testing and Measurement Techniques – Flickermeter – Function and design specifications
- AS/NZS 61000.4.30 Electromagnetic Compatibility (EMC) Testing and Measurement Techniques –Power quality measurement methods
- National Electricity Rules (NER)
- AS60038-2000: Standard Voltages
• IEC 61000.3.14:2013 Electromagnetic compatibility (EMC) - Limits - Assessment of emission limits for harmonics, interharmonics, voltage fluctuations and unbalance for the connection of disturbing installations to LV power systems
• IEC 61000.3.13:2012 Electromagnetic compatibility (EMC) - Limits - Assessment of emission limits for the connection of unbalanced installations to MV, HV and EHV power systems
• IEC 61000.3.15:2013 Electromagnetic compatibility (EMC) - Limits - Assessment of low frequency electromagnetic immunity and emission requirements for dispersed generation systems in LV network
• Information Technology Industry Council (ITIC) Curve

4.0 DEFINITIONS AND ABBREVIATIONS

aerial bundled conductor (ABC)
Insulated overhead cable.

bulk supply point
A substation at which Endeavour Energy receives supply from Transgrid.

Conditional connection
Connection of equipment which requires the user's supply at the interface point to have impedance lower than the reference impedance (Zref) in order that the equipment emissions comply with the limits in this standard.

NOTE Meeting the voltage change limits is not the only condition for connection; emission limits for other phenomena such as harmonics, may also have to be satisfied.

customer connection point
With respect to a given customer, the closest point on the network at which other customers are (or may be in the future) connected.

extra high voltage (EHV)
Voltages exceeding 230kV.

electromagnetic fields
The combination of electric and magnetic fields in the environment.

flicker
Impression of unsteadiness of the visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time (IEV 161-08-14.)

float voltage
The voltage on supplying substation busbar. This voltage varies across the network, and is dependent on network constraints.

generator
An installation capable of supplying real and reactive power to the network.

harmonic
A frequency equal to an integer multiple of the frequency of fundamental component of a periodic waveform.

high voltage (HV)
Voltages exceeding 35kV but less than 230kV.
**impulsive transient**
A short duration disturbance characterised by a rise and decay. Typical rise times of up to 0.1ms and duration of no more than a few milliseconds.

**interharmonic frequency**
Any frequency which is not an integer multiple of the fundamental frequency

**low voltage (LV)**
Voltages not exceeding 1000V (line to line)

**mains signalling**
Periodic waveform superimposed on the medium or high voltage system to control load

**medium voltage (MV)**
voltages exceeding 1000V but less than 35kV

**oscillatory transient**
A short duration disturbance which is periodic, in the frequency range 500 to 2000Hz. Typically, up to 50ms in length and a voltage magnitude and a voltage magnitude up to 4pu.

**power factor**
The ratio of the active power to apparent power.

**RMS**
Root mean squared

**total harmonic distortion (THD)**
Ratio of the r.m.s. value of the sum of all the harmonic components up to a specified order to the r.m.s. value of the fundamental component

**voltage sag (dip)**
A short duration (at least ½ cycle and less than one minute) reduction in RMS voltage below 90% of its nominal value. (Note: swell and dip may occur simultaneously on different phases).

**voltage swell**
A short duration (at least ½ cycle and less than one minute) rise in RMS voltage above 110% of its nominal value.

**voltage unbalance**
The ratio of negative sequence voltage to positive sequence voltage.

### 5.0 ACTIONS

#### 5.1 General

Endeavour Energy is required to design, maintain and operate its network in a cost effective manner to provide reliable power supply to its connected customers. Endeavour Energy must comply to the limits stated in this standard through network design and regulation of connected loads.

#### 5.1.1 Requirements for generators and loads

Any form of generator or load connected to Endeavour Energy’s network must not compromise the quality of supply required by this instruction and the relevant Australian Standards.
5.1.2 Requirements for equipment within a customer installation

Individual items of equipment within a customer installation must comply with the requirements of the NSW Service and Installation Rules and the relevant Australian Standards referenced therein, in particular with respect to the power quality requirements of clause 1.10.2 of the NSW Service and Installation Rules.

5.1.3 Requirements for bulk supply point connection

Power quality obligations at bulk supply connection points are governed by the Distribution Network Connection Agreement between Transgrid and Endeavour Energy and the requirements stipulated in the National Electricity Rules.

5.2 Supply frequency

The nominal supply frequency is 50Hz. The control of the system frequency is the responsibility of the Australian Energy Market Operator (AEMO). The sustained operation of the system is kept within the range 47Hz – 52Hz through the scheduling of generators, governor settings and under-frequency load shedding.

5.2.1 Switching of large loads

The switching of large loads within Endeavour Energy’s network may cause momentary frequency fluctuations. The size of load switched at any one time shall be limited in order to minimise these frequency fluctuations.

5.3 Supply steady state voltage

5.3.1 Low voltage supply range

Low voltage customers shall normally be supplied at a nominal voltage of 230V line to neutral and 400V line to line. Low voltage supply may be available in some areas at 230/460V single phase – three wire supply. The nominal line to line voltage in this situation is 460V. The LV steady state voltage limits should comply with AS 61000.3.100 as shown below in Table 1.

<table>
<thead>
<tr>
<th>Steady State Voltage Measure (10 minute average r.m.s)</th>
<th>Phase-to-neutral voltage</th>
<th>Phase-to-phase voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_1% Limit</td>
<td>216 V</td>
<td>376 V</td>
</tr>
<tr>
<td>V_99% Limit</td>
<td>253 V</td>
<td>440 V</td>
</tr>
<tr>
<td>V_50% Preferred (min)</td>
<td>225 V</td>
<td>392 V</td>
</tr>
<tr>
<td>V_50% Preferred (max)</td>
<td>244 V</td>
<td>424 V</td>
</tr>
</tbody>
</table>

The above limits apply at the customer point of connection. The 1st, 50th and 99th percentile values are evaluated with at least one week’s worth of continuous 10-minute average measurement data. Guaranteed absolute 10 minute average minimum and maximum LV voltage limits such as may be experienced under unusual or emergency network conditions shall comply with the dip and swell thresholds as detailed in 5.4.1.

5.3.2 Medium and high voltage supply range

Customers supplied at medium or high voltage may include nominal line to line voltages of 11kV, 22kV, 33kV, 66kV or 132kV. The MV steady state limits should comply with 61000.3.100 as shown below in Table 2.
### Table 2 - Medium voltage steady state voltage limits

<table>
<thead>
<tr>
<th>Highest voltage for equipment $U_m$ kV</th>
<th>Nominal voltage $U_n$ kV</th>
<th>Phase-to-phase voltage limit (see Notes 1 and 2)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(10 minute r.m.s.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_{1%}$ minimum</td>
<td>$V_{99%}$ maximum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>kV</td>
<td>kV</td>
</tr>
<tr>
<td>12</td>
<td>11</td>
<td>9.9</td>
<td>11.66</td>
</tr>
<tr>
<td>24</td>
<td>12.7</td>
<td>11.43</td>
<td>13.46</td>
</tr>
<tr>
<td>24</td>
<td>22</td>
<td>19.8</td>
<td>23.32</td>
</tr>
<tr>
<td>36</td>
<td>33</td>
<td>29.7</td>
<td>34.98</td>
</tr>
</tbody>
</table>

NOTES:

1. 12.7 kV and 19.1 kV nominal voltages are single wire earth return voltages and are phase-to-earth voltages.
2. For three phase four wire medium voltage systems, the phase-to-neutral limits are the phase-to-phase limits divided by $\sqrt{3}$

The above limits apply at the customer connection point. The 1\textsuperscript{st}, 50\textsuperscript{th} and 99\textsuperscript{th} percentile values are evaluated with at least one week’s worth of continuous 10-minute average measurement data. Guaranteed absolute 10 minute average minimum and maximum MV voltage limits such as may be experienced under unusual or emergency network conditions shall align with the dip and swell thresholds as detailed in 5.4.1

Except as a result of a contingency event, the supply voltage at high voltage customer connection points shall be maintained within the range +10% to -10% of the nominal voltage at the supplying substations per clause S5.1a.4 of the NER. These limits are applicable on the basis that the customer power factor is within the limits of the customer connection agreement.

5.4 Voltage sags and swells

5.4.1 Voltage sags (or dips) and voltage swells

While there are no established limits for the number and duration of voltage sag or swell events, AS 61000.3.100 Appendix C provides preferred voltage dip and swell measurement threshold limits for LV and MV (refer to Table 3 and Table 4 below).
Table 3 - Preferred 230V voltage dip and swell measurement thresholds

<table>
<thead>
<tr>
<th>Preferred Dip and Swell Thresholds (1/2 cycle r.m.s)</th>
<th>Phase-to-neutral voltage</th>
<th>Phase-to-phase</th>
<th>1 phase 3 wire centre neutral phase-to-phase voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dip ($V_{\text{min}}$)</td>
<td>207 V</td>
<td>360 V</td>
<td>414 V</td>
</tr>
<tr>
<td>Swell ($V_{\text{max}}$)</td>
<td>262 V</td>
<td>456 V</td>
<td>524 V</td>
</tr>
</tbody>
</table>

Table 4 - MV voltage dip and swell measurement thresholds

<table>
<thead>
<tr>
<th>Highest voltage for equipment $U_m$ kV</th>
<th>Nominal voltage $U_n$ kV</th>
<th>$\frac{1}{2}$ cycle r.m.s. voltage thresholds</th>
<th>Supply voltage dip threshold kV</th>
<th>Supply voltage swell threshold kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>11</td>
<td>9.46</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>12.7</td>
<td>10.92</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>22</td>
<td>18.92</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>33</td>
<td>28.38</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

5.5 Unbalance

5.5.1 Current unbalance

Customers must balance their load currents so that they meet the requirements stated in the NSW Service and Installation Rules. This requires that the loading of an installation that is supplied by more than one phase is arranged so that the maximum demand in any active service conductor is not more than 25A above the current in any other active service conductor.

Medium and high voltage customers must meet the requirements stated in the National Electricity Rules clause 5.3.6 so that;

- for connections at 30kV or higher voltage, the current in any phase is not greater than 102% or less than 98% of the average of the currents in the three phases and;
- for connections at voltages less than 30kV, the current in any phase is not greater than 105% or less than 95% of the average of the currents in the three phases

5.5.2 Voltage unbalance

Endeavour Energy is required by the National Electricity Rules (S5.1a.7) to limit voltage unbalance such that the maximum negative sequence voltage as a percentage of the nominal voltage meets the requirements stated in Table 5.

Table 5 - Sequence levels

<table>
<thead>
<tr>
<th>Nominal Supply Voltage (kV)</th>
<th>Maximum negative sequence voltage (% of nominal)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non contingency event</td>
</tr>
<tr>
<td></td>
<td>30 minute average</td>
</tr>
<tr>
<td>More than 100</td>
<td>0.5</td>
</tr>
<tr>
<td>More than 10 but not more than 100</td>
<td>1.3</td>
</tr>
<tr>
<td>10 or less</td>
<td>2.0</td>
</tr>
</tbody>
</table>
5.5.3 Voltage unbalance planning levels

The planning level for LV voltage unbalance (negative sequence component) is as set out by the compatibility level in TR IEC 61000.3.13 of 2%. This standard acknowledges that a voltage unbalance of up to 3% may occur on networks which supply smaller installations by connecting these at single phase.

The planning level for MV, HV and EHV voltage unbalance (negative sequence component) is as per Table 6 below from TR IEC 61000.3.13.

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>Planning Level L_u2(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV</td>
<td>1.8</td>
</tr>
<tr>
<td>HV</td>
<td>1.4</td>
</tr>
<tr>
<td>EHV</td>
<td>0.8</td>
</tr>
</tbody>
</table>

There are a number of detailed notes associated with these stated planning levels (refer to TR IEC 61000.3.13).

5.5.3.1 Emission limits/allocations for unbalanced installations

TR IEC 61000.3.13 shall be used to guide the calculation of Unbalance allocations for customer installations.

5.5.4 Voltage difference between neutral and earth

The voltage difference between neutral and earth on the LV network shall be no more than 10V at the customer connection point.

5.6 Voltage fluctuations and flicker

5.6.1 Rapid voltage changes

TR IEC 61000.3.7 provides recommended planning limits on rapid voltage variations for MV, HV and EHV systems as set shown in Table 7 below.

<table>
<thead>
<tr>
<th>Number of changes</th>
<th>ΔU/U_N %</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td></td>
</tr>
<tr>
<td>n ≤ 4 per day</td>
<td>5-6</td>
</tr>
<tr>
<td>n ≤ 2 per day and &gt; 4 per day</td>
<td>4</td>
</tr>
<tr>
<td>2 &lt; n ≤ 10 per hour</td>
<td>3</td>
</tr>
</tbody>
</table>

5.6.2 Voltage fluctuations (flicker) planning levels

The limits for flicker at LV, MV and HV-EHV are established in ENA DOC 034 2014 and TR IEC 61000.3.7 and shown in Table 8 below.
Table 8 - Indicative planning levels for Pst and Plt

<table>
<thead>
<tr>
<th>Voltage Level</th>
<th>LV</th>
<th>MV</th>
<th>HV-EHV</th>
</tr>
</thead>
<tbody>
<tr>
<td>(P_{st})</td>
<td>0.9</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>(P_{lt})</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
</tr>
</tbody>
</table>

**NOTES:**
The LV planning levels are established on the basis that the transfer coefficient between HV and LV or MV and LV is 1 with the assumption that the transfer coefficient between HV and LV or MV and LV is 1.

5.6.2.1 **Emission limits/allocations for fluctuating installations**

ENA DOC 034 2014 shall be used to guide the application of TR IEC 61000.3.7 for the calculation of flicker allocations for customer installations.

5.7 **Harmonics**

5.7.1 **Voltage harmonic planning Levels**

The limits for voltage harmonic distortion at various voltage levels for Australian distribution networks are established in ENA DOC 033 2014 and shown in Table 9 below.

Table 9 - Recommended planning levels for Australian distribution systems (ENA DOC 033 2014)

<table>
<thead>
<tr>
<th>(h^1)</th>
<th>132kV</th>
<th>66kV</th>
<th>33kV</th>
<th>22kV</th>
<th>11kV</th>
<th>400V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1.14</td>
<td>1.34</td>
<td>1.40</td>
<td>1.84</td>
<td>1.84</td>
<td>1.90</td>
</tr>
<tr>
<td>3</td>
<td>2.00</td>
<td>2.65</td>
<td>2.83</td>
<td>4.27</td>
<td>4.27</td>
<td>4.50</td>
</tr>
<tr>
<td>4</td>
<td>0.60</td>
<td>0.70</td>
<td>0.73</td>
<td>0.96</td>
<td>0.96</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>2.00</td>
<td>2.87</td>
<td>3.11</td>
<td>5.12</td>
<td>5.12</td>
<td>5.50</td>
</tr>
<tr>
<td>6</td>
<td>0.30</td>
<td>0.35</td>
<td>0.36</td>
<td>0.48</td>
<td>0.48</td>
<td>0.50</td>
</tr>
<tr>
<td>7</td>
<td>2.00</td>
<td>2.59</td>
<td>2.76</td>
<td>4.19</td>
<td>4.19</td>
<td>4.50</td>
</tr>
<tr>
<td>8</td>
<td>0.30</td>
<td>0.35</td>
<td>0.36</td>
<td>0.47</td>
<td>0.47</td>
<td>0.50</td>
</tr>
<tr>
<td>9</td>
<td>0.81</td>
<td>0.93</td>
<td>0.97</td>
<td>1.27</td>
<td>1.27</td>
<td>1.35</td>
</tr>
<tr>
<td>10</td>
<td>0.29</td>
<td>0.33</td>
<td>0.35</td>
<td>0.46</td>
<td>0.46</td>
<td>0.49</td>
</tr>
<tr>
<td>11</td>
<td>1.50</td>
<td>1.88</td>
<td>1.98</td>
<td>2.97</td>
<td>2.97</td>
<td>3.25</td>
</tr>
<tr>
<td>12</td>
<td>0.27</td>
<td>0.30</td>
<td>0.31</td>
<td>0.41</td>
<td>0.41</td>
<td>0.44</td>
</tr>
<tr>
<td>13</td>
<td>1.50</td>
<td>1.75</td>
<td>1.83</td>
<td>2.53</td>
<td>2.53</td>
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<td>14</td>
<td>0.25</td>
<td>0.28</td>
<td>0.29</td>
<td>0.38</td>
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<td>0.41</td>
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<tr>
<td>15</td>
<td>0.21</td>
<td>0.24</td>
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<td>0.32</td>
<td>0.32</td>
<td>0.35</td>
</tr>
<tr>
<td>16</td>
<td>0.23</td>
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<td>0.27</td>
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Harmonic Voltages (%)

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NOTES:
1. h is the harmonic order.

5.7.1.1 Emission limits/allocations for distorting installations
ENA DOC 033 2014 shall be used to guide the application of TR IEC 61000.3.6 for the calculation of harmonic allocations for customer installations.

5.8 Mains Signalling
Under normal system conditions, the maximum allowable injected signal voltages of mains signalling systems are those shown in Figure 1.

Figure 1 - Meister Curve (AS61000.2.12)

- 20.70 V maximum for 283 - 400Hz
- 13.80 V maximum for 750 Hz
- 9.86 V maximum for 1050 Hz
It is recommended to inject the ripple signal at 2% of nominal busbar voltage to correctly operate the receiving relays. Setting the ripple signal injection to a higher value is generally not necessary and can lead to non-compliances along the feeder where in some cases resonant amplification of the signal occurs. Where ripple signal injection voltage is required to be greater, please contact the Power Quality and Reliability Planning Manager for further guidance.

5.9 Direct current in neutral

All equipment connected to the LV network by a customer must be such that any direct current (DC) on the neutral conductor caused by the equipment does not exceed 120 milli-ampere hours per day.

DC in the network will occur in small quantities due to some types of lighting equipment and from a number of domestic appliances. The DC contributions from these sources are limited by Australian standards. Design aspects which can influence the DC component in the neutral conductors include proximity to large DC traction motors and cathodic protection installations, earth resistance and earthing arrangements.

5.10 Transients

The network shall be designed and constructed such that transients are minimised due to an event on the network through appropriate switching, and appropriate line and earth design.

5.10.1 Oscillatory transients

The company shall design, maintain and operate to minimise the likelihood of oscillatory transients. Design of capacitor bank installations covering such aspects as network location, switching regimes, series reactors and use of point-on-wave switching devices will be carried out to minimise the risk of switching transients where deemed the cost/risk justified solution.

5.10.2 Impulsive transients

The company shall design, maintain and operate its network to minimise the impact of impulsive transients, such as are caused by lightning strikes.

5.11 Power factor

Any power factor requirements at bulk supply connection points as detailed in the Distribution Network Connection Agreement between Transgrid and Endeavour Energy shall be met through the appropriate provision of capacitor banks or other reactive support plant.

5.11.1 Less than 50kV

Customers connected to Endeavour Energy’s network on < 50kV must maintain a power factor of no less than 0.9 lagging as stated in the Service and Installation Rules of NSW.

5.11.2 Between 50 kV - 250 kV

Customers connected to Endeavour Energy’s network on between 50 kV - 250 kV must maintain a power factor no less than 0.95 lagging as stated in the Service and Installation Rules of NSW.

5.12 Electromagnetic fields

The maximum allowable electromagnetic field strength due to Endeavour Energy’s network shall be the reference levels for exposure to r.m.s. magnetic and electric fields at 50 Hz shown in Table 10 and Table 11 respectively.

---

1 Reference: “Interim guidelines on limits of exposure to 50/60 Hz electric and magnetic fields” – National Health and Medical Research Council (NHMRC) 1989
Table 10 - Magnetic field limits

<table>
<thead>
<tr>
<th>Location</th>
<th>B – field strength (μT)</th>
<th>Milligauss (mG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within restricted access site – Short term</td>
<td>5,000</td>
<td>50,000</td>
</tr>
<tr>
<td>Within restricted access site – Occupational – Whole working day, for example, zone substation</td>
<td>500</td>
<td>5,000</td>
</tr>
<tr>
<td>Area accessible by general public (Continuous exposure up to 24 hours)</td>
<td>100</td>
<td>1000</td>
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<tr>
<td>Area accessible by general public (Short time exposure 2 - 3 hours)</td>
<td>1000</td>
<td>10,000</td>
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</table>

Table 11 - Electric field limits

<table>
<thead>
<tr>
<th>Location</th>
<th>5 kV/m</th>
<th>10 kV/m</th>
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<tbody>
<tr>
<td>General public</td>
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<tr>
<td>Occupational</td>
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<td></td>
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</tbody>
</table>

Endeavour Energy’s principle is to exercise prudent avoidance, which means the organisation will minimise the exposure to magnetic fields where cost is justified. The organisation shall construct using principles and techniques that minimises the magnetic field levels.
6.0 AUTHORITIES AND RESPONSIBILITIES

The Chief Engineer has the authority and responsibility for approving this instruction.

The Manager Primary Systems has the authority and responsibility for making recommendations to Chief Engineer in respect to this instruction.

The Manager Asset & Network Planning has the authority and responsibility for:
- developing and implementing power quality monitoring and reporting systems;
- developing an understanding of network wide power quality compliance levels; and
- developing and implementing a power quality management plan

The Network Demand Manager has the authority and responsibility for reflecting the company’s power quality policy and standards provisions in associated customer connection contracts.

The Power Quality and Reliability Planning Manager has the authority and responsibility for:
- monitor network power quality compliance with the levels specified within this standard;
- integrate findings into the power quality management plan; and
- accessing customers power quality limits

The Manager Network Connections has the authority and responsibility for informing high voltage customers of the Endeavour Energy power quality standard upon connection and creation of connection agreement.

The Earthing and Power Quality Manager has the authority and responsibility for:
- reviewing the document to keep the content up to date; and
- develop power quality strategies with Power Quality and Reliability Planning Manager to keep the network within the power quality levels specified in this document

The Distribution Manager Support Services has the authority and responsibility for maintaining that employees are made aware of the requirements this standard.

7.0 DOCUMENT CONTROL

Documentation content coordinator: Earthing and Power Quality Manager

Documentation process coordinator: Standards Process Coordinator