Energy efficiency at our core.
Our Wilson e3 amorphous transformer is the industry leading ultra low loss transformer product. It avoids energy wastage through transformer losses and helps organisations reduce their operating costs and their carbon emissions. With significant energy savings over the lifetime of a transformer, total cost of ownership considerations are almost always favourable with a Wilson e3.

**BENEFITS OF CHOOSING A WILSON E3**

- Guaranteed loss savings over lifetime
- Favourable total cost of ownership (TCO)
- Cost effective 2 in 1 Voltage Management solution
- Over 1100 amorphous installations across the UK
- Around £200k lifetime savings when replacing an existing transformer
- Easy, non-invasive energy efficiency measure
- 24 month guarantee for complete peace of mind
- Award-winning amorphous technology

Our Wilson e3 transformer range provides superior operational efficiency alongside in-built voltage management capabilities, achieving savings in both energy costs and associated CO₂ emissions.

**ADD TO YOUR BOTTOM LINE WITH ONE SIMPLE INFRASTRUCTURE DECISION**

Two types of energy losses are inherent in the running of distribution transformers:

1. **LOAD LOSSES THAT VARY DEPENDING ON TRANSFORMER LOADING**
2. **NO-LOAD LOSSES THAT OCCUR IN THE TRANSFORMER CORE**

Cutting transformer losses further: Amorphous metal core technology

Core losses are continually present from the day the unit is energised; that is 24 hours a day, 365 days a year. Wilson e3 transformers combine amorphous metal cores with low current density conductor to create an ultra low loss transformer with significantly reduced losses.

The result? Providing you with guaranteed, easily quantifiable energy savings for your organisation.

**PAYBACK CALCULATION WILSON E3 - ULTRA LOW LOSS AMORPHOUS**

![Energy & Carbon Savings through Supply Transformers](image)

**AWARD WINNING AMORPHOUS TECHNOLOGY**

![AWARD WINNING AMORPHOUS TECHNOLOGY](image)
ENERGY EFFICIENCY
AT OUR CORE

The Wilson e3 transformer combines amorphous core material with low current density conductors to provide a distribution transformer with the lowest combined transformer losses. As a result it not only exceeds EU Eco Design specifications due to come into force in 2021 (Tier 2) but sets ambitious new standards ahead of the curve for Tier 3. Amorphous technology transformers won 2019 IEMA Sustainability Impact Awards for the energy and carbon savings achieved in over 1000 locations across the UK.

WHAT ARE AMORPHOUS CORE TRANSFORMERS (AMT’S)?

The cores of conventional transformers consist of stacks of laminations that are made from silicon steel with an almost uniform crystalline structure (CRGO). In transformers with amorphous cores, a ribbon of steel is wound to form the core.

The big benefit of amorphous transformers is that amorphous steel has lower hysteresis losses. Simply put, this means that less energy is wasted as heat during the magnetisation and de-magnetisation of the core (see IR imagery below).

WHAT ARE AMORPHOUS METALS?

Amorphous metals are made of alloys that have no atomic order. They are made by rapid cooling of molten metals that prevents crystallisation and leaves a vitrified structure in the form of thin strips. Due to the lack of systematic structure, this type of metal has also been given the name “The Metallic Glasses”.

Infrared (IR) images illustrate significantly lower temperature in an amorphous metal core (right) compared with a traditional silicon steel core (left).

COMPARISON OF PROPERTIES

<table>
<thead>
<tr>
<th>Properties</th>
<th>AMORPHOUS METAL</th>
<th>CRGO STEEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (g/cm³)</td>
<td>7.15</td>
<td>7.65</td>
</tr>
<tr>
<td>Specific resistance</td>
<td>130.00</td>
<td>45.00</td>
</tr>
<tr>
<td>Saturation flux density (Tesla)</td>
<td>1.56</td>
<td>2.03</td>
</tr>
<tr>
<td>Typical core loss (at 50 Hz, 1.4 Tesla)</td>
<td>0.205 Watt/kg</td>
<td>0.54 Watt/kg</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>0.025</td>
<td>0.23</td>
</tr>
<tr>
<td>Space factor</td>
<td>0.86</td>
<td>0.97</td>
</tr>
<tr>
<td>Brittleness</td>
<td>Higher</td>
<td>Lower</td>
</tr>
<tr>
<td>Available form</td>
<td>Ribbon/foil*</td>
<td>Sheet/Roll</td>
</tr>
<tr>
<td>Annealing temperature</td>
<td>360°C</td>
<td>810°C</td>
</tr>
<tr>
<td>Annealing atmosphere</td>
<td>Inert gas</td>
<td>Inert gas</td>
</tr>
<tr>
<td>Special annealing requirement</td>
<td>Magnetic field</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>annealing</td>
<td></td>
</tr>
</tbody>
</table>

*(Standard sizes -142.2mm, 170.2mm & 213.4mm)
Since its launch, Wilson e3 has been continually developed to achieve the highest energy efficiency levels possible. Replacing old transformers with Wilson e3 can significantly reduce your energy waste, carbon emissions and the cost that comes with it.

When calculating the gains associated with upgrading supply transformers to modern ultra low loss equivalents, the age and construction of the existing unit will make a significant difference.

As a rule of thumb, the older your transformer, the worse its performance is likely to be and the greater saving potential you will have.

How much energy (and money!) is your old transformer wasting away through losses? Find out from our rough guide on typical loss values for transformers manufactured in the last 70 years (based on a typical 1000kVA transformer).

A HISTORICAL GUIDE TO LOSSES

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Voltage Management is an energy saving technique that reduces these unnecessary losses by improving voltage to site. The Wilson e3 transformer comes with built-in voltage management capabilities that allow for easy adjustment to LV site voltage without the need of costly additional equipment.

An extremely cost effective infrastructure upgrade that not only provides guaranteed energy savings through reduced transformer losses but delivers substantial additional savings through in-built voltage management capabilities.

Two Areas of Energy Savings

1. Guaranteed savings through reduced transformer losses

Based on a 30-year transformer lifespan, a 1000kVA Wilson e3 transformer will typically save £106,000 over its lifetime when compared with a modern, Eco design Tier 1 compliant transformer.

2. Substantial potential savings through voltage management

The Wilson e3 is designed to deliver a reduced secondary voltage (415 instead of 433V). In addition, the units feature an extended tapping range (+7.5%) designed to reduce site voltage at source without the need for costly dedicated voltage management equipment. This reduces plant footprint, avoids additional system losses and eliminates the need for additional plant maintenance.

NHS CASE STUDY - VOLTAGE DATA

The following graph details the recorded RMS voltage for the supply.

GUIDE VALUES FOR NO LOAD VOLTAGE

<table>
<thead>
<tr>
<th>HV voltage</th>
<th>Tap setting</th>
<th>LV voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>11,000V</td>
<td>7.5% (1)</td>
<td>384V</td>
</tr>
<tr>
<td>11,000V</td>
<td>5% (2)</td>
<td>394V</td>
</tr>
<tr>
<td>11,000V</td>
<td>2.5% (3)</td>
<td>405V</td>
</tr>
<tr>
<td>11,000V</td>
<td>0 (4)</td>
<td>415V</td>
</tr>
<tr>
<td>11,000V</td>
<td>-2.5% (5)</td>
<td>425V</td>
</tr>
<tr>
<td>11,000V</td>
<td>-5% (6)</td>
<td>436V</td>
</tr>
</tbody>
</table>
# Dimensions & Typical Assembly

Representative assembly shown for 2000kVA Wilson e3 transformer.

## Dimensions (in mm)

<table>
<thead>
<tr>
<th>Rating KVA</th>
<th>Tank Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
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<tbody>
<tr>
<td>315</td>
<td>1</td>
<td>1377</td>
<td>1685</td>
<td>1750</td>
<td>1320</td>
<td>1405</td>
<td>720</td>
<td>745</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>500</td>
<td>1</td>
<td>1387</td>
<td>1835</td>
<td>1750</td>
<td>1320</td>
<td>1555</td>
<td>720</td>
<td>755</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>800</td>
<td>1</td>
<td>1585</td>
<td>2080</td>
<td>1750</td>
<td>1320</td>
<td>1800</td>
<td>720</td>
<td>840</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
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<td>840</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
<td>111</td>
<td>-</td>
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<tr>
<td>1250</td>
<td>2</td>
<td>1730</td>
<td>2240</td>
<td>1750</td>
<td>1320</td>
<td>1960</td>
<td>720</td>
<td>870</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
<td>151</td>
<td>-</td>
</tr>
<tr>
<td>1500</td>
<td>2</td>
<td>1730</td>
<td>2240</td>
<td>1750</td>
<td>1320</td>
<td>1960</td>
<td>720</td>
<td>870</td>
<td>1049</td>
<td>1320</td>
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<td>191</td>
<td>-</td>
</tr>
<tr>
<td>1600</td>
<td>2</td>
<td>1730</td>
<td>2240</td>
<td>1750</td>
<td>1320</td>
<td>1960</td>
<td>720</td>
<td>870</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
<td>271</td>
<td>-</td>
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<tr>
<td>2000</td>
<td>3</td>
<td>1985</td>
<td>2242</td>
<td>1750</td>
<td>1320</td>
<td>1960</td>
<td>720</td>
<td>1010</td>
<td>1049</td>
<td>1320</td>
<td>400</td>
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<tr>
<td>2500</td>
<td>4</td>
<td>2130</td>
<td>2437</td>
<td>2712</td>
<td>1500</td>
<td>2155</td>
<td>900</td>
<td>1115</td>
<td>1229</td>
<td>1500</td>
<td>500</td>
<td>311</td>
<td>311</td>
</tr>
</tbody>
</table>

Dimensions shown are subject to tolerances (10%).

**Do you need additional technical information?**

Please ask us for supporting technical details today.
E3 RANGE, ELECTRICAL CHARACTERISTICS & TYPICAL APPLICATIONS

WILSON E3 DISTRIBUTION TRANSFORMER RANGE:

- Single and three phase transformers
- 100kVA – 3000kVA
- Oil filled ONAN or synthetic ester filled KNAN with insulation class up to 36kV
- Primary voltages typically 3.3kV, 6.6kV, 11kV, 11/6.6kV dual, 33kV
- Secondary voltages typically 280V, 315V, 400V, 415V, 433V, 480V, 690V
- Off-load tap changers (on load tap changer available for Wilson e3+)
- Extended tapping range: -5% to +7.5%
- Corrugated or bolt on panel radiator tanks
- Cable box type or open bushings
- BS / IEC standards or custom specifications

TYPICAL APPLICATIONS:

- Step down distribution transformers
- Step up generation transformers
- Package substations
- Unit type substations
- Data centres
- Wind farm transformers
- Solar PV farm transformers
- 6 Pulse and 12 Pulse rectifier transformers
- Isolation transformers
- EV charging stations
- Battery Storage

TYPICAL ACCESSORIES:

- Oil temperature indicator (OTI)
- Close coupled MV switchgear
- Close coupled LV cabinets /feeder pillars
- Winding temperature indicator (WTI)
- Magnetic oil level gauge (MOG)
- Forced air cooling
- Marshalling box
- Pressure relief device (PRD)
- Bi-directional rollers
- Radiator valves
- Dehydrating breather

**ELECTRICAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>RATING KVA</th>
<th>K/V</th>
<th>HV Li/PF</th>
<th>LV Li/PF</th>
<th>Z</th>
<th>P0 NL</th>
<th>P0 LL</th>
<th>THD%</th>
<th>KG</th>
</tr>
</thead>
<tbody>
<tr>
<td>315</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>4.75</td>
<td>180</td>
<td>2380</td>
<td>&lt;5%</td>
<td>2700</td>
</tr>
<tr>
<td>500</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>4.75</td>
<td>270</td>
<td>3330</td>
<td>&lt;5%</td>
<td>3275</td>
</tr>
<tr>
<td>800</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>4.75</td>
<td>380</td>
<td>5160</td>
<td>&lt;5%</td>
<td>4220</td>
</tr>
<tr>
<td>1000</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>4.75</td>
<td>450</td>
<td>6630</td>
<td>&lt;5%</td>
<td>4540</td>
</tr>
<tr>
<td>1250</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>5.5</td>
<td>500</td>
<td>8250</td>
<td>&lt;5%</td>
<td>5255</td>
</tr>
<tr>
<td>1500</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>5.5</td>
<td>560</td>
<td>10156</td>
<td>&lt;5%</td>
<td>5720</td>
</tr>
<tr>
<td>1600</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>5.5</td>
<td>570</td>
<td>10800</td>
<td>&lt;5%</td>
<td>6000</td>
</tr>
<tr>
<td>2000</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>6.0</td>
<td>750</td>
<td>13500</td>
<td>&lt;5%</td>
<td>7180</td>
</tr>
<tr>
<td>2500</td>
<td>11/415</td>
<td>75/28</td>
<td>-/3</td>
<td>6.0</td>
<td>810</td>
<td>16650</td>
<td>&lt;5%</td>
<td>9810</td>
</tr>
</tbody>
</table>

EXCEEDING TIER 2 ECO DESIGN DIRECTIVE SPECIFICATIONS TODAY
Results - £22,500 annual savings
272,949 kWh reduction annually.

I found Carl and his team on site very professional. They all got on with the job, had pride in their workmanship and attention to detail. The client was certainly impressed and is looking forward to the energy savings.

Results - £25,000 annual savings
285,000 annual kWh savings.

An extremely cost effective infrastructure upgrade that not only provides guaranteed energy savings through reduced transformer losses but delivers substantial additional savings through in-built voltage management capabilities.

NHS UNIVERSITY HOSPITAL OF SOUTH MANCHESTER

We’re happy to recommend the Wilson e2 transformer as part of an integrated approach to energy savings.

It was in reality a ‘no brainer’ to select the Wilson e2 for two recently completed substation upgrade projects.

I found Carl and his team on site very professional. They all got on with the job, had pride in their workmanship and attention to detail. The client was certainly impressed and is looking forward to the energy savings.

Over 1,100 Amorphous Transformer Installations Across The UK

Wilson Power Solutions Limited
Westland Works, Westland Square, Leeds LS11 5SS UK
T: +44 (0)113 271 7588 E: info@wilsonpowersolutions.co.uk

Wilson Powersolutions.co.uk