

**Tx21 COST-EFFECTIVE  
TIER 2 COMPLIANT  
FROM JULY 2021**



# ENERGY & CARBON SAVINGS THROUGH SUPPLY TRANSFORMERS

The Tx21 Range of Amorphous Transformers are industry leading ultra low loss products. They avoid energy wastage through transformer losses and help organisations reduce their operating costs and their emissions.

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

The Tx21 transformer range provides superior operational efficiency alongside in-built voltage management capabilities, achieving savings in both energy costs and associated CO<sub>2</sub> emissions.

## 12 MONTH GUARANTEE

Our Tx21 Transformers come with an industry leading 12 month guarantee from dispatch\*

## BENEFITS OF CHOOSING A Tx21

**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

**MEETS & EXCEEDS** TIER 2 (2021) EU ECO DESIGN SPECIFICATIONS

**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**



**electricity  
north west**

Construction and Maintenance



**Tx21 transformers** combine amorphous core material with low current density conductors to provide a distribution transformer with the lowest combined transformer losses. As a result they already exceed the EU Eco Design specifications due to come into force in 2021 (Tier 2) and very high standards ahead of the future Tier 3 requirements.

## WHAT ARE AMORPHOUS CORE TRANSFORMERS (AMT'S)?

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

## 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"

**Amorphous technology transformers won 2019 IEMA Sustainability Impact Awards for the energy and carbon savings achieved in over 1000 locations across the UK.**

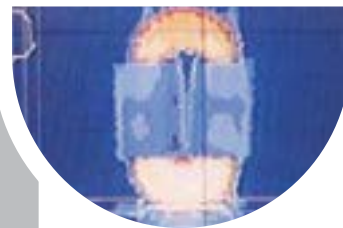
Infrared (IR) images illustrate significantly lower temperature in an amorphous metal core (right) compared with a traditional silicon steel core (left).



CRGO CRYSTALLINE CORE



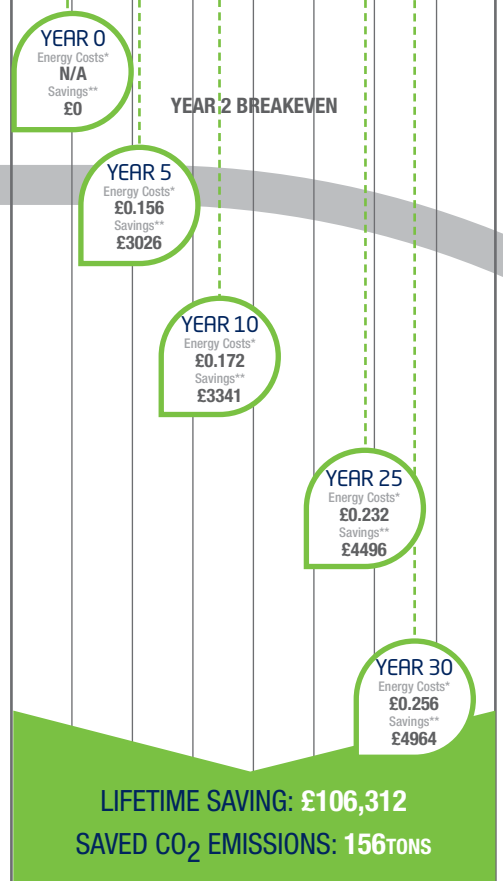
Tx21 AMORPHOUS CORE



## PAYBACK CALCULATION: Tx21 ULTRA LOW LOSS AMORPHOUS TRANSFORMER

### LIFETIME SAVINGS

-£10K £0 £30K £45K £75K £100K £110K



## CUTTING TRANSFORMER LOSSES FURTHER: AMORPHOUS METAL CORE TECHNOLOGY

There are two types of energy losses 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**

Core losses are continually present from the day the unit is energised, that is 24 hours a day, 365 days a year. Tx21 transformers combine amorphous metal cores with low current density conductors to create an ultra low loss transformer with significantly reduced losses.

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

\*(per kWh/year) \*\*\*(for kWh/year)

Replacing old transformers with a Tx21 Tier 2 compliant asset can significantly reduce your energy waste, carbon emissions and the cost that comes with it.

# LOWEST COMBINED TRANSFORMER LOSSES: THE UK'S LEADING ENERGY EFFICIENT TRANSFORMERS



## COMPARE TRANSFORMER LOSSES

KVA	PRE 2015 STANDARD LOSS CRGO TRANSFORMER		Tx15 - TIER 1 2015 ECO DESIGN COMPLIANT		TX21 - TIER 2 2021 ECO DESIGN COMPLIANT	
	Core Losses NLL	Load Losses LL	Core Losses NLL	Load Losses LL	Core Losses NLL	Load Losses LL
315	600	5350	360	3900	180	2380
500	900	7400	510	5500	270	3330
800	1150	11000	650	8400	382	5160
1000	1350	12500	770	10500	450	6630
1250	1575	16000	950	11000	500	8250
1500	1700	21000	1125	13140	560	10156
1600	1800	21700	1200	14000	570	10800
2000	2300	24000	1450	18000	750	13500
2500	3000	28000	1750	22000	810	16650

Transformer loss comparison. All values are given in Watts [W] and refer to full load. Figures correct at date of fourth publication, March 2020.

## A HISTORICAL GUIDE TO LOSSES

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.

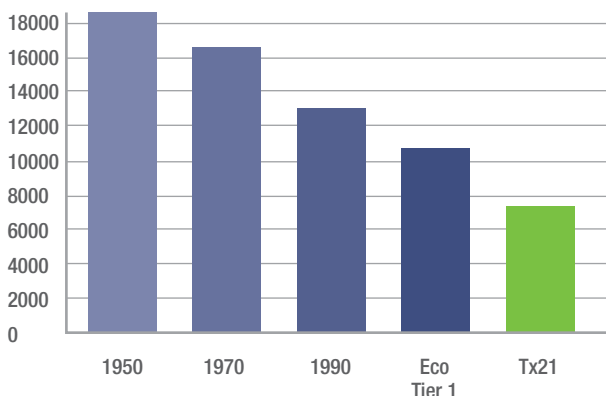
How much energy (and money!) is your old transformer wasting away through losses? Find out from our rough guide on typical loss values for transformers manufactured in the last 70 years (based on a typical 1000kVA transformer).

## TRANSFORMER LOSSES COMPARISON

TRANSFORMER CONSTRUCTION	CORE LOSSES (APPROX (W))	LOAD LOSSES (APPROX (W))	kWh SAVINGS Tx21/PA	£'S SAVINGS Tx21/PA*
1950s Transformer (Hot rolled steel - typically pre 1965)	2870	15625	59809	£8971
1970s Transformer (Early CRGO 1965 to 1985 approx)	1770	15094	47893	£7184
1990s Transformer (modern standard CRGO - from approx 1985 onwards)	1400	13125	36201	£5430
2015 Transformer (Tier 1 EU Eco design compliant)	770	10500	19415	£2912

\*Based on electricity costs of £0.15/kWh \*\*All based on 1MVA rating and 70% load. Please note that the dates detailed above are approximate and an overlap of manufacturing techniques may be evident in transformers commissioned around these milestone periods

## 1000kVA COMBINED LOSSES



Many sites in the UK are supplied by a higher than optimal voltage that is responsible for significant energy losses in voltage dependent equipment.

# VOLTAGE MANAGEMENT THROUGH MV SUPPLY

Voltage Management is an energy saving technique that reduces these unnecessary losses by improving voltage to site. The Tx21 transformers we supply come with in-built voltage management capabilities that allow for easy adjustment to LV site voltage without the need for costly additional equipment.

## TWO AREAS OF ENERGY SAVINGS

### 1 SAVINGS THROUGH REDUCED TRANSFORMER LOSSES

Based on a 30-year transformer lifespan, a 1000kVA Tx21 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

Tx21 transformers are designed to deliver a reduced secondary (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.



### GUIDELINE VALUES FOR NO LOAD VOLTAGE

HV VOLTAGE	TAP SETTING	LV VOLTAGE
11000V	7.5% (1)	384V
11000V	5% (2)	394V
11000V	2.5% (3)	405V
11000V	0% (4)	415V
11000V	-2.5% (5)	425V
11000V	-5% (6)	436V





# Tx21 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 TX21+)

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

# Tx21 ELECTRICAL CHARACTERISTICS

## TYPICAL APPLICATIONS:

STEP DOWN DISTRIBUTION TRANSFORMERS

STEP UP GENERATION TRANSFORMERS

PACKAGE SUBSTATIONS

6 & 12 PULSE RECTIFIER TRANSFORMERS

DATA CENTRES

WIND FARM TRANSFORMERS

SOLAR PV FARM TRANSFORMERS

UNIT TYPE SUBSTATIONS

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

RATING KVA	KV/V	HV LL/PF	LV LL/PF	Z	PO NL	PO LL	THD%	KG
315	11/415	75/28	-/3	4.75	180	2380	<5%	2700
500	11/415	75/28	-/3	4.75	270	3330	<5%	3275
800	11/415	75/28	-/3	4.75	380	5160	<5%	4220
1000	11/415	75/28	-/3	4.75	450	6630	<5%	4540
1250	11/415	75/28	-/3	5	500	8250	<5%	5255
1500	11/415	75/28	-/3	5.5	560	10156	<5%	5720
1600	11/415	75/28	-/3	5.5	570	10800	<5%	6000
2000	11/415	75/28	-/3	6	750	13500	<5%	7180
2500	11/415	75/28	-/3	6	810	16650	<5%	9810

JULY 2021 TIER 2 ECO  
DESIGN COMPLIANT

**Electricity North West (Construction & Maintenance) Limited** is a specialist power engineering company delivering electrical engineering solutions for businesses and public-sector organisations, from Low Voltage to 132kVA.

We specialise in providing energy solutions for customers' privately owned assets; from safe systems of work, design, construction and maintenance to energy efficiency solutions and the latest innovative technologies.

Our customers trust us to deliver solutions which can protect and manage their critical electrical assets and our experienced team will work closely with you to provide the products and services you need.



Call: **0845 0702520** to  
arrange your survey now or  
email us at:  
**[sales@enwcml.co.uk](mailto:sales@enwcml.co.uk)**

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Registered in England and Wales. Registered Number 07382637.



# HIGH VOLTAGE TRANSFORMER OWNER OPERATORS

How do you benefit as  
part of the **#HVUPGRADE**  
community:

- 1 Call or Email our team to arrange a transformer quotation and savings model
- 2 An initial survey and free quotation based on projected savings will be provided
- 3 We suggest you allow us to undertake a full power study and data logging (undertaken by an independent 3rd party)
- 4 ENW (Construction and Maintenance) Limited present the quote and return on investment
- 5 Finance options presented based on client preference



Electricity North West (Construction & Maintenance) Limited provide world class transformer technology, support, service and maintenance

**electricity  
north west**

Construction and Maintenance

For more information about  
our products and services visit  
[www.enwcml.co.uk](http://www.enwcml.co.uk)