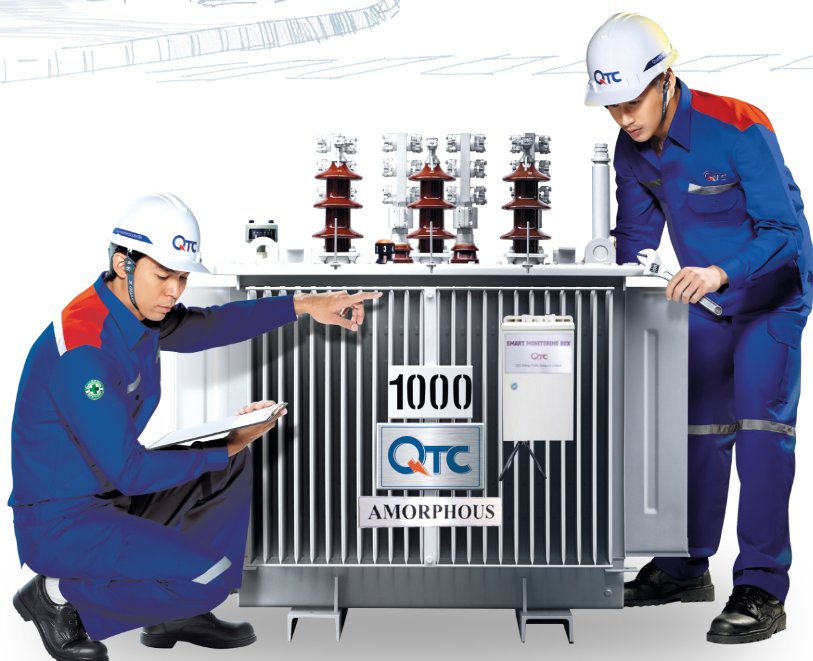


# SUPER LOW LOSS TRANSFORMER

Save energy save your money

Amorphous Alloy  
MaDC-A™ inside



Reduce No load losses > 80%



Return of investment  
3-4 years



Reduce Greenhouse-gas  
emissions



Short Circuit Withstand  
from **CESI Italy**



Super Low Loss Transformer can be developed and produced by QTC manufacturer in Thailand, which is environmentally friendly transformer.

The Super Low Loss Transformer can save the energy and having a very high efficiency at AAA0-AK level (En 50588-1:2017), thus this can reduce the Greenhouse gas emissions from electricity generating.

## WHAT IS SUPER LOW LOSS TRANSFORMER?

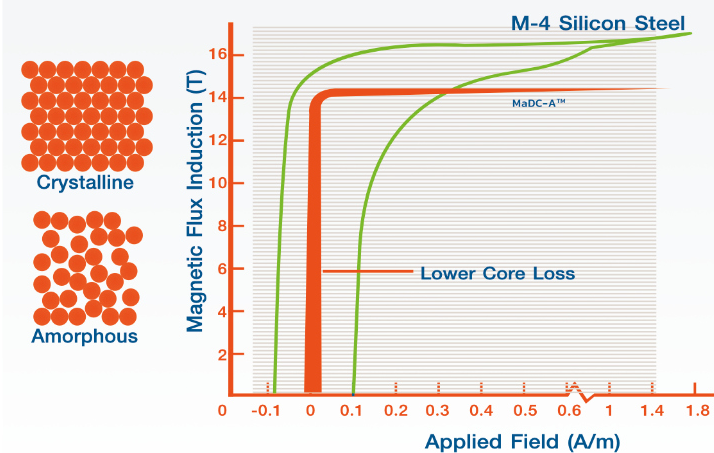
Amorphous Alloy Ribbon, MaDC-A™

The Super Low Loss Transformer is the best solution to reduce electric energy loss. The Super Low Loss Transformer which will change the magnetic core material from Silicon Steel to Amorphous Alloy, can reduce the exciting current, and the No-Load Losses (NLL) by up to 80% ,comparing with Silicon Steel.

QTC Energy PLC is a first company in Thailand, who can be capable of design and manufacturing for Super Low Loss Transformer, MEA and PEA specification will be complied as well.

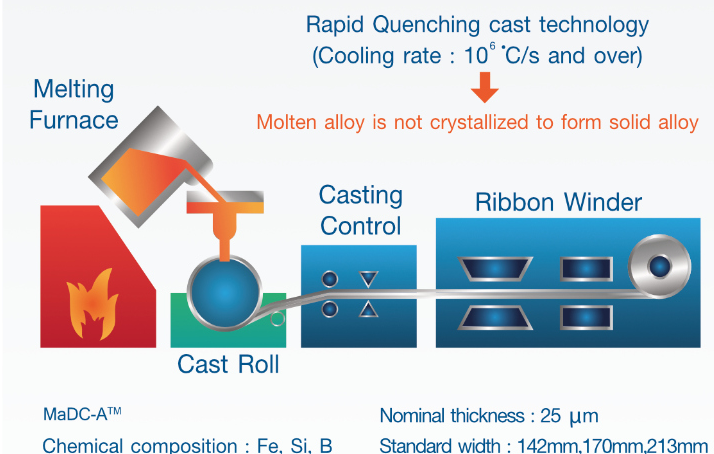
## WHAT IS AMORPHOUS ALLOY?

Amorphous Alloy is a general term for a metal with a non-crystalline structure of atom. Internal structure of the material has disordered. In transformers with Amorphous cores, a ribbon of Amorphous alloy is wound forming the core. The big benefit of Super Low Loss Transformer is that Amorphous alloy has lower hysteresis losses. In addition, Eddy current loss is decreased as the thickness is approximate 25  $\mu\text{m}$ , which is about 1/10 comparing with silicon steel. Therefore, the No-Load Loss (Eddy current Loss and hysteresis loss) can be decreased to about 1/3 of silicon steel.



## MANUFACTURING OF AMORPHOUS METALS

- Molten Metal Feed through small nozzle slot onto rapidly moving, water cooled substrate.
- Rapid Solidification  $10^6$  C/s





# SHALL WE USE AMORPHOUS ALLOY FOR SUPER LOW LOSS TRANSFORMER?

1. No-Load Losses (NLL) is lower than Silicon Steel

- Hysteresis Loss

- Eddy Current Loss

2. Energy saving potential and reducing CO<sub>2</sub> emissions

3. Environmentally friendly product, recycle is available

When applying magnetic field, random atomic structure leads less friction than Silicon Steel.

Therefore it is easy for Amorphous Alloy to magnetize and demagnetize resulting in low Hysteresis Loss.

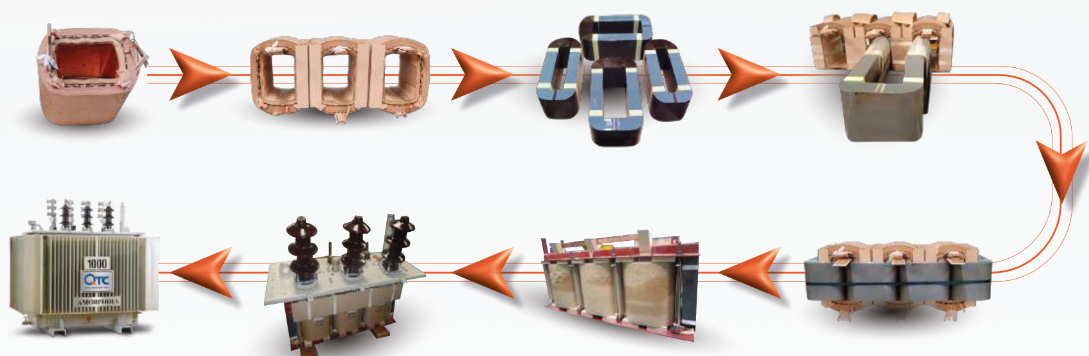
Amorphous Alloy has very thin laminations (25 micron). Thin laminations result in lower eddy current loss as compared to Silicon Steel.

Super Low Loss contributes energy saving and CO<sub>2</sub> emissions reduction in electricity network.

Recycle flow of Super Low Loss

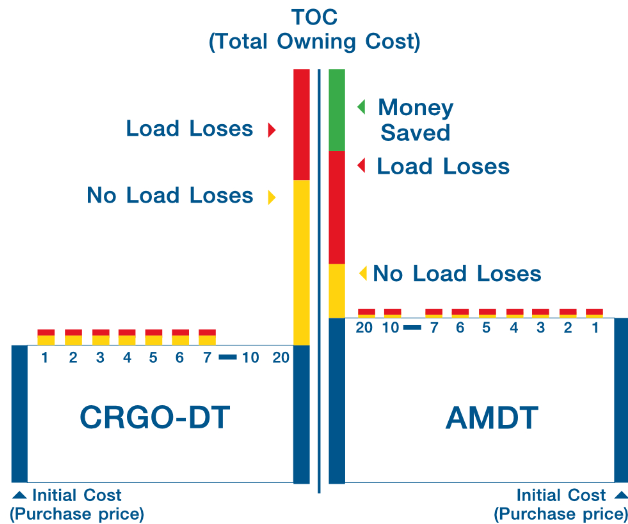


## PRODUCTION PROCESS



# BENEFIT OF SUPER LOW LOSS TRANSFORMER

## Concept of TOC



## CONCEPT OF TOTAL OWNING COST (TOC)

- Distribution Transformer usually can be operated >20-30 years (average lifetime in EU will be around 40 years).
- Purchase of Distribution Transformer based on initial price is not economical in their life time.
- TOC takes account of initial price and running cost in a life time: not only initial price.
- Price of energy efficiency product such as Super Low Loss Transformer is usually higher than Cold Rolled Grain Oriented Distribution Transformer (CRGO-DT) but running cost will be lower than CRGO-DT.
- TOC is suitable for economic analysis of energy efficient and long life products.
- $TOC = \text{Initial Purchase Price} + \text{Cost of Future Energy Loss.}$

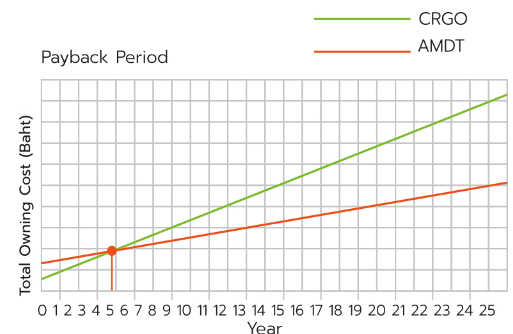
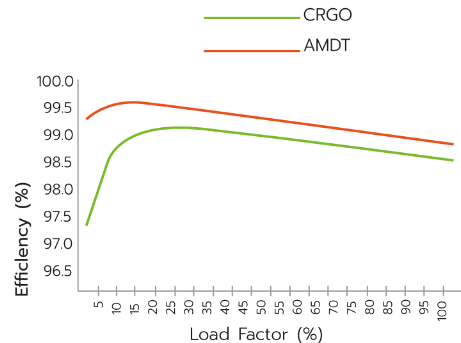
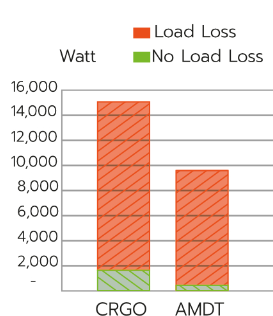
## CALCULATION ANALYSIS

1000kVA 3Ph 50Hz Dyn11 22000-400 / 230V Impedance 6.0%  
EN 50588-1 : 2017 AAAO-Ak

$$\text{Annual loss of electricity cost (money amount/year)} = \left[ \frac{\text{NLL (W)} + \text{LL (W)} \times \left( \frac{\text{Load Factor}}{100} \right)^2}{1,000} \right] \times 24\text{h} \times 365 \text{ (days)} \times \text{Energy cost (Baht/kWh)}$$

$$\text{CO}_2 \text{ Emission} = \left[ \frac{\text{NLL (W)} + \text{LL (W)} \times \left( \frac{\text{Load Factor}}{100} \right)^2}{1,000} \right] \times 24\text{h} \times 365 \text{ (days)} \times \text{CO}_2\text{EF}^* \text{ (kg-CO}_2\text{/kWh)}$$

Type	No Load Loss (Watt)	Load Loss (Watt)	Load Factor (%)	Time/year (Hr)	Energy Cost (Baht)	Cost (Baht/Year)	CO2 Emission (kg/year)
CRGO	1,600	13,500	50	8,760	4.00	174,324	25,334
AMDT	320	7,600	50	8,760	4.00	77,889	11,305
difference	1,280	5,900	-	-	-	96,535	14,029



The above result shown that It will reduce the loss by 7,180 watt/transformer or 24,134 kWh/year, which is equivalent to reducing the Greenhouse gas by 14 Ton/year



# SUPER LOW LOSS TRANSFORMER SPECIFICATION (GENERATION II)

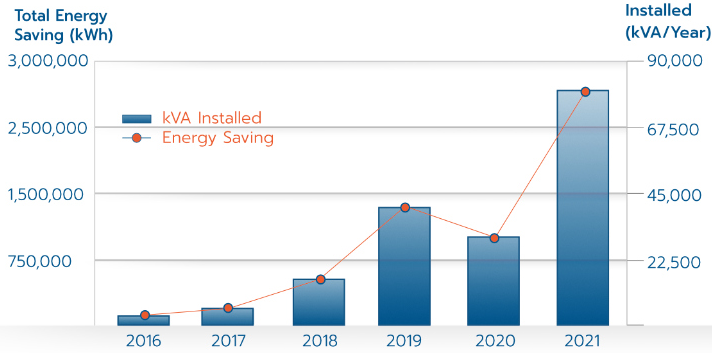
( <AAAO-Ak ) ≤ Um 24kV

Rated Power (KVA)	No Load Loss (W)	Load Loss @75°C (W)	Guarantee			Total Weight (KG)	Dimension (mm.)		
			Short Circuit Impedance at 75°C (%)	Efficiency @1PF and 50% Load (%)	Efficiency @1PF and 100% Load (%)		W	L	H
315	130	2800	4.00	99.48	99.08	1690	840	1520	1380
400	165	3250	4.00	99.51	99.15	1940	870	1660	1410
500	205	3900	4.00	99.53	99.19	2360	960	1640	1420
630	250	4600	4.00	99.56	99.24	2770	950	1730	1510
800	280	6000	6.00	99.56	99.22	3340	1050	1880	1580
1000	320	7600	6.00	99.56	99.21	3870	1160	2040	1670
1250	370	9500	6.00	99.56	99.22	4400	1170	2160	1700
1600	520	12000	6.00	99.56	99.22	5430	1200	2280	1860
2000	600	15000	6.00	99.57	99.23	6630	1300	2460	1910
2500	730	18500	6.00	99.57	99.24	8020	1300	2380	2020

Standard Accessories	Rated Power (kVA)									
	315	400	500	630	800	1000	1250	1600	2000	2500
HV BUSHING DIN 42531	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
LV BUSHING DIN 42530	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
LIFTING LUGS	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
OFF-CIRCUIT TAP CHANGER	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
LIFTING EYE	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
EARTH CONNECTION BM 12 DIN 48088	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
BIDIRECTIONAL ROLLER	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
OIL DRAIN DEVICE	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
OIL LEVEL INDICATOR	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
THERMOMETER POCKET	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
THERMOMETER INDICATOR	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
THERMOMETER WITH CONTACTS	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
TRANSFORMER PROTECTION RELAY	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
WINDING TEMP RELAY	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
CT	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
CABLE BOX	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡
SMART MONITORING SYSTEM	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡	⚡

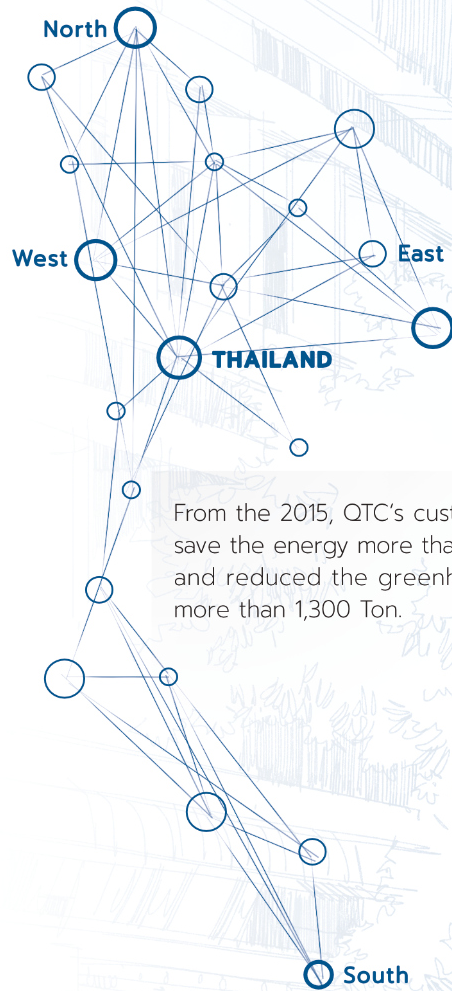


# PROJECT REFERENCE SUPER LOW LOSS TRANSFORMER



Super Low Loss Transformer has been officially sold by QTC since 2015. It can be used for all sectors such as a factory, building and power plant. Several units have been installed all regions in Thailand and overseas.

Currently, Demand of super Low Loss Transformer has been gradually growth due to energy saving awareness.



From the 2015, QTC's customer can save the energy more than 15 MWh and reduced the greenhouse gas more than 1,300 Ton.



## HEAD OFFICE

2/2 Soi Krungthep Kritha 8 (5), Krungthep Kritha Rd., Huamark, Bangkok, Bangkok 10240

Sale Contact: (66) 65-539-5162  
Tel: (66) 2379 3089-92 Fax: (66) 2379-3097  
Hotline: (66) 89-444-0844  
E-mail: [contact@qtc-energy.com](mailto:contact@qtc-energy.com)



## FACTORY

149 M.2, Tambol Mabyangporn, Ampur Pluakdaeng, Rayong 21140 Thailand

Tel: (66) 3889-1411-3  
Fax: (66) 3889-1420, 3889-1595



LINE :  
[@qtc\\_energy](https://line.me/tv/@qtc_energy)



FACEBOOK :  
QTC Energy PCL.



WEBSITE :  
[www.qtc-energy.com](http://www.qtc-energy.com)