Hitachi Amorphous Metal Core (2605SA1)

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Hitachi Amorphous Metal Transformers significantly reduce energy losses by using amorphous alloy for their core, which improves electrical characteristics, reduces energy costs and CO_2 emissions. Hitachi is a leading manufacturer of amorphous metal transformers. It has an integrated production line that extends from amorphous metal core processing to assembly that requires advanced process techniques. Hitachi amorphous metal cores are suitable for both single and three phases, distribution transformer applications.

Amorphous Metal Core to Reduce Standby Power Requirement

There are two type of losses that are generated during operation: No Load loss and Load loss. Amorphous metal has significant advantages in reducing “No Load loss.” By applying Amorphous metal to the transformer core with Hitachi's advanced technologies, higher efficiency can be achieved and energy savings can result that contribute to the reduction of CO_2 emissions.
Amorphous metal cores can be used and are effective for most distribution transformers. They are ideally suited for Renewable Energy applications such as wind farm and solar power, as they typically operates with 20~40% low load conditions.

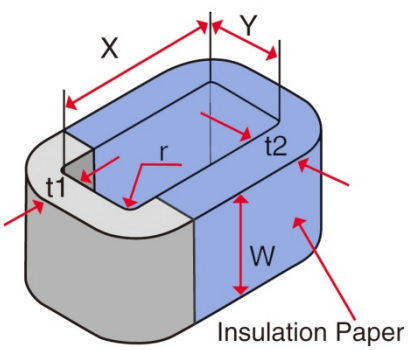
Material Characteristic Comparison

Amorphous metal is a non-crystal substance created by rapidly freezing liquids at high temperature. Because there is no rule of atomic arrangement, the energy loss (hysteresis loss) is small when the flux of magnetic induction passes the iron core. In addition, eddy current loss is decreased because the thickness is approximately 1/10 compared with conventional silicon steel (0.025mm). Therefore, the no load loss (hysteresis loss and eddy current loss) can be decreased to approximately 1/5 of silicon steel's.

Material	Saturation flux density: Bs (T)	Hc (A/m)	Electrical resistance ($\mu\Omega$-cm)	Iron loss (W/kg) (*1)	Thickness (mm)
Silicon Steel (Crystalline)	2.03	45	50	0.440	0.23
Amorphous Alloy 2605SA1	1.56	2.0	130	0.070	0.025

(*1) Estimated; 50Hz, flux density at 1.3T

Core Design Specification



Item	Dimension		Notes
	mm, kg	Inch, lb.	
X: Window height	174 - 1000mm	6.86 - 39.37”	
Y: Window width	59 - 1000mm	2.33 - 39.37”	
t1: Lap build	≦250mm	≦9.84”	t2×1.15 (nominal)
t2: Core build	≦195mm	≦7.67”	Add +3mm for t2 & +2mm for W. This includes the tolerance & insulation paper.
W: Ribbon width	142.2mm	5.6”	
	170.2mm	6.7”	
	213.4mm	8.4”	
r: Corner radius	≧4.5mm	≧0.18”	
Core weight	≦800kg	≦1763 lb.	
Material length	450 - 5,000mm	17.72 - 96.85”	(*2)
Lamination factor	86%		nominal
Density	7.18g/cm3		

(*2) Outer perimeter must be below 5,000mm. Please contact the representative for anything over the above information.

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Core Characteristic

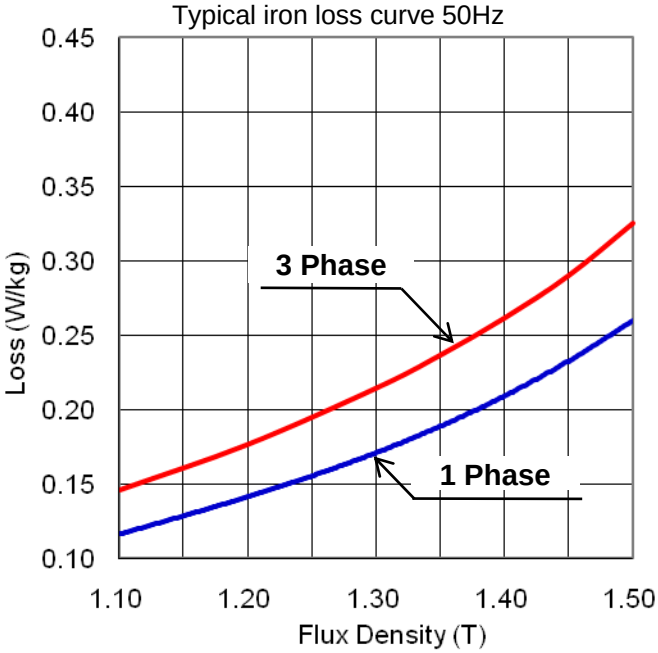
Typical iron loss curves are shown below. These are achieved with Hitachi's advanced technologies and insulation paper. This unique core structure can provide flexibility and eliminates the loss level during assembly, and it reduces the noise level.
To achieve maximum core performance, amorphous metal core should be treated with the lowest stress conditions. Insulation paper provides the least stress and keeps the core in shape. It also keeps the core from chipping when assembling it to transformers.

Typical iron losses (W/kg)

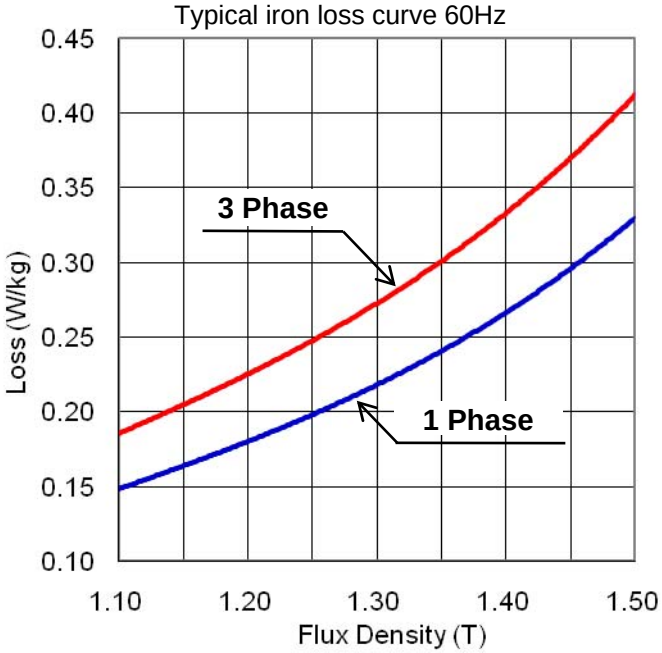
Frequency	Flux density (T)	1.10	1.20	1.30	1.35	1.40	1.45	1.50
50Hz	1 Phase	0.117	0.141	0.171	0.189	0.209	0.232	0.260
	3 Phase	0.146	0.176	0.214	0.236	0.261	0.290	0.325
60Hz	1 Phase	0.149	0.180	0.218	0.241	0.267	0.295	0.330
	3 Phase	0.186	0.225	0.273	0.301	0.333	0.369	0.413

(Reference values at 25℃)

Typical iron loss curve 50Hz



Typical iron loss curve 60Hz



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