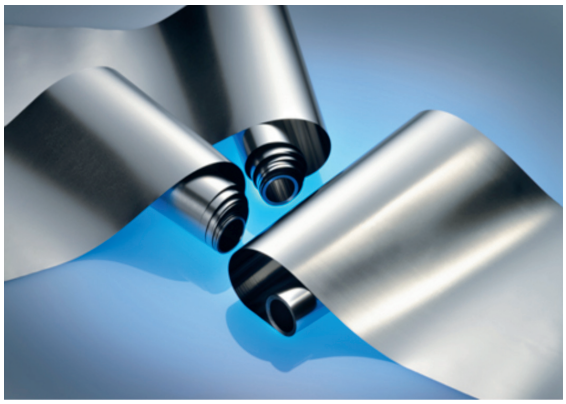
Metglas®, Inc.

Metglas® HB1M-LL Transformer Core Alloy

NEW PRODUCT RELEASE



INTRODUCTION

Metglas **HB1M-LL** is a new domain refined ultra low core loss amorphous electrical steel product developed for use in the next generation of high efficiency distribution transformers. Reduction of core losses between 20-40% over standard amorphous metal is achieved by mechanically scribing the surface of Metglas HB1M alloy laminations.

HB1M-LL allows OEM transformer manufacturers to address a wider range of Total Ownership opportunities thus allowing more electrical utilities to experience the economic benefits of Metglas amorphous metal transformers.

HB1M-LL is manufactured in Conway, South Carolina and is now available.

GENERAL PROPERTIES & CHARACTERISTICS FOR METGLAS® HB1M-LL TRANSFORMER CORE ALLOY

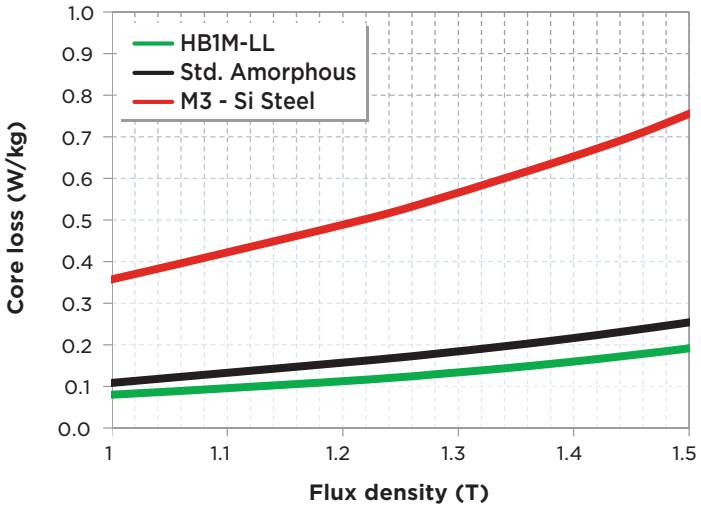
Alloy	Nominal Composition	Density (g/cm3)	Standard Available Widths (mm)*	Saturation Induction (T)	Remnant Induction (T)	Coercivity Hc (A/m)	Max DC Permeability	Electrical Resistivity (μΩm)	Curie Temperature (°C)	Magneto-striction (x10-6)
HB1M-LL	FeBSi	7.33	142.2 170.2 213.4	1.63	1.53	0.9	1,000,000	1.2	364	27

*Please contact sales representative for custom ribbon width.

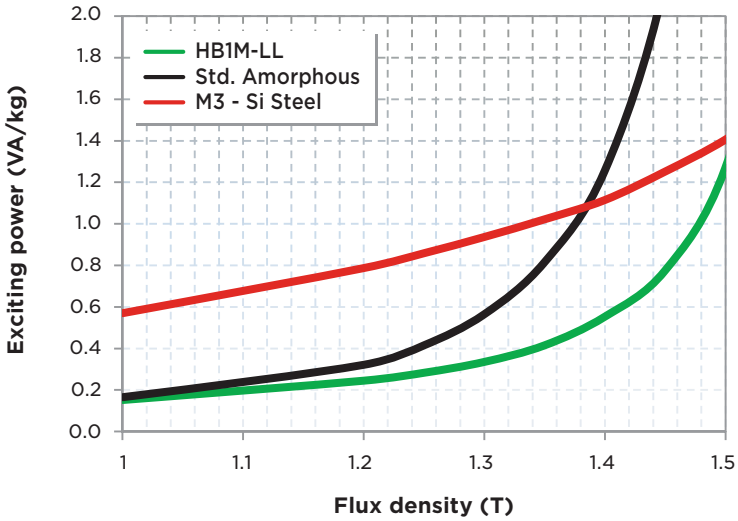
MAGNETIC CHARACTERISTICS FOR HB1M-LL AMORPHOUS CORE

Core loss of HB1M-LL is shown below and compared to standard amorphous alloy and most commonly used M3 silicon steel grade.*

Typical Core Loss At 25°C at 60Hz



Typical Exciting Power At 25°C at 60Hz



Transformer core results are based on widths of 213mm and nominal weights of 80 kgs. Variations in core geometry may change results slightly.

Operating Flux Density

Design induction is dependent upon various considerations such as operating temperature, overvoltage requirements, sound level etc. Most transformer designs use 1.42 T as the operating induction for HB1M-LL, due to the higher saturation compared to 1.35 T in standard amorphous.

email: **metglas@metglas.com** **www.metglas.com** Tel: **1-800-581-7654**

TOTAL OWNING COST OF EFFICIENT DISTRIBUTION TRANSFORMERS

Electrical Utilities purchase transformers based on either government mandated Minimum Efficiency Standards (MES) or Total Ownership Cost (TOC) where the performance of the transformer is evaluated over its expected life span of 30-40 years. Unlike MES, the TOC method is more flexible because it gives Utilities the ability to change their evaluation formulas as their operating costs change.

A high efficiency transformer purchased using the TOC method will have a higher first cost than an MES unit. However, the accumulated savings in energy over the life of the transformer not only neutralizes the higher initial costs of the TOC transformer but provides additional energy savings not achievable with MES transformers.

Typical Metglas Core

RECOMMENDED FOR DISTRIBUTION TRANSFORMERS

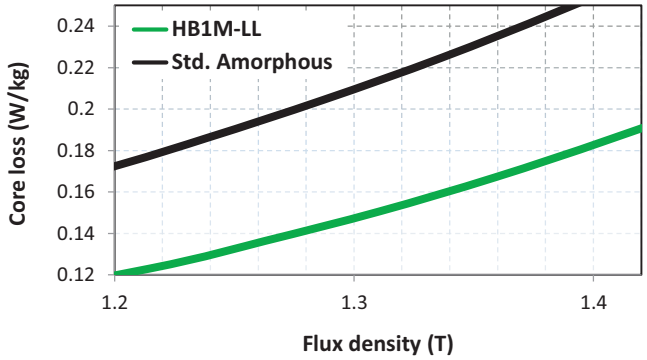
SINGLE-PHASE	
Transformer Ratings	10 kVA – 500 kVA
Transformer Core Sizes*	20 kgs – 200 kgs
THREE-PHASE	
Transformer Ratings	25 kVA – 2,500 kVA
Transformer Core Sizes*	20 kgs – 300 kgs

**Individual Core Size*

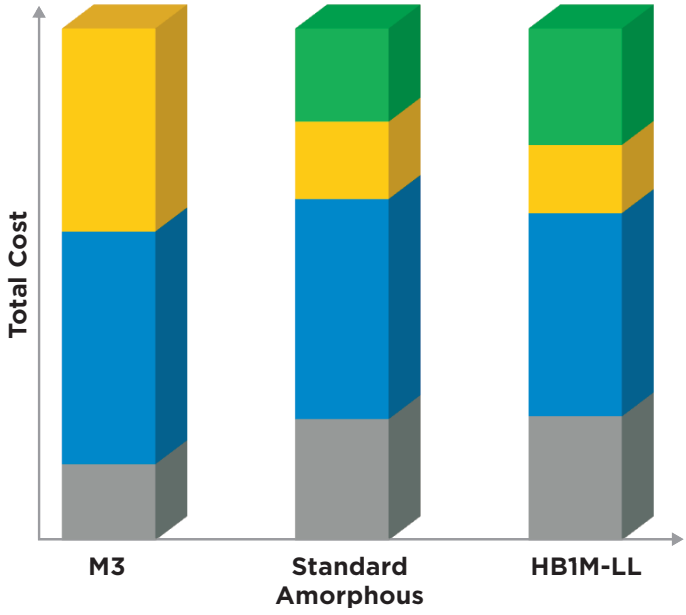
TYPICAL MAGNETIC PROPERTIES AT 1.42 TESLA

Frequency	60 Hz
Core Loss	0.19 Watts/kg
Exciting Power	0.6 VA/kg

Measurements taken without oil impregnation at ambient temperature.



TOC for Three-Phase Transformer – 300 kVA



■ **COST SAVINGS**:** Based on TOC calculations, utility companies can save at least 25% in Total Owning Cost over a transformer's lifetime.

■ **NO-LOAD LOSSES:** Metglas HB1M-LL core material offers up to 70% lower core loss compared to M3-Grade Silicon Steel cores in Single Phase and Three Phase transformers.

■ **LOAD LOSSES:** With our newly developed and domain refined Amorphous Core Alloy and TOC optimized transformer design, utility companies can achieve up to an additional 15% savings on transformer Load Losses over the transformer's service life.

■ **INITIAL TRANSFORMER COST**

**28 Year period

This focus on lowest price leads to suboptimal investments over the transformer's service life, because operating costs due to losses are significant and yet are undervalued in the procurement transaction.