



A Division of Spang & Company

Components Division

Butler, Pa. 16001

TECHNICAL BULLETIN

TWC-S4

Preliminary Data

Tape Wound Cores With METGLAS[®] Alloy Ribbon

Since the 1960 discovery of the existence of ferromagnetism in some amorphous materials, active R&D efforts in the last few years have resulted in the development of practical magnetic glasses. Metallic glasses are generally produced by very rapid quenching in which a molten metal alloy is rapidly cooled (at rates on the order of 10^6 degrees/second) through the temperatures at which crystallization usually occurs. The basic difference between crystalline and glassy metals is in their molecular structures. Crystalline metals are composed of regular, 3 dimensional arrays of atoms which exhibit long-range order. Metallic glasses do not have long-range structural order; their atoms are packed in a random arrangement similar to that of liquid metal or ordinary glass. The intrinsic resistivity of the amorphous ribbon is about 2 to 4 times higher than that of conventional crystalline magnetic metals, which means that the eddy current effect is much reduced in the amorphous metals as compared with crystalline alloys. This makes the amorphous metals attractive for some high frequency applications.

The work of Allied Chemical in this field has led to their introduction of METGLAS alloys. The material is normally in the form of thin ribbon which is then wound into a tape-wound core. METGLAS alloys are inherently thin, 1 to 2.5 mils, extremely hard, over C-80 Rockwell, but very soft magnetically. They are available as tape wound cores in 2 basic types of alloys.

METGLAS Alloy 2605S-3 is an iron-boron composition, which when wound into tape cores and appropriately annealed, yields a material which is similar in magnetic properties to the higher nickel contained alloys (80 Permalloys). This alloy is suitable for applications in magnetic core devices which require high permeabilities at intermediate inductions at frequencies between DC and 100 kilohertz. Core losses are comparable to Supermalloy and ferrites in this frequency range. These properties, plus a special advantage of high induction (2-3 times the 80 Permalloys), make the alloy very attractive in switching power supplies where ruggedness and low weight are important.

METGLAS Alloy 2605SC provides an attractive high magnetic induction material for a wide variety of magnetic applications. It is essentially a square loop alloy comparable to Orthonol material.

The data presented in this brochure is typical of that obtained from tape wound cores made from METGLAS alloys. Guaranteed limits will be available after sufficient data over a period of time has been accumulated.

For evaluation purposes, cores in experimental quantities are available for purchase. For more information, contact your nearest sales office or the factory.

METGLAS[®] is Allied Corporation's registered trademark for amorphous alloys of metals. ORTHONOL[®] is a registered trademark for MAGNETICS[®] 50 Ni/50 Fe strip material.

METGLAS® Alloys Properties (Reproduced by permission from Allied Chemical)

<u>MAGNETIC PROPERTIES</u>	<u>Units</u>	<u>2605 S-3</u>	<u>2605SC</u>
Saturation Magnetization, B_s	kG	15.8	16.1
Coercive Force, H_c	Oe	.1	0.06
Residual Induction, B_r	kG	3	11.2
Induction at 80 A/m (10 Oe), B_{80}	kG	10	13.6
Curie Temperature	°C	405	370

PHYSICAL PROPERTIES

Density	gm/cc	7.28	7.3
Pack Factor	--	>.75	>.75
Continuous Service Temperature	°C	125	125
Crystallization Temperature	°C	515	480

ELECTRICAL PROPERTIES

Resistivity	Ohm cm	125×10^{-6}	125×10^{-6}
-------------	--------	----------------------	----------------------

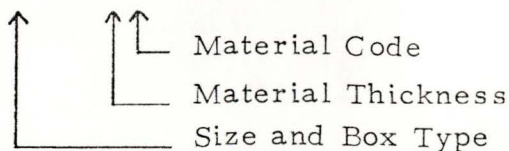
All statements, information, and data given herein are believed to be accurate and reliable but are presented without guaranty, warranty, or responsibility of any kind, express or implied, on our part. Statements or suggestions concerning possible use of our product are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated, or that other measures should not be taken. -- Allied Chemical, March 1981.

* * * * *

CORE AVAILABILITY

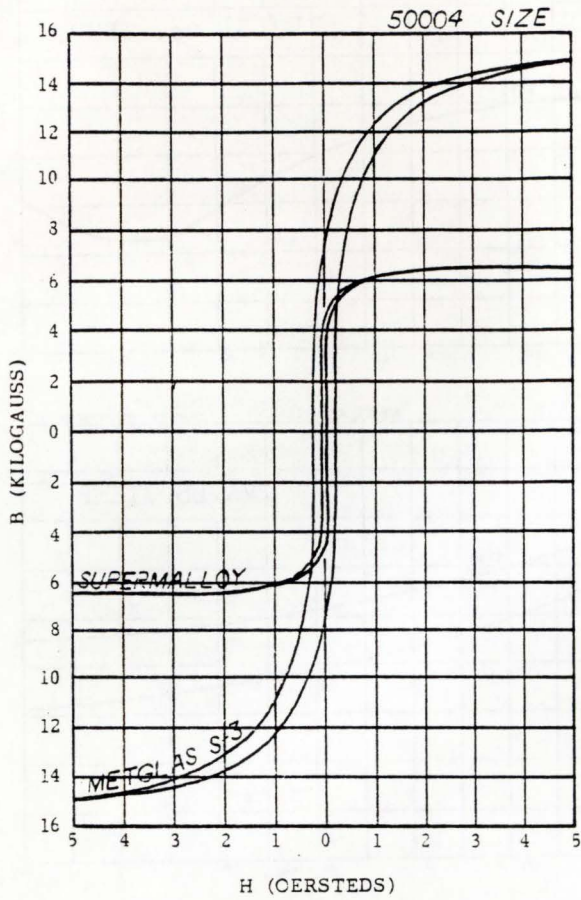
Cores are made from 1 mil (.001") strip and are available in a variety of sizes in both S-3 and SC materials. Catalog TWC-300 lists standard sizes on page 62. Page 15 of this catalog illustrates the ordering code.

Example: 52026 - 1B (SC material)
 52026 - 1C (S-3 material)

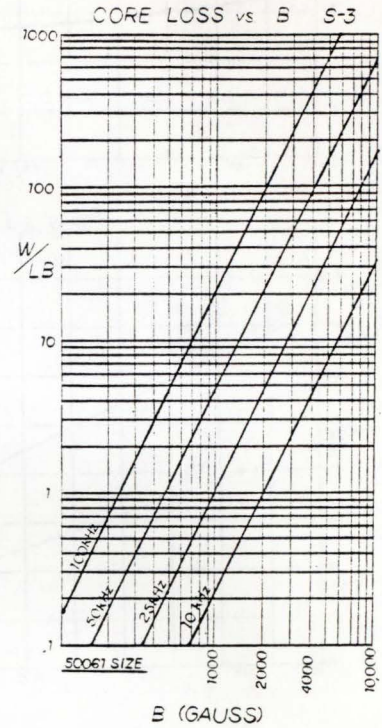
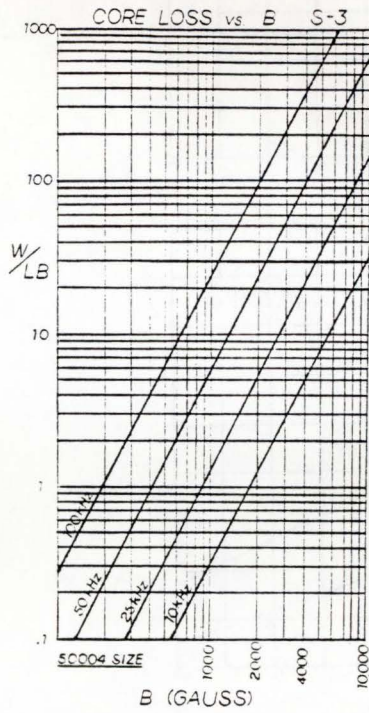


2605S-3 MATERIAL

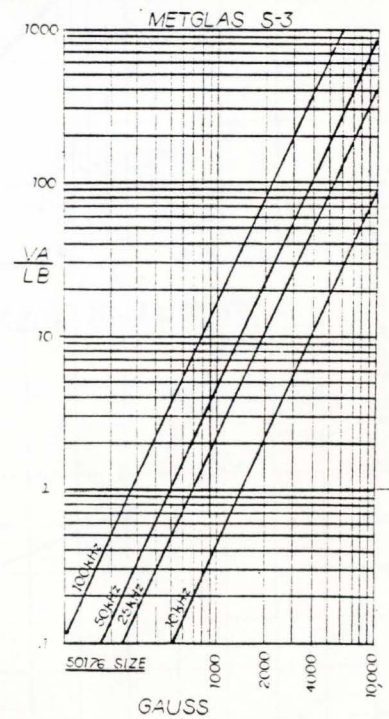
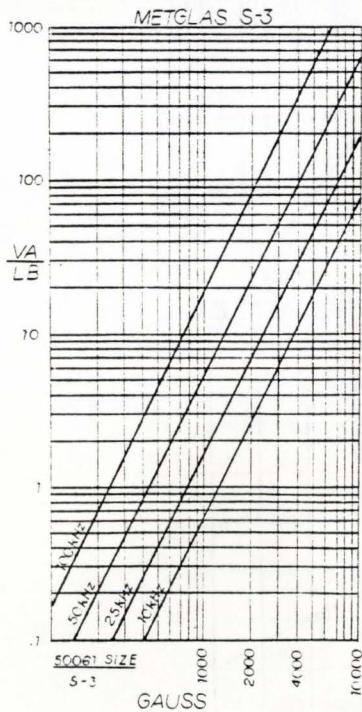
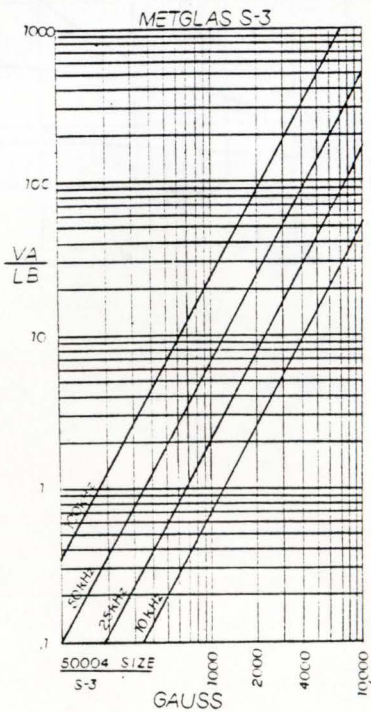
DC HYSTERESIS LOOPS

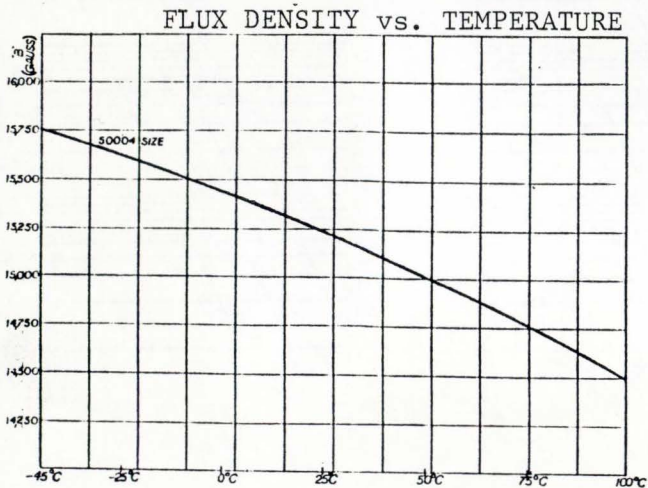
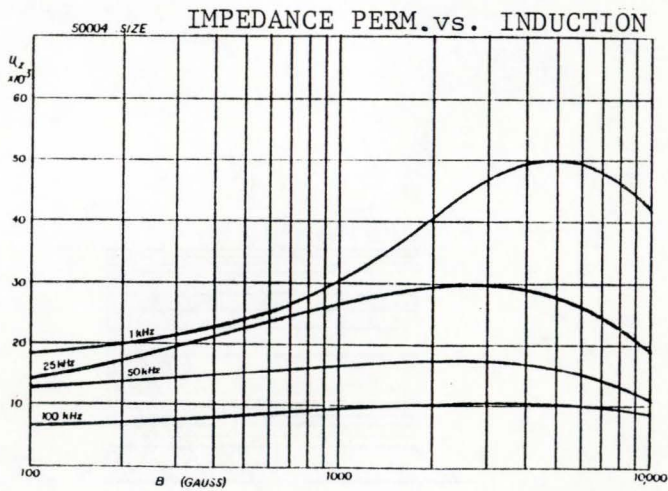
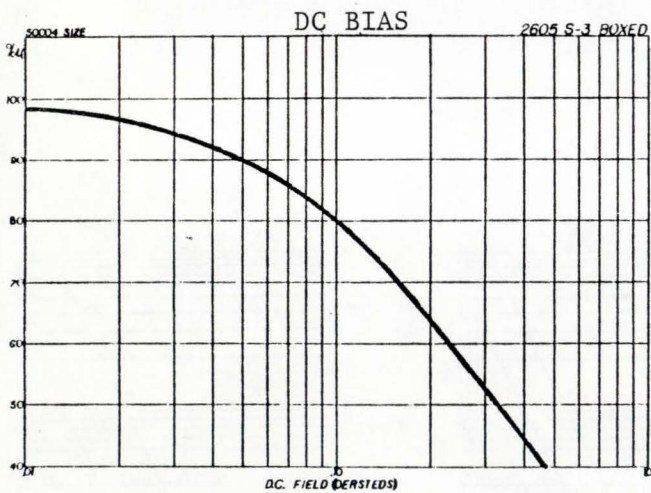
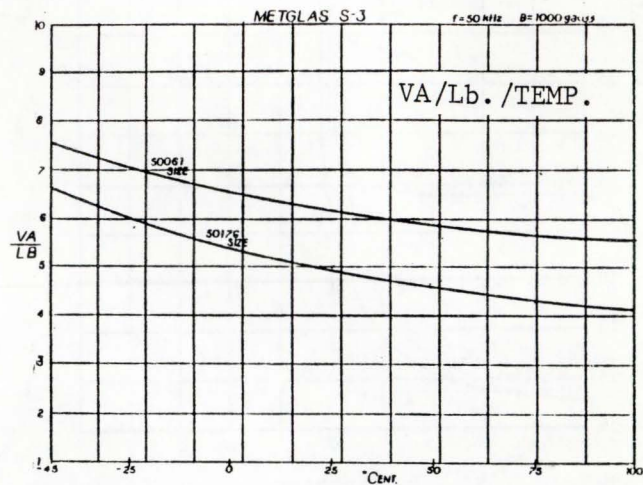
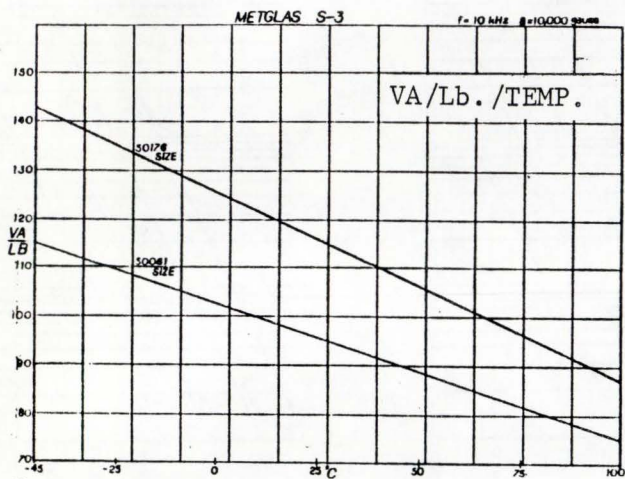
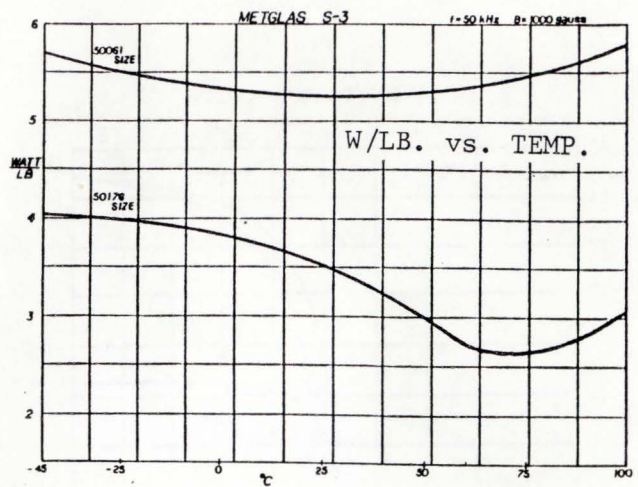
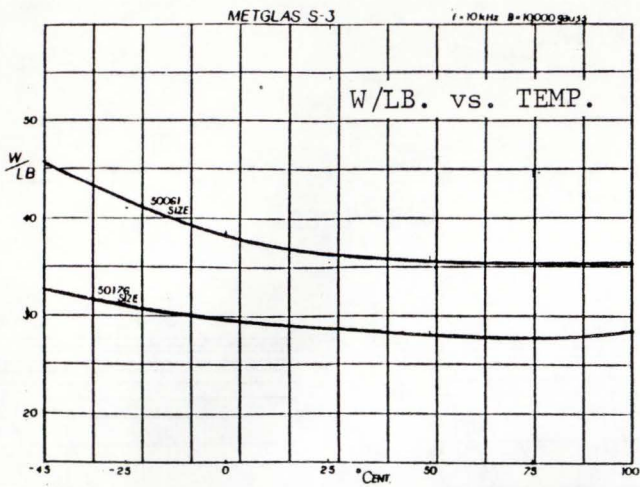


CORE LOSS



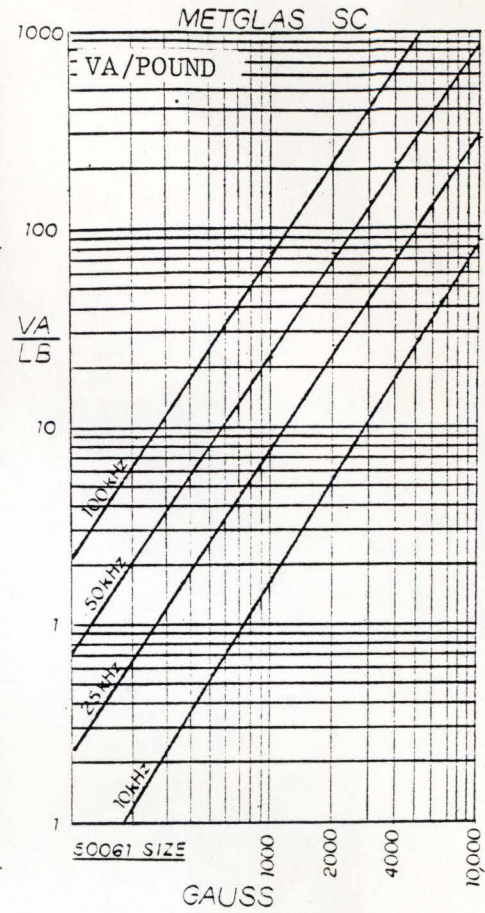
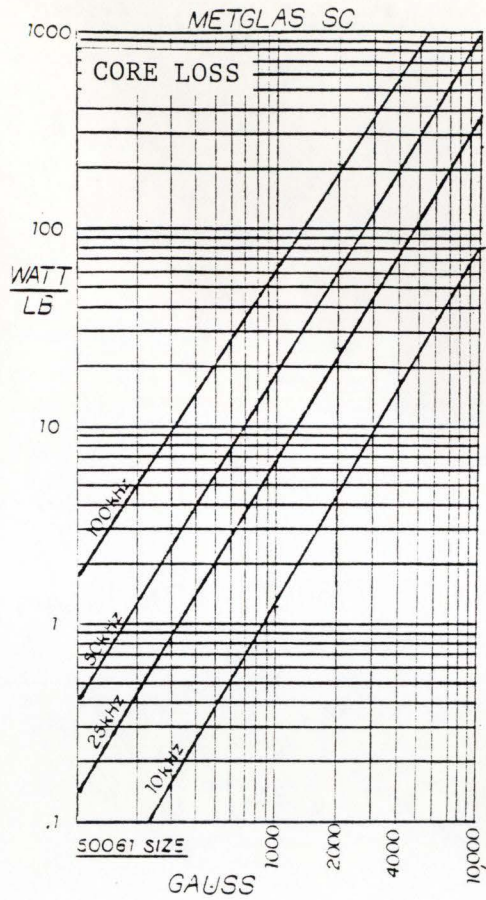
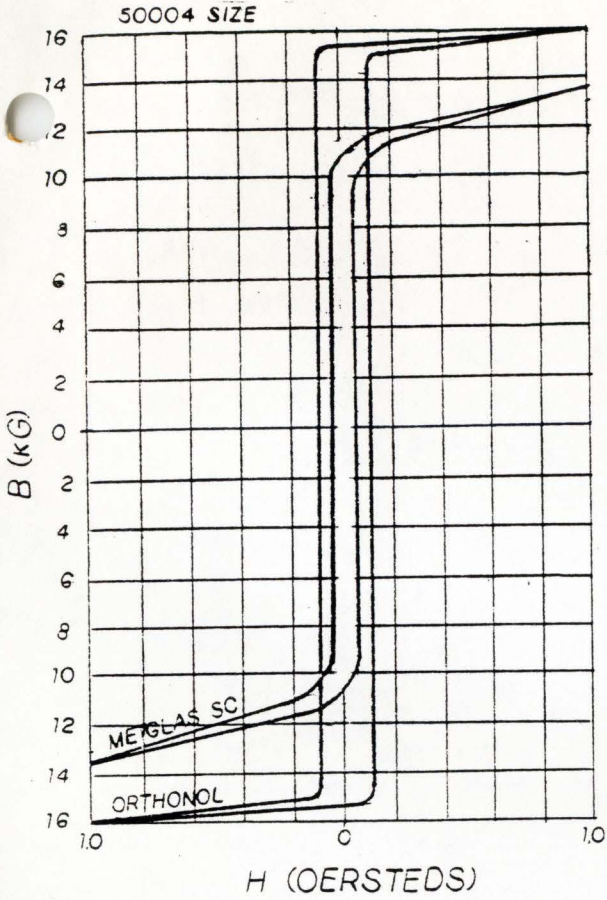
VA/POUND



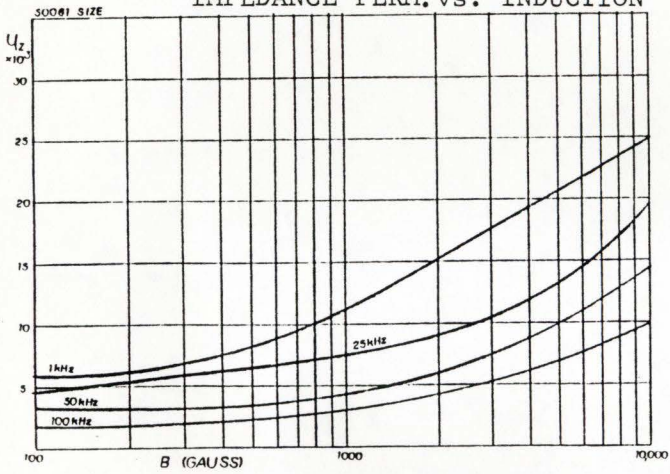


2605SC MATERIAL

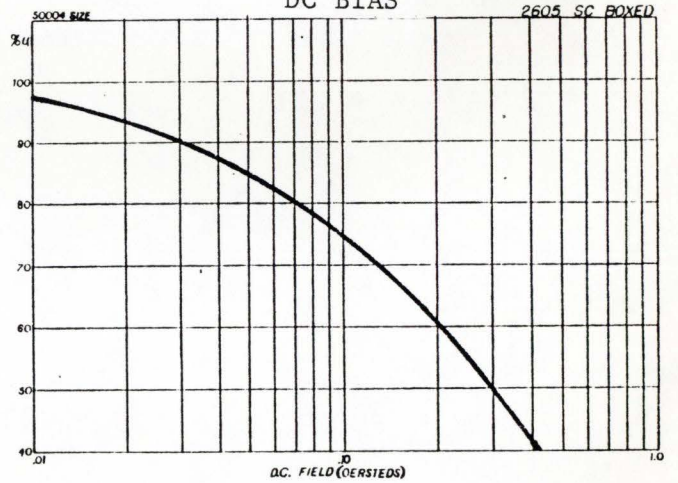
DC HYSTERESIS LOOPS



IMPEDANCE PERM. vs. INDUCTION



DC BIAS



FLUX DENSITY vs. TEMPERATURE

