



GMI
AERO

*Innovation in Technology for Aircraft
Maintenance and Fabrication*

FLEXIBLE HEATING BLANKETS *for* **AEROSPACE - NAVAL COMPOSITE INDUSTRIES**



REPAIR BONDING & FABRICATION

GMIMKDHB071010

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Information:

This documents describes the specifications of our **standard flexible** blankets.

For other families like:

- a. Conformable Blankets
- b. Radome Shaped Blankets
- c. Autonomous Blankets

... consult the corresponding specifications documents.

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1 INTRODUCTION

GMI AERO supplies and engineers very flexible heating blankets suitable to heat a composite part for repair bonding operations. The challenge is to get flexibility and temperature homogeneity performances to achieve appropriate curing of the resin laid on the whole patch. Our blankets meet these specifications together with long life duration.

To answer to various expressions of needs and configurations, GMI has been led to design a variety of families of blankets that differ in terms of size geometry, electrical circuit design, adaptation to shapes, specifications to meet constraints of the use environment.....

A variety of items according to dimensions are on stock but all dimensions can be ordered specifically. Shaped items can also be designed and manufactured.

All our blankets are engineered to meet the temperature control specifications of our ANITA Bonding Consoles.

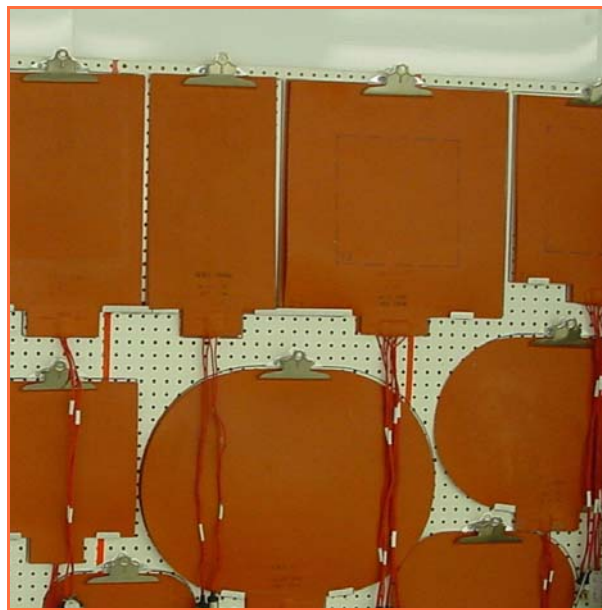


Figure 1: VARIOUS SHAPE DESIGN IS POSSIBLE

2 HEATING BLANKETS FOR ANITA CONSOLES

We offer 3 classes of **Standard Models**:

1. Model 1 - Standard Blankets for atmosphere non explosive:

These blankets connect to ANITA Models NG or OT .

GMI proposes items with this feature and advises the customer upon request. Each zone gets own OT. lead output to connect to the heating control console.

These blankets are designed under 230 or 120 Volts AC.

2. Model 2 - Blankets for Explosive atmosphere:

These blankets are specially designed to connect to our special ANITA version OTHE for hazardous environment.

These blankets are designed under 230 or 120 Volts AC.

3. Model 3 - Three-Phase Blankets for atmosphere non explosive

These blankets of generally **very large dimensions** and thus of **high power** are designed under 3 phase voltage to connect to the standard Anita NG or OT through a power amplifier three phases

3 GENERAL BASIC SPECIFICATIONS

- Silicone rubber made heaters,
- Flexible silicone with glass fiber weave for better resistance to abrasion.
- The dimensions can be ordered in inch or cm,
- Maximum raising temperature: 260°C (500 F),
- High temperature up to 350 °C (600 °F) are also available- consult us,
- Thickness: 1.4 mm (0.55 inch.)
- Voltage to be specified at the order : 230 or 120 Volts AC monophase or 380, 415 Volts AC three phases
- Lead output in a tab to guarantee no non heated area in the whole surface,
- Lead length: 500 mm (20 in);
- Leads are mounted with a connector standard for connection to ANITA controller cables (unless ordered differently)
- Wattage: the wattage depends of the specific needs of the application planned by the customer. However, standard blankets for the use with an ANITA Bonding Console is as follows: the maximum wattage per surface unity (density) is usually between 0,6 to 0,7 watts /square centimeter
- Shape, and electrical zones; we manufacture standard rectangular, round heating blankets.
Oval heating blankets are also available. Some specific features may apply; consult us.
The number of zones for standard blankets is of 1 or 2.
Other possibilities of more than 2 zones occur at the request of the customer.
- The position of the lead output (Tab) is in general in the middle of the small side unless required differently
- Delivery of each blanket with a serial number ; file records of initial specs are kept in house for 5 years

4 BOEING SPECIFICATIONS

Boeing specifies for its own use, blankets according to certain specifications dealing with temperature distribution.

These performances can only be achieved if the resistance wire is routed with a maximum of density and regularity.

GMI manufactures its blankets to meet this specification recommendation.

5 ELECTRICAL ZONING

Zoning may be advised when using a large blanket. To get better temperature homogeneity performances, it can be interesting to divide the surface in two or more zones that will be controlled in temperature. The Anita console allows this feature and the user is invited to take benefit of it when dealing with large surface or structures with variability of thicknesses.

5-1 DESIGN OF BLANKETS IN 1 ZONE

Two models are possible according to the position of the Tab:

- SS, Tab in the middle of the small side
- LS, Tab in the middle of the large side

The model SS is the standard model.

If you do not specify differently, your blanket as ordered will be with tab in the middle of the small side

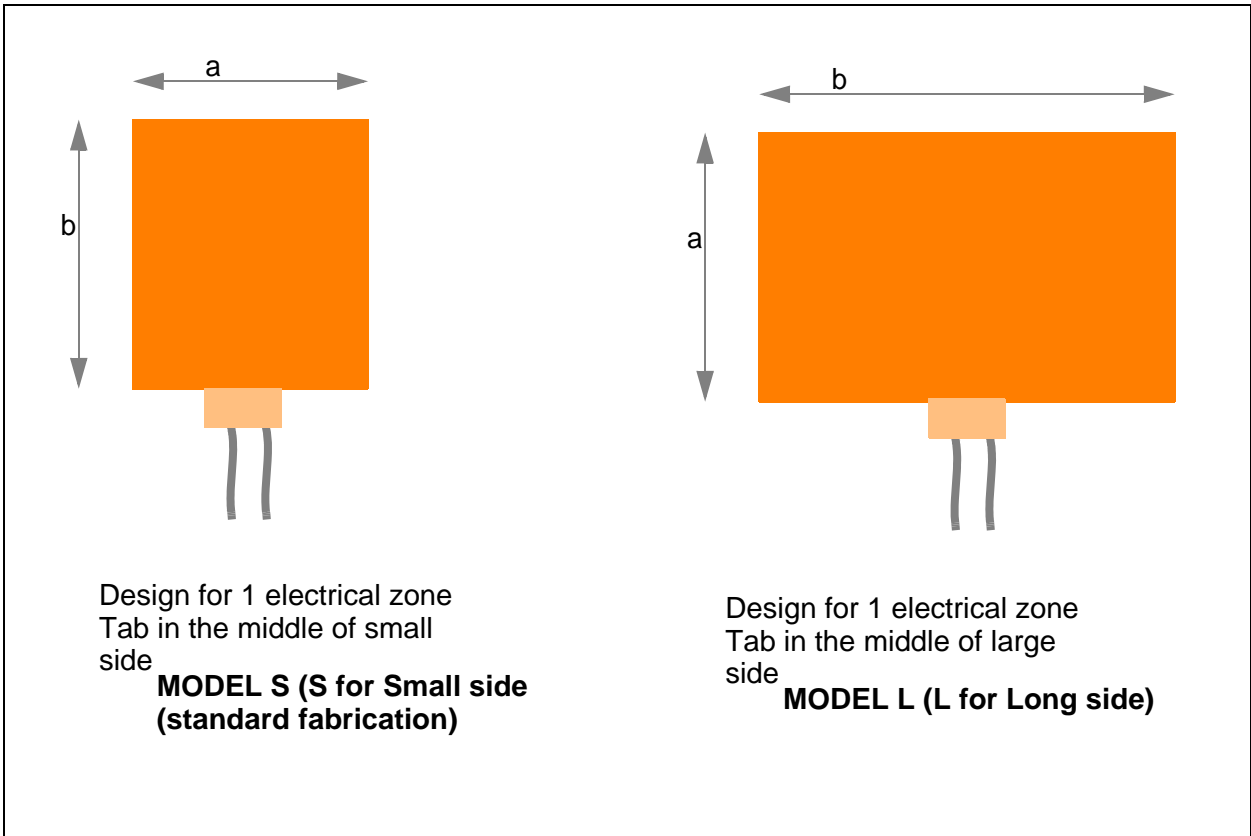


Figure 2: Standard One Zone blanket general design

Figure 3: Standard 1 zone Blanket



5-2 DESIGN OF 2 ZONE BLANKETS

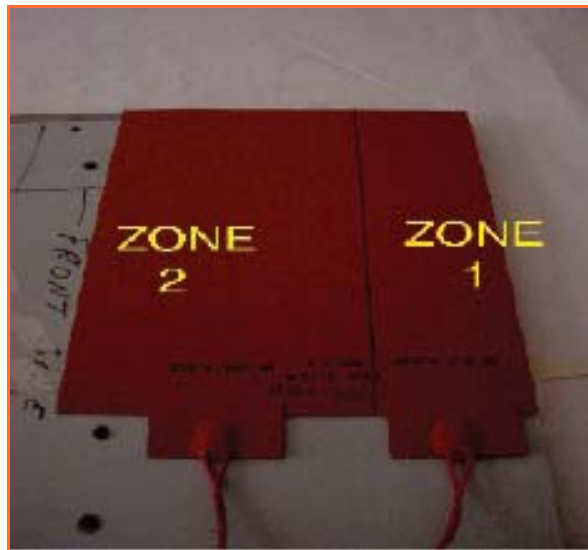


Figure 4: Two zone blanket illustration

There are 2 usual design models of 2 zone heating blankets.

The first case where the two heating zones are parallel, side by side (see picture above) and sketch below for lead positioning choice.

The second case where one zone is internal to the other.

The first design is appropriate for long rectangular blankets. The second one may be used for large square surfaces to heat large uniform structures.

The two zones may be equal in surfaces or according to specific request from customer.

One classical application corresponds to the heat of leading edges, vertical surfaces,...

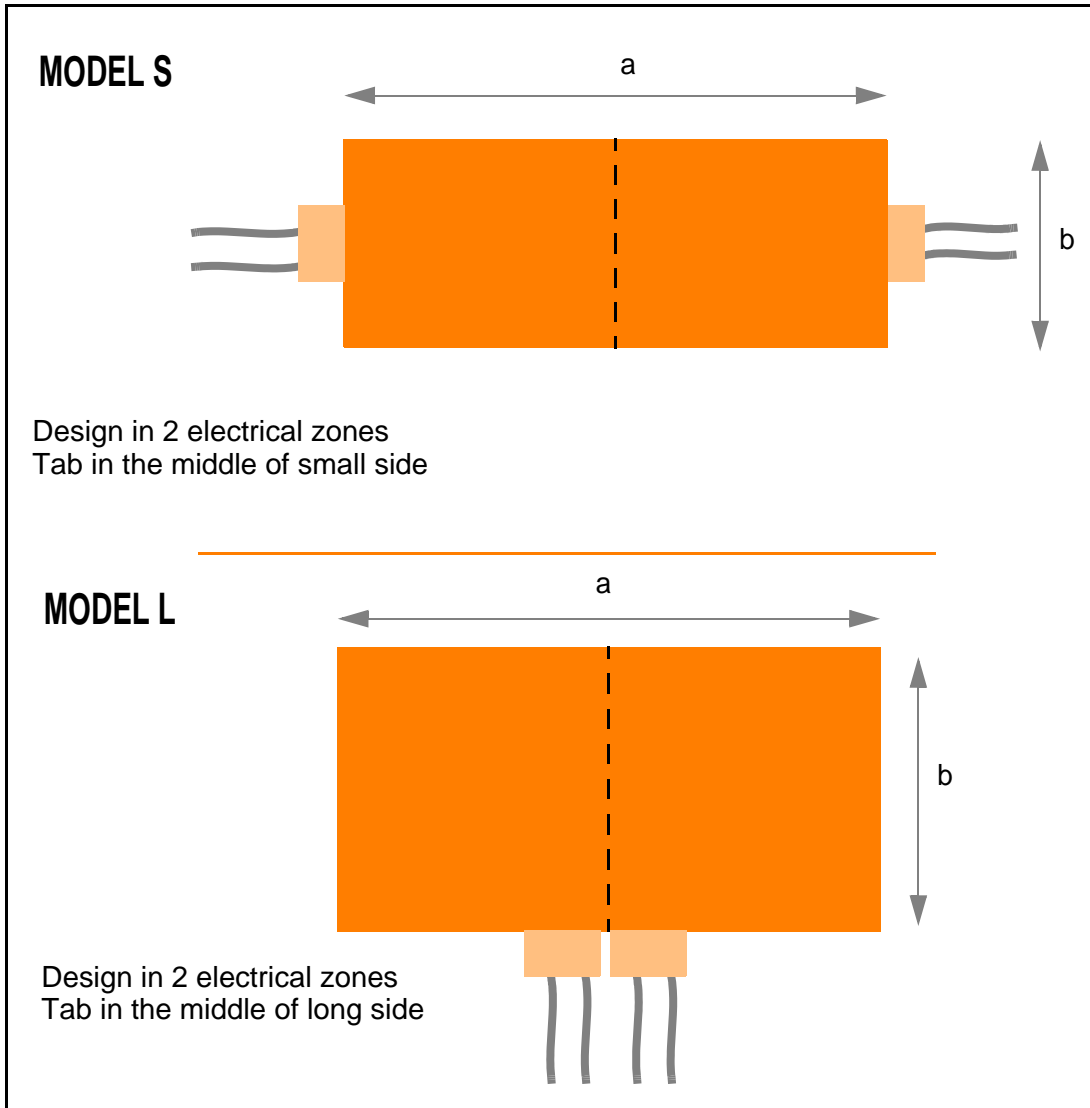


Figure 5: Standard Blankets designed in 2 zones

Figure 6: Special design for heat of a surface with a stringer on the edge

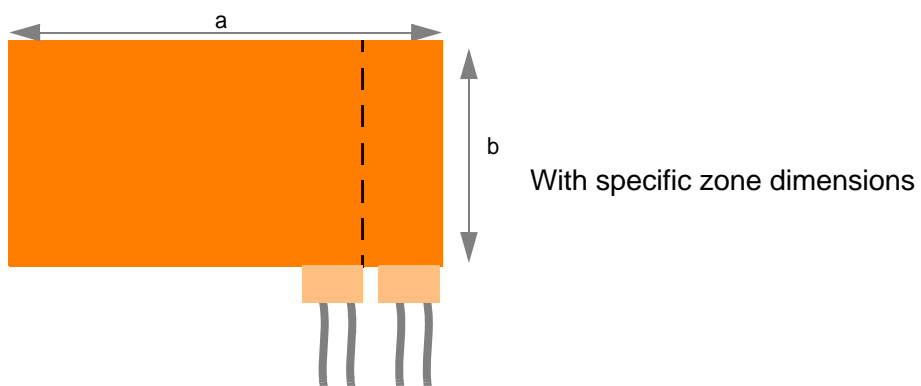
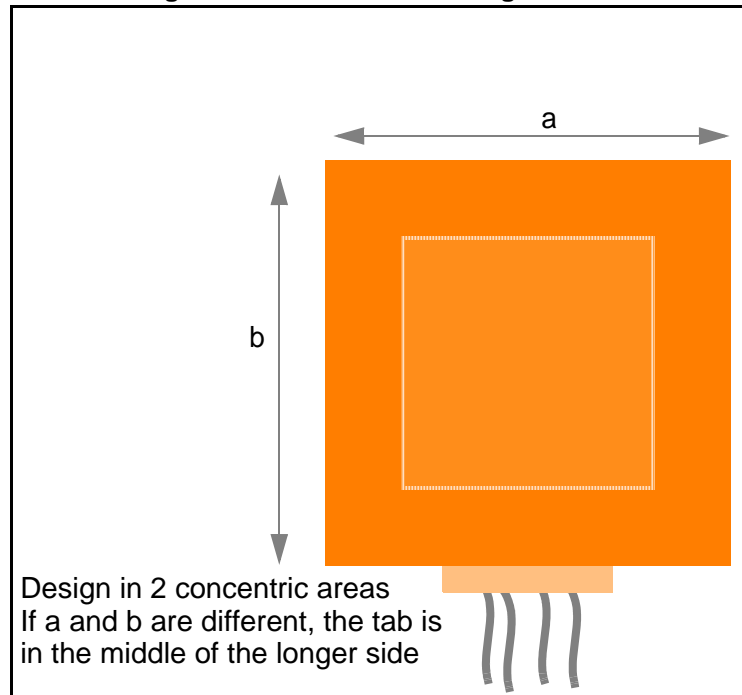


Figure 7: Blanket 2zone design with 2 concentric areas



5-3 STANDARD BLANKETS LISTS OF ITEMS PER DIMENSIONS

5-3.1 LIST OF TRADITIONALLY ORDERED ITEMS FOR 1 OR 2 ZONE DESIGN

We provide here a list of standard rectangular and circular blankets for ANITA NG, OT,ES models.

Table 1 :STANDARD RECTANGULAR / SQUARE BLANKETS

Dimensions in mm (inches)	P/N	Remarks
200 x 200 (8 x 8)	GMIHB020020-1Z-V*	1 zone
250 x 250 (10 x 10)	GMIHB025025-1Z-V*	1 zone
300 x 300 (12 x 12)	GMIHB030030-1Z-V*	1 zone
300 x 500 (12 x 20)	GMIHB030050-1Z-V*	1 zone
300 x 700 (12 x 27)	GMIHB030070-1Z-V*	1 zone
400 x 400 (16 x 16)	GMIHB040040-1Z-V*	1 zone
500 x 500 (20 x 20)	GMIHB050050-1Z-V*	1 zone

Table 1 :STANDARD RECTANGULAR / SQUARE BLANKETS

600 x 600 (24 x 24)	GMIHB060060-2Z-V*	2 zones
150 x 500 (6 x 20)	GMIHB015050-1Z-V*	1 zone
610 x 810 (24 x 32)	GMIHB06108-2Z-V*	2 zones
810 x 810 (32 x 32)	GMIHB081081-2Z-V*	2 zones

* V= 1 for 120 Volts; V= 2 for 230 Volts AC; Specify always at the order 120 or 230 Volts
monophase
Special dimensions under request

Table 2 :CIRCULAR BLANKETS

Diameter in mm (inches)	P/N	Remarks
200 (8)	GMIHB020-1Z-V*	1 zone
250 (10)	GMIHB025-1Z-V*	1zone
300 (12)	GMIHB030-1Z-V*	1 zone
400 (16)	GMIHB040-1Z-V*	1 zone
450 (18)	GMIHB045-1Z-V*	1 zone
500 (20)	GMIHB050-1Z-V*	1 zone
550 (22)	GMIHB055-1Z-V*	1 zone
600 (24)	GMIHB060-2Z-V*	2 zones
700 (28)	GMIHB070-2Z-V*	2 zones
750 (30)	GMIHB075-2Z-V*	2 zones
800 (32)	GMIHB080-2Z-V*	2 zones
900 (35)	GMIHB090-2Z-V*	2 zones

Specify at the order 120 or 220 Volts monophase
Special dimensions under request

6 BLANKETS FOR EXPLOSIVE ENVIRONMENT

These blankets are to be used in explosive environment. They are controlled by the Anita Explosion proof under the P/N: GMIHE04.

Blankets have the same specifications as the standard models in terms of general built in principles and quality.

They have an **additive feature design**. They are covered with a ground grid moulded in. This grid is used to ground the heating circuit and to provide a path for ground continuity.

All these blankets are equipped with **anti arcing connector**.

6-1 LIST OF ITEMS

This is the list of generally ordered items

Table 3 :RECTANGULAR / SQUARE BLANKETS EXPLOSIVE PROOF

Dimensions in mm (inches)	P/N	Remarks
200 x 200 (8 x 8)	GMIHBHE020020-1Z-V*-G	1 zone
250 x 250 (10 x 10)	GMIHBHE025025-1Z-V*-G	1 zone
300 x 300 (12 x 12)	GMIHBHE030030-1Z-V*-G	1 zone
300 x 500 (12 x 20)	GMIHBHE030050-1Z-V*-G	1 zone
300 x 700 (12 x 27)	GMIHBHE030070-1Z-V*-G	1 zone
400 x 400 (16 x 16)	GMIHBHE040040-1Z-V*-G	1 zone
500 x 500 (20 x 20)	GMIHBHE050050-1Z-V*-G	1 zone
600 x 600 (24 x 24)	GMIHBHE060060-2Z-V*-G	2 zones
150 x 500 (6 x 20)	GMIHBHE015050-1Z-V*-G	1 zone
610 x 810 (24 x 32)	GMIHBHE061081-2Z-V*-G	2 zones
810 x 810 (32 x 32)	GMIHBHE081081-2Z-V*-G	2 zones

7 THREE PHASE BLANKETS FOR VERY LARGE BONDING AREAS

These blankets connect to the GMI 3 phase Power Expansion Kit (also called amplifier) and are controlled by the ANITA console.

They are designed according a **3 phase triangle** scheme

Example of traditionally ordered items

P/N below are given for 380 Volts; for 480 and 220 volts, please specify at the request.

Blankets are delivered ready to use with connectors mounted to match the cables of the GMI Power Amplifier Standard of 16 KW capacity (see the specific Power amplifier brochure and specifications)

LIST OF GENERALLY ORDERED ITEMS

Table 4 :3 PHASE HEATING BLANKETS

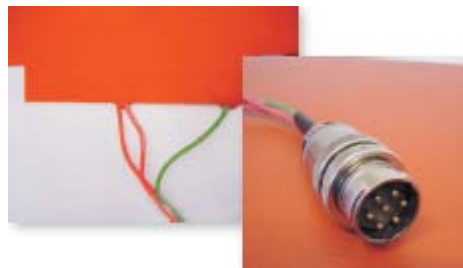
Dimensions in mm	Part Number	Remarks	Nominal Total Power Watts
800 x 1500	GMIHB080150-3-380*	2 zones 800 x 750 mm	9 400
1000 x 1000	GMIHB100100-3-380*	2 zones 1000 x 750 mm	7 800
1000 x 1500	GMIHB100150-3-380*	2 zone 1000 X 750 mm	11 700
1000 x 2000	GMIHB100200-3-380*	2 zones 1000 x 1000 mm	15 600
750 x 1500	GMIHB075150-3-380*	2 zones 750 x 750 mm	8 775
750 x 2000	GMIHB075200-3-380*	2 zones 750 x 1000 mm	11 700
	* for 380 Volts 3 Phases Specify if other voltage		

8 BLANKET CONNECTION ACCESSORIES

1. For standard blankets monophase
Electrical connector
Volts: monophase - 120 or 220 Volts; P/N: GMIOTE030



2. Multiple Blanket Connection Solutions
For standard Blankets - Volts: monophase - 120 or 220 Volts
 - Cable to connect 2 blankets in parallel: P/N: GMINGE102
 - For blankets anti explosion proof



Electrical connector P/N: GMIOTHE030

3. For 3 phase blankets



- For 220, 380,415,480,... Volts, P/N: GMIOTE060-2