

New Concepts in Shielded Cabinets

ROBERT BOYLE
Zero Corporation

INTRODUCTION

For years, specifiers of shielded cabinets for electronic equipment have had to compromise between the "black and white" choices of standard or custom enclosures. Choosing the standard route meant pouring through vendors' catalogs for the configuration which best matched the application, and designing around it. Using a "catalog-grade" standard cabinet made it difficult for engineers to create a distinctive appearance, one that was immediately recognizable as the OEM company's proprietary product.

The alternative, a custom cabinet, offers desirable flexibility and uniqueness of design, but with the disadvantages of longer lead times, additional tooling and engineering costs, and higher unit costs.

Now manufacturers of electronic enclosures have addressed the issue, applying experience gained in developing cabinets to solve the equipment packaging problems of aerospace and defense programs. From this, companies have proceeded to help defense firms and others develop products for commercial markets where they are free to apply originality, timely production, and economical fabrication, rather than being guided by rigid military specifications.

The result is a new product capability, not a new product line. This capability incorporates a broad latitude for custom cabinet configurations within a standard cabinet structure. Specifiers gain the ability to alter and equip cabinets practically at will, at approximately half the cost of cus-

New production techniques expand choices of cabinet configuration and outfitting.

tom units and in about one-third the time. Manufacturers offer delivery within one to six weeks.

A smaller selection of customizable models with 19" openings and medium- or high-level EMI shielding is available even more quickly, sometimes within four working days.

STANDARDIZED CONSTRUCTION

Central to this new capability is a flexible design and unique standardized manufacturing concept. The basic cabinet design consists of four components: a top pan, bottom pan, and two side structures which are welded together as shown in Figure 1.

The top and bottom pieces fit between the side structures, determining the horizontal opening as well as the depth, while the side structures determine the cabinet height and depth. Altering the enclosure size is a simple matter of changing the dimensions of the frame openings and component parts. Since the construction is always the same, there is no increase in labor and there are very minor material cost differences. This is also true if the configuration changes to something other than a vertical rack, as long as the basic construction is the same.

STREAMLINED FABRICATION

Changing cabinet sizes and shapes can be done economically because weld fixturing is virtually eliminated. The frame parts and other details are held together with pins during welding so the cabinet size, shape and parts locations are irrelevant to the manufacturing process.

In some factories individual setups have been eliminated through the use of a manufacturing cell where machines have dedicated setups to produce cabinets of any size. The implementation of "simultaneous engineering" theory also contributes to this concept, since one group of engineering personnel is responsible for both the cabinet design and the manufacturing technique.

ADVANTAGES

- Designers can choose any frame dimensions and vertical or horizontal openings within broad guidelines.
- Sloping surfaces can be added to cabinet fronts, backs, or both, with no angle restrictions.
- Multiple bays can be created by bolting sections together or using one-piece construction up to three bays wide, simplifying shielding.
- Cabinets can be ordered which feature EMI shielding and resistance to shock, vibration, humidity, salt exposure, fungi, water, temperature extremes, dust or high altitudes.

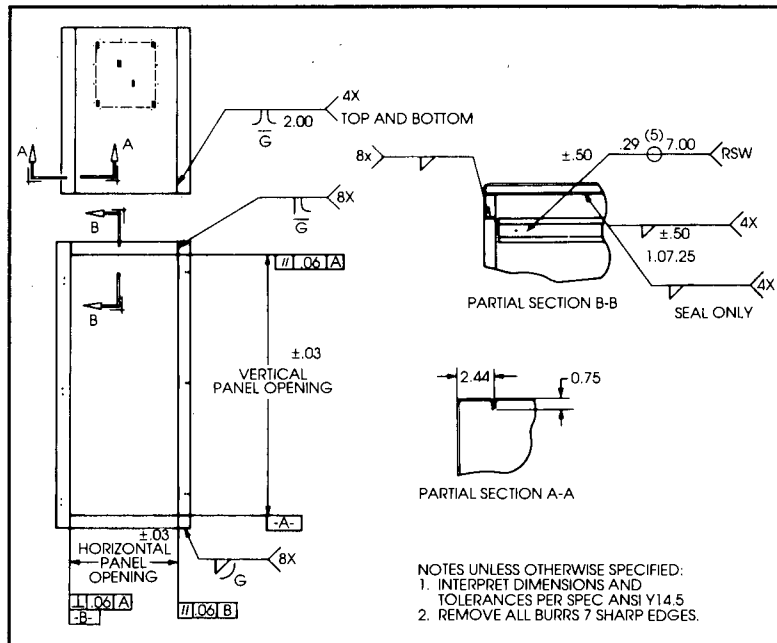


Figure 1. Cabinet Design.

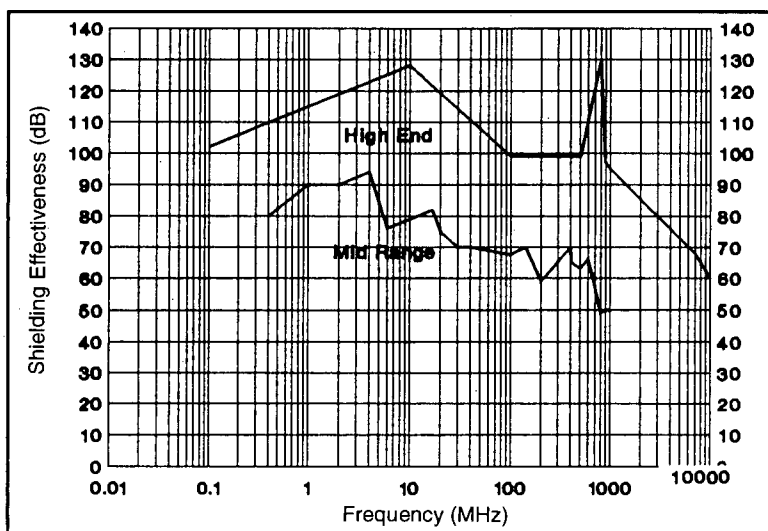


Figure 2. Cabinet Shielding Effectiveness.

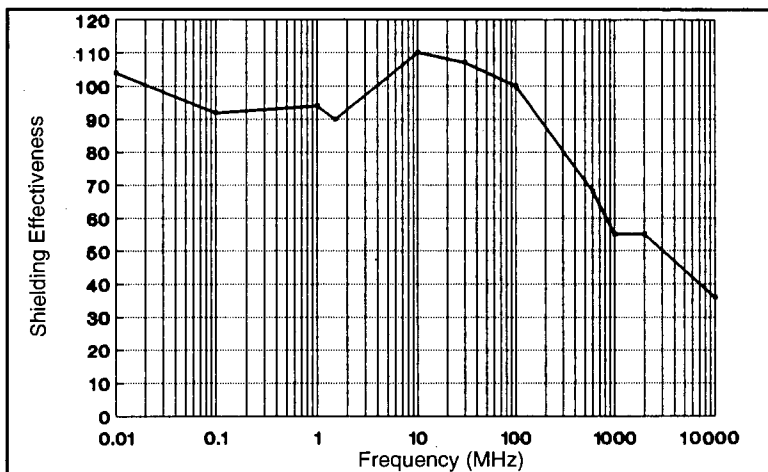


Figure 3. Shielded Plexiglas Door.

- Hundreds of accessories are available to meet functional, shielding, environmental and convenience requirements. These include: dollies and bases for forklift handling; packaged blowers; fan trays; chassis slides; bus bars; air conditioning units; writing surfaces; desk-top cabinets (27 sizes, 2000 configurations); and Plexiglas doors, shielded or unshielded.

EMI SHIELDING

Figure 2 shows the attainable shielding effectiveness levels according to tests performed per MIL-STD-285. As the graph shows, there are two levels of shielding,

This new cabinet concept is only limited by the dimensions of the frame openings and component parts.

mid-range and high-end, which allow further flexibility to more economically fit an application. The gasket material is tin-plated, copper-clad steel wire mesh over a neoprene sponge core. The gasket is stuffed into a groove on the door for ease of gasket replacement. As an alternative, self-adhesive copper finger-stock gasket is also available.

For electrolytic compatibility, the gasket areas of steel shielded cabinets can be arc-sprayed with a 0.008"-thick tin/zinc alloy coating. Aluminum cabinets are treated with a chemical film, per MIL-C-5541, Class 3. Shielded Plexiglas doors are also available up to the shielding effectiveness levels shown in Figure 3.

SPECIFICATIONS AND RESTRICTIONS

This new cabinet concept is only limited by the dimensions of the frame openings and component parts. The size must fit into a maximum envelope of 48" x 72" x 84" and the vertical side panel face must be 1.44" wide when a shielded and/or environmentally sealed door is required.

Construction materials are steel and aluminum; frames are 0.125" aluminum

Continued on page 256

New PEEL'N SHIELD™ EMI gaskets lower installed cost!



W. L. Gore & Associates, Inc.'s new PEEL'N SHIELD EMI gasket assemblies significantly reduce your installed costs while providing excellent EMI/RFI shielding. PEEL'N SHIELD gaskets (patent pending) use removable release and carrier sheets for easy alignment and fast installation. These soft and pliable EMI gaskets, made of high performance GORE-SHIELD™ expanded PTFE material, offer 100 dB shielding effectiveness through 18 GHz. They lower installed cost on your PCBs (populated or unpopulated), castings, or covers and can be positioned to tight tolerances. Automated production also makes PEEL'N SHIELD EMI gaskets extremely cost effective for routine or unique applications. Call now for more information:



1-800-231-4364

W. L. Gore & Associates, Inc., P.O. Box 1220, Elkton, MD 21922
GORE-SHIELD and PEEL'N SHIELD are trademarks of W. L. Gore & Associates, Inc.

Circle Number 13 on Inquiry Card

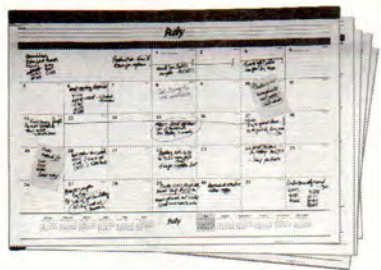
HOW TO SELECT A SHIELDED CABINET . . . Continued from page 254

SUMMARY

Cabinet purchasers should never settle for less than they need in terms of shielding effectiveness, product line or service. A good manufacturer designs cabinets to meet customers' special needs. On the other hand, why reinvent the wheel when the solution may already have been designed? The design staff at the enclosure vendor is a valuable resource. Their work should be free and could save the buyer significant problems, time and money.

KEN GAZAREK is Vice President of Engineering, Equipto Electronics Corporation. He also serves as Chairman of the EIA CE 5.0 Committee, which is responsible for U.S. Standards 310D (racks and panels). (708) 897-4691.

THEIR DELIVERY SCHEDULE OURS.



TIRED OF DELAYS? WANT TO SPEED THINGS UP?

Express design assistance.

Express samples, prototypes, and production runs.

Express, yet courteous, service.

We offer a full line of RFI/EMI shielding.

We cross-reference all manufacturers' part numbers. Call today!



RFI vents,
air filters



RFI elastomer
gaskets



RFI mesh
gaskets



Route 140 Industrial Park
29 Mozzone Boulevard
Taunton, MA 02780
tel: 508-880-0987
fax: 508-880-0334

NEW CONCEPTS IN SHIELDED CABINETS . . . Continued from page 186

or 12-gauge steel, and doors are 0.063" aluminum or 16-gauge steel. Doors can be ordered with flush, paddle or slam latches (which automatically latch when the door is closed).

CONCLUSION

Given a new mid-course alternative to the either/or restrictions of standard versus custom shielded cabinets, the design engineer is now free to develop an enclosure that is uniquely functional and visually distinctive as well as economical and quickly procured.

ROBERT BOYLE is Engineering Manager at Zero East Division, Zero Corporation, 288 Main Street, Monson, MA. (413) 267-5561.