AMERICAN GLOVEBOX SOCIETY
STANDARDS DEVELOPMENT COMMITTEE

GUIDELINES FOR GLOVEBOXES

Section 5.14: Electrical

submitted by

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5.14 ELECTRICAL

When possible, the electrical system should be designed concurrently with other elements of the glovebox. This approach can save time during the electrical installation portion of the project. The subsections below address this issue.

5.14.1 CODES (RULES) / INDUSTRY STANDARDS

Applying codes is an essential part of any design. Codes guide the engineer in producing a design that ensures the safety of the equipment and operator(s). Specifically, in electrical design, the National Electrical Code (NEC) is observed. Industry standards may also be referenced, such as those of the Electronic Industries Association (EIA), Institute of Electrical and Electronics Engineers (IEEE), National Fire Protection Association (NFPA), Underwriters Laboratories (UL), and Canadian Standards Association (CSA).

5.14.2 PENETRATIONS / FEEDTHROUGHS

The method of supplying power to the internal section of a glovebox is through the membrane of the glovebox. The common terms used by the engineer and designer are penetration or feedthrough. Various types of standard feedthroughs are available from a manufacturer, and others are fabricated by the glovebox users (see section 5.2.3.2.3).

5.14.3 WIREWAYS

Strategic design of wireways for electrical conductors in a glovebox will allow uncomplicated installation of receptacles and/or other plug and socket needs and will minimize labor costs during installation.

5.14.4 JUNCTION BOXES

A junction box is typically used as an interface where conductors are spliced or terminated at a feedthrough.

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5.14.5 RECEPTACLES

General purpose outlets, typically 115 VAC, are an important part of glovebox operation. They provide convenient power access for plugging in electrical equipment. When possible, outlets should be placed so that power cords do not stretch across other equipment.

5.14.6 DERATING FACTORS

Depending on the atmosphere for which the glovebox is being designed, there may be maximum voltage and current derating factors that should be taken into account for any electrical equipment, such as conductors, motors, and connectors.

5.14.7 CONDUCTORS

Conductors must be insulated, be properly sized for voltage and current requirements, and conform to temperature limitations. All conductors and cables must be marked with the maximum rated voltage, the type of wire, the AWG (American Wire Gauge) size or circular-mil area, and the manufacturer's name or trademark.

5.14.8 CONDUCTOR INSULATION

Proper selection of conductor insulation is key to safe operation of equipment in a glovebox. Standard thermoplastics rated at least 90°C should be used (THHN or equivalent). Higher temperatures require special insulation. The glovebox environment is critical to insulation selection, and the designer should also consider the type of radiation that may be present.

5.14.9 GROUNDING

Many gloveboxes can be classified as metal enclosures and must be grounded. Metal enclosures are required to be grounded so that any fault between an ungrounded (electrically hot) conductor and the enclosure will not energize the enclosure, thereby creating a shock hazard.

5.14.10 REFERENCES

Mark W. Earley, John M. Caloggero, Richard H. Murray, National Electrical Code Handbook 1993, Sixth Edition, National Fire Protection Agency (NFPA).

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