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Biological Indicators for Gas and Vapor-Phase Decontamination Processes: Specification, Manufacture, Control and Use

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Biological Indicators Task Force

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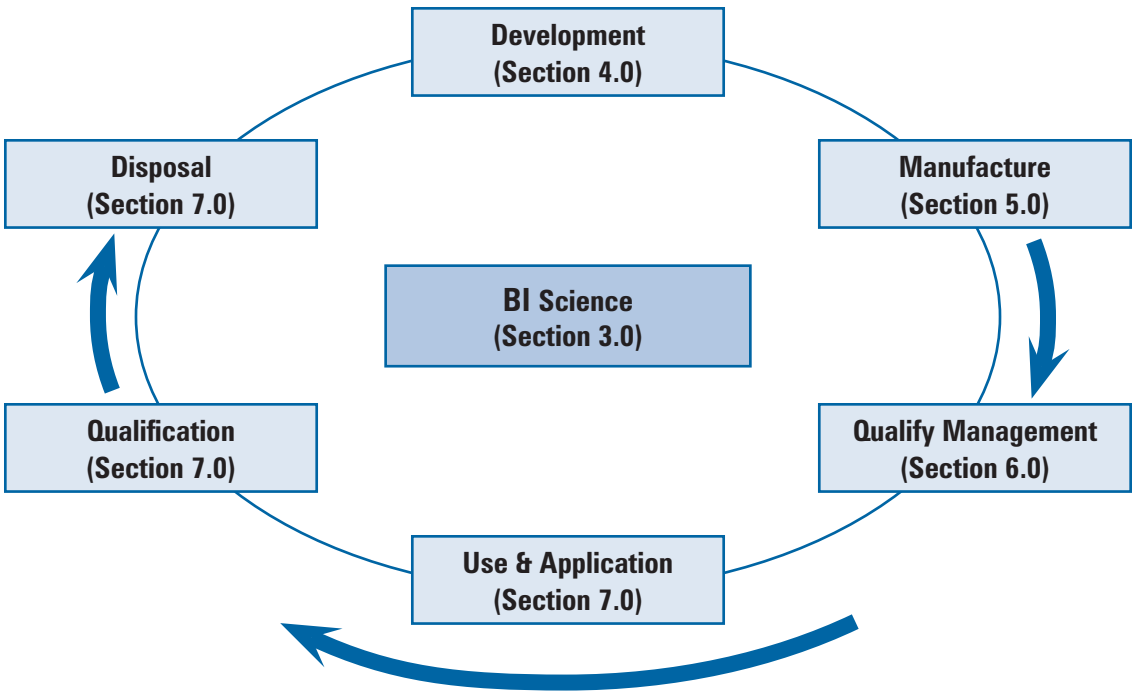
1.0 Introduction

Biological Indicators (BIs) are used during cycle development and the qualification of processes in which sterilization, sanitization, or decontamination is claimed. BIs currently are considered the only available tool capable of integrating the results of many parameters involved in achieving target kill at representative points throughout an enclosed space. These guidelines relate to sporicidal gas and vapor-phase decontamination processes where biological decontamination of surfaces inside contained volume areas is conducted. These areas include isolators, cleanrooms, containment rooms, and separative enclosures/devices. Some of these principles, however, may be applicable to the use of BIs for other processes.

This technical report provides a comprehensive review of an area not adequately addressed in current guidance documents. The report is intended to provide recommended specifications for BIs to be used with sporicidal gas and vapor-phase decontamination cycles together with guidance regarding their manufacture, quality control, and use. The principles described in this report are based upon the manufacture and use of BIs prepared from spore suspensions; however, they can be equally applied to the preparation of BIs from other sources.

Figure 1.0-1 illustrates processes regarding the science of BIs and specifications discussed in this report. Each subsequent process is then described, beginning with development and proceeding through manufacture, quality management, qualification, use, and disposal.

Figure 1.0-1 Biological Indicator Lifecycle



PDA requested the formation of a task force to develop a comprehensive set of guidelines to address the manufacture and use of BIs for sporicidal vapor-phase decontamination processes. The task force was composed of European BI manufacturers, academia, members of the pharmaceutical industry, and regulatory professionals. This report underwent a global technical peer review that included feedback from North America and Europe. References to regulatory documents, standards, and scientific publications are included to provide more detail and supportive data.

1.1 Purpose / Scope

The science and current understanding of biological inactivation mechanisms for sporicidal vapor-phase decontamination processes are included in this guide along with details relating to BI specification and guidance concerning manufacturing methods. Since BIs are intended for use in the qualification of vapor-phase decontamination cycles used in current good manufacturing practices aseptic processing and in critical bio-safety applications, recommendations for quality assurance and quality control in the manufacture and use of BIs are also included.

Quality control of BIs for sporicidal vapor-phase decontamination processes is imperative since minor changes in the manufacture, shipping, storage, and presentation of the BI may affect its sensitivity to the decontaminating agent. This is, in part, due to the fact that the sporicidal vapor-phase decontamination process is non-penetrating, whereas moist heat sterilization is penetrating and is therefore less affected by variations in the BI.

Sporicidal decontamination processes include, but are not restricted to, hydrogen peroxide vapor, peracetic acid vapor, chlorine dioxide gas, and formaldehyde separately and possibly in combination with more than one agent. These recommendations are based on current practices using hydrogen peroxide vapor alone (or in combination with peracetic acid) but may be equally applied to other agents used in similar gaseous or vapor based processes. Examples based on the use of hydrogen peroxide are described in **Section 7**.

Ethylene oxide will not be discussed in this document since it is used almost exclusively in the context of sterilizers used for processing items such as thermolabile medical devices.