January 11, 2024

Epic Medical Pte Ltd
Freddie Lee
CEO, MD
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Singapore, Singapore 069534
Singapore

Re: K222929
Trade/Device Name: ToxiSeal™ Vial Adapter with External Balloon
Regulation Number: 21 CFR 880.5440
Regulation Name: Intravascular administration set
Regulatory Class: Class II
Product Code: ONB
Dated: January 8, 2024
Received: January 8, 2024

Dear Freddie Lee:

We have reviewed your section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to devices that have been reclassified in accordance with the provisions of the Federal Food, Drug, and Cosmetic Act (the Act) that do not require approval of a premarket approval application (PMA). You may, therefore, market the device, subject to the general controls provisions of the Act. Although this letter refers to your product as a device, please be aware that some cleared products may instead be combination products. The 510(k) Premarket Notification Database available at https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm identifies combination product submissions. The general controls provisions of the Act include requirements for annual registration, listing of devices, good manufacturing practice, labeling, and prohibitions against misbranding and adulteration. Please note: CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading.

If your device is classified (see above) into either class II (Special Controls) or class III (PMA), it may be subject to additional controls. Existing major regulations affecting your device can be found in the Code of Federal Regulations, Title 21, Parts 800 to 898. In addition, FDA may publish further announcements concerning your device in the Federal Register.

Additional information about changes that may require a new premarket notification are provided in the FDA guidance documents entitled "Deciding When to Submit a 510(k) for a Change to an Existing Device"

(https://www.fda.gov/media/99812/download) and "Deciding When to Submit a 510(k) for a Software Change to an Existing Device" (https://www.fda.gov/media/99785/download).

Your device is also subject to, among other requirements, the Quality System (QS) regulation (21 CFR Part 820), which includes, but is not limited to, 21 CFR 820.30, Design controls; 21 CFR 820.90, Nonconforming product; and 21 CFR 820.100, Corrective and preventive action. Please note that regardless of whether a change requires premarket review, the QS regulation requires device manufacturers to review and approve changes to device design and production (21 CFR 820.30 and 21 CFR 820.70) and document changes and approvals in the device master record (21 CFR 820.181).

Please be advised that FDA's issuance of a substantial equivalence determination does not mean that FDA has made a determination that your device complies with other requirements of the Act or any Federal statutes and regulations administered by other Federal agencies. You must comply with all the Act's requirements, including, but not limited to: registration and listing (21 CFR Part 807); labeling (21 CFR Part 801); medical device reporting (reporting of medical device-related adverse events) (21 CFR Part 803) for devices or postmarketing safety reporting (21 CFR Part 4, Subpart B) for combination products (see https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products); good manufacturing practice requirements as set forth in the quality systems (QS) regulation (21 CFR Part 820) for devices or current good manufacturing practices (21 CFR Part 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR Parts 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR 807.97). For questions regarding the reporting of adverse events under the MDR regulation (21 CFR Part 803), please go to https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems.

For comprehensive regulatory information about medical devices and radiation-emitting products, including information about labeling regulations, please see Device Advice (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance) and CDRH Learn (https://www.fda.gov/training-and-continuing-education/cdrh-learn). Additionally, you may contact the Division of Industry and Consumer Education (DICE) to ask a question about a specific regulatory topic. See the DICE website (https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/contact-us-division-industry-and-consumer-education-dice) for more information or contact DICE by email (DICE@fda.hhs.gov) or phone (1-800-638-2041 or 301-796-7100).

Sincerely,

David Wolloscheck, Ph.D.
Assistant Director
DHT3C: Division of Drug Delivery and
General Hospital Devices,
and Human Factors

OHT3: Office of Gastrorenal, ObGyn,
General Hospital, and Urology Devices
Office of Product Evaluation and Quality
Center for Devices and Radiological Health

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Food and Drug Administration

Indications for Use

Form Approved: OMB No. 0910-0120
Expiration Date: 07/31/2026
See PRA Statement below.

510(k) Number *(if known)*
K222929

Device Name
ToxiSeal™ Vial Adaptor with External Balloon

Indications for Use *(Describe)*
The ToxiSeal™ Vial Adaptor with External Balloon mechanically prohibits environmental contaminants from entering the system and the escape of drug or vapor concentrations from the system, thereby minimizing individual and environmental exposure to drug vapor, aerosols, and spills. The device also prevents the introduction of microbial contaminations into the drug or fluid path for up to 168 hours (or 7 days) when used as intended.

Type of Use *(Select one or both, as applicable)*

☒ Prescription Use (Part 21 CFR 801 Subpart D) ☐ Over-The-Counter Use (21 CFR 801 Subpart C)

CONTINUE ON A SEPARATE PAGE IF NEEDED.

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K222929 - 510(K) Summary

Date Prepared: January 11, 2023

I. Submitter

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Contact Person: Mr. Freddie LEE, CEO/MD
E-mail: freddie.lee@epic-med.com

II. Subject Devices

Trade /Device Name	ToxiSeal™ *Vial Adaptor with External Balloon*
Common /Usual Name	Closed Antineoplastic and Hazardous Drug Reconstitution and Transfer Device
Classification Name	Intravascular administration set
Regulation Medical Specialty, and Review Panel	General Hospital
Regulation Number	21 CFR 880.5440
Regulatory Classification	Class II
Product Code	ONB

III. Predicate

510(K) Number	K123213
Trade /Device Name	BD PhaSeal® *Closed System Drug Transfer Device*
Regulation Number	21 CFR 880.5440
Regulatory Classification	Class II
Product Code	ONB

IV. Indications for Use Statement

The ToxiSeal™ *Vial Adaptor with External Balloon* mechanically prohibits environmental contaminants from entering the system and the escape of drug or vapor concentrations from the system, thereby minimizing individual and environmental exposure to drug vapor, aerosols, and spills. The device also prevents the introduction of microbial contaminations into the drug or fluid path for up to 168 hours (or 7 days) when used as intended.

V. Device Description

The ToxiSeal™ *Vial Adaptor with External Balloon* devices are single-use, sterile, non-pyrogenic CSTD drug vial adaptors that are fitted to the drug vials and seal against the closures of the vials. They are used as sterile docking interfaces between the drug vials and the ProSeal™ *Injectors* for injection of diluents into the drug vials and/or aspiration of liquid drug from the vials.

In addition, the ToxiSeal™ *Vial Adaptor with External Balloon* devices equalize the pressure difference which occurs when fluid or air is added to or removed from the drug vial. This neutral pressure is maintained utilizing an external balloon/ expansion chamber.

The ToxiSeal™ *Vial Adaptor with External Balloon* devices, designed to be used with the cleared ProSeal™ *Injector* within the ProSeal™ *CSTD* system (K192075), are additions of CSTD vial adaptor component device offerings to the ProSeal™ CSTD system. The additions enhance the completeness of the portfolio of ProSeal™ *CSTD* devices system.

VI. Comparison of Technological Characteristics

The ToxiSeal™ *Vial Adaptor with External Balloon* devices and the Predicate devices share the following characteristics:

- use of CSTD vial adaptor barrier technology
- use of an integrated pressure equalization chamber
- same interfaces between system components
- same materials of construction for vial adaptor spike

The ToxiSeal™ *Vial Adaptor with External Balloon* devices and the Predicate devices PhaSeal® Protector vial adaptor devices are different with respect to the membrane material and the spike material.

The table that follows compares key technological features between the Subject and Predicate devices.

Technological characteristics comparison

Parameter/ characteristic compared	**Predicate Device** **BD PhaSeal® *Closed System Drug Transfer Device* – PhaSeal I® *Protector*** **(K123213)**	**Subject Device** **Epic Medical ToxiSeal™ *Vial Adaptor with External Balloon*** **(K222929)**	**Discussion**
System component	Vial Adaptor (Vial Access Device)	Vial Adaptor (Vial Access Device)	Same
Closed System Technology	Physical barrier to prevent all drug mass from crossing the system boundary	Physical barrier to prevent all drug mass from crossing the system boundary	Same
Drug vial air pressure equalization	Integrated pressure equalization chamber	Integrated pressure equalization chamber	Same
Interface between system components	Elastomeric resealing double-membrane	Elastomeric resealing double-membrane	Same
Membrane material	Thermoplastic elastomer (TPE)	Isoprene rubber (IR)	Different See comment # 1
Vial adaptor spike	Plastic (Model P28, plastic (polypropylene (PP))	Plastic (all models, Copolyester)	Different See comment #1
Sterilization method	EO, SAL 10^{-6}	EO, SAL 10^{-6}	Same
System components	○ PhaSeal® *Protector* ○ PhaSeal® *Injector* ○ PhaSeal® *Connector*	○ ToxiSeal™ *Vial Adaptor with External Balloon* ○ ProSeal™ I*njector* ○ ProSeal™ *Connecto*r	Same
Hydrophobic filter (non-fluid path)	Polytetrafluoroethylene (PTFE)	Polytetrafluoroethylene (PTFE)	Same
Expansion films	Polypropylene (PP), Polyamide aka Nylon (PA)	Polyethylene terephthalate - Polyethylene (PET/PE) laminate and Polyethylene (PE)	Different See comment #2
Filter cover	Polypropylene (PP)	Acrylonitrile Butadiene Styrene (ABS)	Different See comment #2
Housing	Polypropylene (PP)	Polycarbonate (PC) and Copolyester	Different

Technological characteristics comparison

Parameter/ characteristic compared	Predicate Device BD PhaSeal® *Closed System Drug Transfer Device* – PhaSeal I® *Protector* (K123213)	Subject Device Epic Medical ToxiSeal™ *Vial Adaptor with External Balloon* (K222929)	Discussion
			See comment #2
Protective lid	Polyethylene aka polythene (PE)	Polyvinylchloride (PVC)	Different See comment #2
Non-fluid path materials in general that are not listed above	Polypropylene (PP), Polyamide aka Nylon (PA)	Polypropylene (PP), Acrylonitrile Butadiene Styrene (ABS), Polyvinylchloride (PVC)	Different See comment #2

Discussion of differences in technological characteristics

Comment #1

Isoprene Rubber (IR) and Copolyester of medical grade/ formulated for medical devices are widely used in medical devices as fluid path materials. IR is used in the Subject device in place of thermoplastic elastomer (TPE) in the Predicate. Both TPE and IR are nonallergenic, unlike natural rubber latex; and both TPE and IR offer easy sterilization and have great abrasion resistance, flexibility, and stability. Both Copolyester (Subject device) and polypropylene (Predicate device) are chemically resistant and are materials of choice in devices that contact drugs containing chemical solvents, surfactants, and/or fat emulsions.

In addition, biocompatibility studies and chemical analyses for added safety assurance are conducted for the materials and validated to be safe for the intended use (see section VII-B).

The Subject device underwent analytical and functional performance tests to assure safety and performance standards are met. The evaluations of the membrane and spike material differences confirmed these do not raise any new or different safety or performance effectiveness issues/ concerns (see section VII-A and VII-C).

Comment #2

These specific material differences do not raise any new or different safety or performance issues/ concerns as they are not within the fluid-path. Moreover, their functional performances are tested and found to have met their respective safety and effectiveness acceptance criteria (see section VII-A and VII-C).

VII. Performance Data Supporting Substantial Equivalence

A. Functional Performance

The sterile, single-use, vial adaptor with external balloon described in this Summary were tested and demonstrated to be in conformance with the following ISO and FDA recognized standards:

- ISO 22413: 2010, *Transfer sets for pharmaceutical preparations – Requirements and test methods*
- ISO 8871-5: 2016, *Elastomeric parts for parenterals and for devices for pharmaceutical use Part 5: Functional requirements and testing*
- ISO 8536-2:2010, *Infusion equipment for medical use – Part 2: Closures for infusion bottles*
- ISO 8536-4: 2019, *Infusion equipment for medical use - Part 4: Infusion sets for single use, gravity feed*

Testing done:

- Fragmentation study
- Vial Adaptor penetration force testing
- Device leak integrity testing
- Volume of pressure equalization study
- Testing to (draft) *NIOSH CSTD Test Protocol*
- Microbial ingress/ microbiological integrity testing

B. Biocompatibility

In accordance with ISO 10993-1: 2018, the *Vial Adaptor with External Balloon* is classified as: *Externally Communicating Device, Blood Path Indirect, Prolonged Contact* (>24hr to 30d). The following testing were conducted, and found to have met their respective acceptance criteria:

- Cytotoxicity
- Skin sensitization
- Intracutaneous reactivity
- Acute systemic toxicity
- Pyrogenicity
- Subacute/subchronic systemic toxicity
- Hemocompatibility study
- Chemical characterization
- Toxicological risk management

Particulate matter testing was conducted in accordance with USP <788> *Particulate Matter in Injections* and found to have met the USP acceptance criteria.

C. Sterility, Shipping, and Shelf-Life

The Subject device complies with sterilization requirements of ISO 11135:2014, *Sterilization of Health Care Products –Ethylene Oxide – Part 1: Requirements for Development, Validation and Routine Control of a Sterilization Process for Medical Devices.*

- Package Integrity Test
- Sterile Barrier Packaging Testing performed on the proposed device:
  - Seal strength – ASTM F88
- Shelf-life of 3 years is validated using the FDA recognized standard, ASTM 1980-16, *Standard Guide for Accelerated Aging of Sterile Barrier Systems for Medical Devices*.

VIII. Conclusions

The differences between the Predicate and the Subject device do not raise any new or different questions of safety or effectiveness. The ToxiSeal™ *Vial Adaptor with External Balloon* is substantially equivalent to the BD PhaSeal® Closed System Drug Transfer Device with respect to the indications for use, target populations, treatment method, and technological characteristics.

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