



**510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION  
DECISION SUMMARY  
ASSAY ONLY**

**I Background Information:**

**A 510(k) Number**

K193504

**B Applicant**

Hardy Diagnostics

**C Proprietary and Established Names**

HardyDisk AST Cefiderocol 30µg (FDC30)

**D Regulatory Information**

| Product Code(s) | Classification | Regulation Section                                             | Panel             |
|-----------------|----------------|----------------------------------------------------------------|-------------------|
| JTN             | Class II       | 21 CFR 866.1620 -<br>Antimicrobial<br>Susceptibility Test Disc | MI - Microbiology |

**II Submission/Device Overview:**

**A Purpose for Submission:**

To obtain a substantial equivalence determination for Cefiderocol Antimicrobial Susceptibility Test Disk

**B Measurand:**

Cefiderocol 30µg

**C Type of Test:**

Antimicrobial Susceptibility Test Disks

### **III Intended Use/Indications for Use:**

#### **A Intended Use(s):**

HardyDisk AST Disks are used for semi-quantitative *in vitro* susceptibility testing by the agar diffusion test procedure (Kirby-Bauer) of rapidly growing and certain fastidious bacterial pathogens. Standardized methods for agar diffusion testing have been described for *Enterobacteriaceae*, *Staphylococcus* spp., *Pseudomonas* spp., *Acinetobacter* spp., *Listeria monocytogenes*, *Enterococcus* spp., and by modified procedures, *Haemophilus* spp., *Neisseria gonorrhoeae*, *N. meningitidis* and *Streptococcus* spp., including *Streptococcus pneumoniae*.

#### **B Indication(s) for Use:**

HardyDisk AST Disks are used for semi-quantitative *in vitro* susceptibility testing by the agar diffusion test procedure (Kirby-Bauer) of rapidly growing and certain fastidious bacterial pathogens. Standardized methods for agar diffusion testing have been described for *Enterobacteriaceae*, *Staphylococcus* spp., *Pseudomonas* spp., *Acinetobacter* spp., *Listeria monocytogenes*, *Enterococcus* spp., and by modified procedures, *Haemophilus* spp., *Neisseria gonorrhoeae*, *N. meningitidis* and *Streptococcus* spp., including *Streptococcus pneumoniae*.

Use of HardyDisk AST Cefiderocol 30µg (FDC30) for *in vitro* agar diffusion susceptibility testing is indicated when there is the need to determine the susceptibility of bacteria to Cefiderocol.

HardyDisk AST Cefiderocol at concentration 30µg can be used to determine the zone diameter (mm) of Cefiderocol against the following bacteria for which Cefiderocol has been shown to be active both clinically and *in vitro*:

*Escherichia coli*  
*Enterobacter cloacae* complex  
*Klebsiella pneumoniae*  
*Proteus mirabilis*  
*Pseudomonas aeruginosa*

#### **C Special Conditions for Use Statement(s):**

Rx - For Prescription Use Only

#### **D Special Instrument Requirements:**

None

### **IV Device/System Characteristics:**

**A Device Description:**

HardyDisk AST Disks utilize 6-mm diameter white filter paper disks. The disks are prepared by impregnating absorbent paper with a known concentration of 30µg Cefiderocol. The disks are marked with the code FDC30, on both sides.

HardyDisk AST Disks are supplied in plastic cartridges containing 50 disks each. They are also packaged as one cartridge per vial with desiccant or five cartridges per vial with desiccant.

**B Principle of Operation:**

The HardyDisk AST Disk is based on the agar diffusion (Kirby-Bauer) methodology. It utilizes dried filter paper disks impregnated with a known concentration of an antimicrobial agent that are placed onto the test medium surface. Mueller Hinton agar is recommended for agar diffusion testing of non-fastidious organisms and Mueller Hinton with 5% Sheep Blood is recommended for *Streptococcus* spp. Three to five similar colonies are transferred to 4-5 mL of a suitable broth medium. The broth is incubated at 35°C for 2-6 hours to develop a turbidity that exceeds or is equivalent to a 0.5 McFarland standard. Alternatively, a direct broth or saline suspension of colonies may be prepared from an overnight culture. The final inoculum density should be equivalent to a 0.5 McFarland turbidity standard. The inoculum density may also be standardized photometrically.

Within 15 minutes of inoculum preparation, the Mueller Hinton agar plate is streaked with an inoculated swab to obtain an even inoculation of organism. Disks are aseptically placed onto the agar surface with a disk dispenser and the disks are pressed down with a sterile needle or forceps to make contact with the agar surface. Agar plates are incubated in an ambient air incubator at 35±2°C for 16 - 18 hours. Fastidious organisms are tested using appropriate media incubated in an atmosphere enriched with 5% CO<sub>2</sub>, as recommended in the CLSI M02 approved standard document.

After incubation the agar medium is examined for a zone of inhibition around the disks. The zones of inhibition are measured to the nearest millimeter and compared to recognized zone size ranges for the antimicrobial agent being tested.

**V Substantial Equivalence Information:**

**A Predicate Device Name(s):**

HardyDisk AST Tigecycline 15µg

**B Predicate 510(k) Number(s):**

K062245

**C Comparison with Predicate(s):**

| <b>Device &amp; Predicate Device(s):</b> | <b>Device</b>             | <b>Predicate</b>          |
|------------------------------------------|---------------------------|---------------------------|
|                                          | <u>K193504</u>            | <u>K062245</u>            |
| Device Trade Name                        | HardyDisk AST Cefiderocol | HardyDisk AST Tigecycline |

|                                                   |                                                                                                                                                                                                                                                                             |             |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
|                                                   | 30µg (FDC30)                                                                                                                                                                                                                                                                | 15µg        |
| <b>General Device Characteristic Similarities</b> |                                                                                                                                                                                                                                                                             |             |
| Intended Use                                      | Semi-quantitative <i>in vitro</i> susceptibility testing by the agar diffusion test procedure (Kirby-Bauer) of rapidly growing and certain fastidious bacterial pathogens.                                                                                                  | Same        |
| Methodology                                       | Kirby-Bauer Disk Diffusion Susceptibility Test Protocol requires the user to determine categorical interpretations (S/I/R) using the measured zone diameters.                                                                                                               | Same        |
| Inoculum                                          | Prepared from pure isolated colonies to match the turbidity equivalent of a 0.5 McFarland in Tryptic Soy Broth.                                                                                                                                                             | Same        |
| Inoculum Method                                   | Dip a sterile swab into the prepared inoculum and streak an appropriate agar plate's surface three times. Add the disks impregnated with the antimicrobial agent to the surface of the plate. Incubate the agar plate agar side up in a 35 ± 2°C incubator for 16-18 hours. | Same        |
| Reading Method                                    | The user will interpret the zone diameters according established interpretive criteria for the drug.                                                                                                                                                                        | Same        |
| <b>General Device Characteristic Differences</b>  |                                                                                                                                                                                                                                                                             |             |
| Antimicrobial Agent                               | Cefiderocol                                                                                                                                                                                                                                                                 | Tigecycline |
| Concentration                                     | 30µg                                                                                                                                                                                                                                                                        | 15µg        |

**VI Standards/Guidance Documents Referenced:**

CLSI M100, 29<sup>th</sup> ed., “Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Ninth Informational Supplement, January 2019”.

**VII Performance Characteristics (if/when applicable):**

**A Analytical Performance:**

1. Precision/Reproducibility:

Not applicable

2. Linearity:

Not applicable

3. Analytical Specificity/Interference:

Not applicable

4. Assay Reportable Range:

Not applicable

5. Traceability, Stability, Expected Values (Controls, Calibrators, or Methods):

Not applicable

6. Detection Limit:

Not applicable

7. Assay Cut-Off:

Not applicable

**B Comparison Studies:**

1. Method Comparison with Predicate Device:

The premarket submission for HardyDisk Cefiderocol included a letter dated March 27, 2019 indicating the right of reference to NDA 209445. Descriptive characteristics were sufficient for the HardyDisk Cefiderocol 30µg (FDC30) disk based on extensive data from several microbiology disk studies evaluated by CDER which were used to generate the breakpoints, identified by FDA on the susceptibility test interpretive criteria webpage. In addition, CDER concurred with the disk QC ranges that were established by CLSI. The disk data used to support this submission included data from testing organisms for which cefiderocol has been shown to be active both *in vitro* and in clinical infections within the spectrum of activity of cefiderocol and as noted in the device's intended use.

Data obtained from stability, quality control, disk to MIC correlation, reproducibility (from disk content optimization studies) were generated in accordance with the CDER Clinical/Antimicrobial guidance, *Microbiology Data for Systemic Antibacterial Drugs- Development, Analysis, and Presentation* to ensure precise, accurate and reproducible results.

For this review, the interpretative criteria are applied to *Enterobacteriaceae* and *Pseudomonas aeruginosa* according to the FDA STIC website. As required under 511A(2)(2)(B) of the Federal Food, Drug and Cosmetic Act, the following statements are

added as footnotes to the Cefiderocol 30µg interpretative criteria table in the HardyDisk AST package insert:

*Per the FDA-Recognized Susceptibility Test Interpretive Criteria website, the safety and efficacy of antimicrobial drugs, for which antimicrobial susceptibility is tested by this AST device, may or may not have been established in adequate and well-controlled clinical trials for treating clinical infections due to microorganisms outside of those found in the indications and usage in the drug label. The clinical significance of susceptibility information in those instances is unknown. The approved labeling for specific antimicrobial drugs provides the uses for which the antimicrobial drug is approved.*

2. Matrix Comparison:

Not applicable

**C Clinical Studies:**

1. Clinical Sensitivity:

Not applicable

2. Clinical Specificity:

Not applicable

3. Other Clinical Supportive Data (When 1. and 2. Are Not Applicable):

Not applicable

**D Clinical Cut-Off:**

Not applicable

**E Expected Values/Reference Range:**

The cefiderocol interpretive criteria for disk diffusion are shown in the table below.

**FDA-Identified Disk Diffusion Interpretive Criteria**

(Zone diameter in mm for Cefiderocol 30µg)

| Indications for Use Organism(s)        | Interpretive Criteria |         |     |
|----------------------------------------|-----------------------|---------|-----|
|                                        | S                     | I       | R   |
| <i>Enterobacteriaceae</i> <sup>a</sup> | ≥18                   | 14 – 17 | ≤13 |
| <i>Pseudomonas aeruginosa</i>          | ≥25                   | 19-24   | ≤18 |

<sup>a</sup>Includes *E. coli*, *K. pneumoniae*, *P. mirabilis* and *E. cloacae* complex.

**VIII Proposed Labeling:**

The labeling supports the finding of substantial equivalence for this device.

**IX Conclusion:**

The submitted information in this premarket notification is complete and supports a substantial equivalence decision.