December 7, 2022

Siemens Medical Solutions USA, Inc.
% Patricia Jones
Regulatory Affairs Professional
40 Liberty Boulevard
MALVERN PA 19355

Re: K223410
Trade/Device Name: Cios Select (VA21) Flat Panel
Regulation Number: 21 CFR 892.1650
Regulation Name: Image-intensified fluoroscopic x-ray system
Regulatory Class: Class II
Product Code: OWB, OXO, JAA
Dated: November 4, 2022
Received: November 9, 2022

Dear Patricia Jones:

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 (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 located 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.

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 803) for

devices or postmarketing safety reporting (21 CFR 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 4, Subpart A) for combination products; and, if applicable, the electronic product radiation control provisions (Sections 531-542 of the Act); 21 CFR 1000-1050.

Also, please note the regulation entitled, "Misbranding by reference to premarket notification" (21 CFR Part 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,

Lu Jiang 2022.12.07 17:26:25 -05'00'

Lu Jiang, Ph.D.
Assistant Director
Diagnostic X-Ray Systems Team
DHT8B: Division of Imaging Devices
and Electronic Products
OHT8: Office of Radiological Health
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: 06/30/2023
See PRA Statement below.

510(k) Number *(if known)*
K223410

Device Name
Cios Select (VA21) Flat Panel

Indications for Use *(Describe)*

The Cios Select is a mobile X-ray system intended for use in Operating room, Traumatology, Endoscopy, Intensive Care Station, Pediatrics, Ambulatory patient care and in Veterinary Medicine.

The Cios Select can operate in three different modes, Digital Radiography, Fluoroscopy, and Pulsed Fluoroscopy which are necessary in performing wide variety of clinical procedures, such as intraoperative bile duct display, fluoroscopic display of an intra-medullary nail implants in various positions, low dose fluoroscopy in pediatrics, fluoroscopic techniques utilized in pain therapy and positioning of catheters and probes.

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.

This section applies only to requirements of the Paperwork Reduction Act of 1995.

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510(k) Summary: Cios Select (VA21) Flat Panel System

Submission Number: K223410

Company: Siemens Medical Solutions USA, Inc.
40 Liberty Boulevard
Malvern, PA 19355

Date Prepared: December 5, 2022

This 510(k) summary of safety and effectiveness information is being submitted in accordance with the requirements of SMDA 1990 and 21 CFR § 807.92.

1. **General Information:**

   Importer / Distributor:
   Siemens Medical Systems USA, Inc.
   40 Liberty Boulevard, 65-1A
   Malvern, PA 19355
   Establishment Registration Number: 2240869

   Manufacturing Site:
   Siemens Shanghai Medical Equipment Ltd.
   278 Zhou Zhu Road, Shanghai
   201318, China
   Establishment Registration Number: 3003202425

2. **Contact Person:**

   Patricia D. Jones
   Regulatory Affairs Specialist
   Siemens Medical Solutions USA, Inc.
   40 Liberty Boulevard
   Malvern, PA 19355
   Phone: (678) 575-8832
   Email: patricia.jones@siemens-healthineers.com

3. **Device Name and Classification:**

Trade Name:	**Cios Select (VA21) Flat Panel**
Classification Name:	Image-Intensified Fluoroscopic x-ray System
Classification Panel:	Radiology
Regulation Number:	21 CFR §892.1650
Device Class:	Class II
Product Codes:	OWB, OXO, JAA

4. **Legally Marketed Predicate Device**

Trade Name:	**Cios Select (VA21) Flat Panel**
510(k) Clearance	K210309
Clearance Date	March 5, 2021
Classification Name:	Image-intensified fluoroscopic x-ray System
Classification Panel:	Radiology

Regulation Number:	21 CFR §892.1650
Device Class:	Class II
Product Code:	OWB
Subsequent Product Codes:	JAA, OXO
Total Product Life Cycle:	There are no Recalls nor MDR incidents for this cleared device.

5. Device Description:

The Cios Select (VA21C) with Flat Panel Detector Mobile X-ray System is designed for the surgical environment. The Cios Select FD (VA21) is a modification of the Cios Select (VA21) Flat Panel originally cleared under Premarket Notification K210309 on March 5, 2021.

The Cios Select consists of two major units:
The Siemens Healthineers Cios Select mobile fluoroscopy C-arm system is an X-ray imaging system consisting of two mobile units: a mobile acquisition unit and a monitor cart as the image display station.

The mobile acquisition unit is comprised of the X-ray control, the C-arm which supports the single-tank high-frequency generator/X-ray tube assembly, the flat panel detector, and user controls.

The monitor cart connects to the acquisition unit by a cable. It integrates the TFT flat panel displays, Digital Imaging Processing System, user controls, and image storage devices (USB).

The following modifications were made to the predicate device the Cios Select (VA21) Flat Panel mobile X-ray System cleared under Premarket Notification K210309 on March 5, 2021. Siemens Medical Solutions USA, Inc. submits this Special 510(k) to request clearance for the Subject Device the Cios Select (VA21C) with Flat Panel Detector in comparison to the Predicate Device.

1. Updated Software from VA21(B) to VA21(C) to support the following hardware changes.
   a. New collimator
   b. New PC hardware
2. Updated 510(k) Information

6. Indications for Use:

The Cios Select is a mobile X-ray system intended for use in Operating room, Traumatology, Endoscopy, Intensive Care Station, Pediatrics, Ambulatory patient care, and in Veterinary Medicine.

The Cios Select can operate in three different modes, Digital Radiography, Fluoroscopy, and Pulsed Fluoroscopy which are necessary in performing wide variety of clinical procedures, such as intraoperative bile duct display, fluoroscopic display of an intra-medullary nail implants in various positions, low dose fluoroscopy in

pediatrics, fluoroscopic techniques utilized in pain therapy and positioning of catheters and probes.

7. Substantial Equivalence:

The Cios Select (VA21C) with Flat Panel Detector system is substantially equivalent to the legally marketed predicates listed in **Table 1** below:

Table 1: Predicate Device Comparable Properties for Subject Device Modifications:

Predicate Device Name and Manufacturer	510(k) Number	Clearance Date	Comparable Properties
Predicate Device	K210309	3/5/2021	• Indications for use • X-ray technology • Image processing • Mechanical design • Cybersecurity • Software • Collimator • PC Hardware
Cios Select (VA21) Flat Panel Siemens Shanghai Medical Equipment Ltd.			

8. Summary of Technological Characteristics of the Subject Device as Compared with the Predicate Device:

The Cios Select (VA21C) with Flat Panel Detector System is designed as a set of components (floor stand, C-arm, X-ray tube and housing, flat panel detector, digital imaging system, collimator, generator etc.) that is combined to provide a specialized angiography system. Components used with Cios Select (VA21C) with Flat Panel Detector System are either commercially available with current Siemens systems or include modifications to existing components. Technological differences between the Subject Device and the Predicate Device are provided in **Table 2** below for all modifications.

Table 2: Summary of Comparison of Technological Characteristics

Subject Device Cios Select (VA 21C) with Flat Panel Detector System Modifications		Predicate Device Cios Select (VA21B) Flat Panel K210309	Comparison Results
1.	Software update from VA21(B) to VA21(C) to support the following new hardware, no new features	VA21B System Software	**Comparable:** There are no new functionalities when compared to the **Predicate Device Cios Select (VA21) Flat Panel cleared in K210309.** The system software update to support the new hardware does not raise any new safety or effectiveness issues.
A.	Replaced Collimator	Collimator	**Comparable:** There are no new functionalities when compared to the **Predicate Device Cios Select (VA21) Flat Panel cleared in K210309.** The

Subject Device Cios Select (VA 21C) with Flat Panel Detector System Modifications		Predicate Device Cios Select (VA21B) Flat Panel K210309	Comparison Results
			new collimator does not raise any new safety or effectiveness.
B.	Updated PC hardware "Mini-PC"	PC hardware	**Comparable:** There are no new functionalities when compared to the **Predicate Device Cios Select (VA21) Flat Panel cleared in K210309.** The new mini-PC does not raise any new safety or effectiveness issues

9. Nonclinical Performance Testing:

Non-clinical tests were conducted for the Cios Select (VA21C) with Flat Panel Detector during product development. The Siemens Cios Select (VA21C) with Flat Panel Detector has been tested to meet the requirements for conformity to multiple industry standards. Performance testing confirmed, that the Siemens Cios Select (VA21C) with Flat Panel Detector complies with the following 21 CFR Federal Performance Standards.

Code of Federal Regulations Title 21 Subchapter J- Radiological Health, applicable sections include:

- 1020.30 Diagnostic X-Ray Systems and their major components
- 1020.32 Fluoroscopic Equipment
- 1040.10 Laser products

The Cios Select (VA 21C) with Flat Panel Detector was certified by Siemens Healthcare GmbH Corporate Testing Laboratory to comply with the following standards for Electrical safety, performance, and Electromagnetic Compatibility:

- AAMI ANSI ES60601-1:2005/(R)2012
- IEC 60601-1-2:2014
- IEC 60601-1-3:2013
- IEC 60601-1-6:2010/A1:2013
- IEC 60825-1:2014
- IEC 62304:2015
- IEC 60601-2-28:2017
- IEC 60601-2-43:2019
- IEC 60601-2-54:2018
- IEC 62366-1:2015
- ISO 14971:2019

Provided in **Table 4** is a list of relevant Guidance Documents that were used in the development of the 510(k) content.

Table 4: FDA Guidance Documents

FDA Guidance Documents and Effective Date	
1.	Guidance for Industry and FDA Staff – **User Fees and Refunds for Premarket Notification Submissions 510(k)** Document issued on October 2, 2017
2.	Guidance for Industry and Food and Drug Administration Staff: **Refuse to Accept Policy for 510(k)s** Document issued on January 30, 2018
3.	Guidance for Industry and FDA Staff: **The Special 510(k) Program** Document issued on September 13, 2019
4.	Guidance for Industry and FDA Staff: **Deciding when to submit a 510(k) for a change to an existing device.** Document issued on October 25, 2017
5.	Guidance for Industry and Food and Drug Administration Staff: **The 510(k) Program: Evaluating Substantial Equivalence in Premarket Notifications [510(k)]** Document Issued on July 28, 2014
6.	Guidance for Industry and FDA Staff: **Guidance for the Submission Of 510(k)'s for Solid State X-ray Imaging Devices** Document issued on September 1, 2016
7.	Guidance for Industry and FDA Staff: **Guidance for the Content of Premarket Submission for Software in Medical Devices** Document issued on May 11, 2005
8.	Guidance for Industry and FDA Staff: **Guidance for Off-The-Shelf Software Use in Medical Devices** Document issued on September 9, 1999
9.	Guidance for Industry and FDA Staff: **Applying Human Factors and Usability Engineering to Medical Devices**. Document issued February 3, 2016
10.	Guidance for Industry and FDA Staff: **Pediatric Information for X-ray Imaging Device Premarket Notifications.** Document issued on November 28, 2017
11.	Guidance for Industry and FDA Staff: **Content of Premarket Submissions for Management of Cybersecurity in Medical devices.** Document issued on October 2, 2014
12.	Guidance for Industry and FDA Staff: **Information to Support a Claim of Electromagnetic Compatibility (EMC) of Electrically Powered Medical Devices** Document issued on July 11, 2016
13.	Guidance for Industry and FDA Staff: **Radio Frequency Wireless Technology in Medical Devices** Document issued on August 14, 2007
14.	Guidance for Industry and Food and Drug Administration Staff: **Pediatric Information for X-ray Imaging Device Premarket Notifications** Document issued on November 28, 2017.
15.	Guidance for Industry and FDA Staff: **Appropriate Use of Voluntary Consensus Standards in Premarket Submission for Medical devices** Document issued on September 14, 2018
16.	Guidance for Industry and FDA Staff: **Medical Device Accessories – Describing Accessories and Classification Pathways** Document issued on December 20, 2017
17.	Guidance for Industry and FDA Staff: **Recommended Content and Format of Non-Clinical Bench Performance Testing Information in Premarket Submissions** Document issued on December 20, 2019

The modifications described in this Premarket Notification are supported with verification and validation testing.

Verification and Validation:

Software Documentation for a **Moderate** Level of Concern software per FDA's Guidance Document "Guidance for the Content of Premarket Submissions for Software Contained in Medical Devices" issued on May 11, 2005, and "Off-The-Shelf Software Use in Medical Devices" is also included as part of this submission. The performance data demonstrate continued conformance with special controls for medical devices containing software. Non-clinical tests were conducted on the Subject Device Cios Select with Flat Panel Detector software version VA21(C) during product development.

The Risk analysis was completed, and risk control was implemented to mitigate identified hazards. The testing results support that all the software specifications have met the acceptance criteria. Testing for verification and validation of the device was found acceptable to support the claims of substantial equivalence.

Bench testing in the form of Unit, Subsystem, and System Integration testing was performed to evaluate the performance and functionality of the new features, hardware, and software updates. All testable requirements in the Engineering Requirements Specifications keys, Subsystem Requirements Specifications keys, and the Risk Management Hazard keys have been successfully verified and traced in accordance with the Siemens product development (lifecycle) process. The software verification and regression testing have been performed successfully to meet their previously determined acceptance criteria as stated in the test plans.

Electrical safety and EMC testing were conducted on the Cios Select, consisting of the acquisition unit (C-arm system) and the image processing and display station. The system complies with the IEC 60601-1, IEC 60601- 2-43, and IEC 60601-2-54 standards for safety and the IEC 60601-1-2 standard for EMC.

The Cios Select with Flat Panel Detector software VA21(C) was tested and found to be safe and effective for intended users, uses, and use environments through the design control verification and validation process. The Human Factor Usability Validation showed that Human factors are addressed in the system test according to the operator's manual and in clinical use tests with customer reports and feedback forms. Customer employees are adequately trained in the use of this equipment.

Siemens conforms to the cybersecurity requirements by implementing a process of preventing unauthorized access, modifications, misuse, or denial of use, or the unauthorized use of information that is stored, accessed or transferred from a medical device to an external recipient. Provided in this submission is a cybersecurity statement that considers IEC 80001-1:2010. The responsibility for compliance with IEC 80001-1-2010 is the hospital. Provided in the Software Section is the required cybersecurity information.

Additional engineering bench testing was performed including the non-clinical testing identified in the guidelines for submission of 510(k)s for Solid State X-Ray Imaging

Devices (SSXI); demonstration of system performance; and an imaging performance evaluation. X-ray Imaging Devices- Laboratory Image Quality and Dose Assessment, Tests and Standards" was performed with acceptable results.

Summary:
Performance tests were conducted to test the functionality of the Cios Select (VA21C) with Flat Panel Detector. These tests have been performed to assess the functionality of the Subject Device. The results of all conducted testing and clinical assessments were found acceptable and do not raise any new safety or effectiveness issues.

10. General Safety and Effectiveness Concerns:

Instructions for use are included within the device labeling, and the information provided will enable the user to operate the device in a safe and effective manner.

Risk management is ensured via a hazard analysis, which is used to identify potential hazards. These potential hazards are controlled via software development, verification, and validation testing. To minimize electrical and mechanical hazards, Siemens adheres to recognized and established industry practices, and all equipment is subject to final performance testing. Furthermore, the operators are healthcare professionals familiar with and responsible for the evaluation and post-processing of X-ray images.

11. Conclusion as to Substantial Equivalence:

The Cios Select (VA21C) with Flat Panel Detector has the same indications for use, operating environment, and mechanical design as the predicate. Siemens concludes via the documentation provided in the 510(k) submission that the Cios Select (VA21C) with Flat Panel Detector does not introduce any new potential safety risks and is substantially equivalent and performs as well as the predicate devices.