

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

**A. 510(k) Number:**

k141957

**B. Purpose for Submission:**

Expanded indications for use of previously cleared control material (k120744) with the modified Sysmex XN series (XN-11 and XN-21) hematology analyzers

**C. Measurand:**

Assayed hematology parameters: WBC-BF ( $10^3/\mu\text{L}$ ), RBC-BF ( $10^6/\mu\text{L}$ ), MN# ( $10^3/\mu\text{L}$ ), PMN# ( $10^3/\mu\text{L}$ ), MN% (%), PMN% (%), TC-BF# ( $10^3/\mu\text{L}$ )

**D. Type of Test:**

Quantitative

**E. Applicant:**

Streck, Inc.

**F. Proprietary and Established Names:**

XN CHECK™ BF

**G. Regulatory Information:**

1. Regulation section:

21 CFR § 864.8625, Hematology quality control mixture

2. Classification:

Class II

3. Product code:

JPK, mixture, hematology quality control

4. Panel:

Hematology (81)

**H. Intended Use:**

1. Intended use(s):

XN CHECK BF is used for control and calibration verification of Sysmex XN series (XN-10, XN-11, XN-20, XN-21) analyzers. It is not, however, intended for actual calibration of these analyzers. Assayed parameters include:

WBC-BF ( $10^3/\mu\text{L}$ ), RBC-BF ( $10^6/\mu\text{L}$ ), MN# ( $10^3/\mu\text{L}$ ), PMN# ( $10^3/\mu\text{L}$ ), MN(%), PMN(%), TC-BF# ( $10^3/\mu\text{L}$ )

2. Indication(s) for use:

Same as intended use

3. Special conditions for use statement(s):

For prescription use only

4. Special instrument requirements:

Sysmex XN (XN-10, XN-11, XN-20, XN-21) hematology analyzers

**I. Device Description:**

XN CHECK™ BF body fluid control is an in-vitro diagnostic product that contains the following: stabilized red blood cell component(s) and stabilized white blood cell component(s) in a preservative medium. The control includes two levels (i.e., low and medium) which are packaged separately in polypropylene plastic vials with screw caps containing 3 mL. The vials will be packaged in (4) welled vacuum formed clamshell container with the Instructions for Use / assay sheet. The product storage conditions are at 2-8°C.

**J. Substantial Equivalence Information:**

1. Predicate device name(s):

XN CHECK™ BF

2. Predicate 510(k) number(s):

k120744

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	XN CHECK BF is used for control and calibration verification of Sysmex XN series (XN-10, XN-11, XN-20, XN-21) analyzers. It is not, however, intended for actual calibration of these analyzers. Assayed parameters include: WBC-BF ( $10^3/\mu\text{L}$ ), RBC-BF ( $10^6/\mu\text{L}$ ), MN# ( $10^3/\mu\text{L}$ ), PMN# ( $10^3/\mu\text{L}$ ), MN% (%), PMN% (%), TC-BF# ( $10^3/\mu\text{L}$ )	XN CHECK BF is used for control and calibration verification of Sysmex XN (XN-10, XN-20) analyzers. It is not, however, intended for actual calibration of these analyzers. Assayed parameters are: WBC- BF ( $10^3/\mu\text{L}$ ), RBC-BF ( $10^6/\mu\text{L}$ ), MN# ( $10^3/\mu\text{L}$ ), PMN# ( $10^3/\mu\text{L}$ ), MN% (%), PMN% (%), TC-BF# ( $10^3/\mu\text{L}$ )
Open-vial stability	30 days	Same
Closed-vial stability	84 days	Same
Reagents	XN CHECK BF contains the following: stabilized red blood cell component(s) and stabilized white blood cell component(s) in a preservative medium.	Same
Storage conditions	2 - 8°C	Same

**K. Standard/Guidance Document Referenced (if applicable):**

CLSI H26-A2, Validation, Verification, and Quality Assurance of Automated Hematology Analyzers; Approved Standard-Second Edition

CLSI EP05-A2, Evaluation of Precision Performance of Quantitative Measurement Methods; Approved Guideline-Second Edition

**L. Test Principle:**

Bi-level XN CHECK™ BF was designed to evaluate the accuracy and precision of the Sysmex XN series (XN-10, XN-11, XN-20, XN-21) instruments.

**M. Performance Characteristics (if/when applicable):**

1. Analytical performance:

a. *Precision/Reproducibility:*

Precision performance studies were conducted at 2 different sites. Data were collected across 3 different Sysmex XN-21 analyzers throughout the product dating claim, with 3 separately manufactured lots of two levels of XN CHECK BF control material. Three operators performed 10 consecutive runs on each analyzer with

separate vials of control from each lot at the beginning and end of the product dating claim. The datasets collected across the 3 lots of XN CHECK BF illustrate consistent recovery across multiple instruments at multiple sites with the resulting data sets recovering within the parameter specific assay assignment ranges set forth for each measurand.

The acceptance criteria for the XN CHECK BF assayed parameters were based on a compilation of the CV% for each measurand over the data collected on 3 XN-21 instruments at 2 sites throughout the product dating claim, with the 3 separately manufactured lots of XN CHECK BF. The acceptance criteria was based on the data collected internally at Streck and external sites which takes into account inter-operator, inter-laboratory, and inter-instrument variability. The reported CV% for each measurand per level, per lot was deemed acceptable if less than the threshold value as reported in the XN CHECK BF CV% Summary Table.

Results show that the CV% values collected were within acceptable threshold values.

**XN-CHECK BF CV% Summary Table**

<b>XN-CHECK BF Level 1</b>							
Lot #	Measurand (%CV)						
	<b>WBC-BF</b>	<b>RBC-BF</b>	<b>MN#</b>	<b>PMN#</b>	<b>MN%</b>	<b>PMN%</b>	<b>TC-BF#</b>
3280	4.4807	3.9460	5.9163	5.6166	4.402	2.895	4.4807
3322	3.6548	4.4597	6.7422	5.3493	5.674	3.915	3.6548
3336	3.7443	5.0878	6.6383	5.2739	5.417	3.735	3.7443
CV% Acceptance Criteria	10.0	10.0	10.0	10.0	15.0	10.0	10.0

<b>XN-CHECK BF Level 2</b>							
Lot #	Measurand (%CV)						
	<b>WBC-BF</b>	<b>RBC- BF</b>	<b>MN#</b>	<b>PMN#</b>	<b>MN%</b>	<b>PMN%</b>	<b>TC-BF#</b>
3280	2.2505	2.4603	3.7223	3.3590	3.241	2.229	2.2505
3322	3.1141	4.2985	4.3791	4.0480	3.356	2.406	3.1141
3336	2.8845	3.8881	4.7677	4.3441	4.122	2.960	2.8845
CV% Acceptance Criteria	15.0	5.0	10.0	10.0	15.0	15.0	10.0

To illustrate the variance component estimates, an Analysis of Variance (ANOVA) method was used in data analysis as shown in tables below.

Module XN-21														
Level 1			Within-run		Between-run		Between-instrument		Between-lot		Between-site		Total	
Sample	N	Mean	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
WBC-BF	180	0.077	0.003	3.86	0.001	0.95	0.001	0.85	0.001	0.79	0.000	0.00	0.003	4.14
RBC-BF	180	0.026	0.001	2.95	0.001	2.19	0.001	1.94	0.000	0.00	0.001	3.35	0.001	5.34
MN#	180	0.031	0.002	6.36	0.000	0.00	0.000	0.00	0.000	0.00	0.001	1.89	0.002	6.64
PMN#	180	0.046	0.002	4.83	0.001	2.32	0.000	0.93	0.001	1.76	0.001	1.44	0.003	5.89
MN%	180	40.44	1.921	4.75	0.731	1.81	0.000	0.00	0.534	1.32	0.884	2.19	2.300	5.69
PMN%	180	59.56	1.921	3.22	0.731	1.23	0.000	0.00	0.534	0.90	0.884	1.48	2.300	3.86
TC-BF	180	0.077	0.003	3.86	0.001	0.95	0.001	0.85	0.001	0.79	0.000	0.00	0.003	4.14

Module XN-21														
Level 2			Within-run		Between-run		Between-instrument		Between-lot		Between-site		Total	
Sample	N	Mean	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV	SD	%CV
WBC-BF	180	0.307	0.007	2.26	0.005	1.69	0.000	0.15	0.004	1.32	0.002	0.52	0.010	3.16
RBC-BF	180	0.078	0.001	1.68	0.001	1.91	0.002	2.80	0.001	1.60	0.002	2.17	0.004	4.65
MN#	180	0.127	0.005	4.04	0.002	1.65	0.000	0.00	0.002	1.38	0.001	0.97	0.006	4.68
PMN#	180	0.180	0.006	3.07	0.004	2.24	0.000	0.19	0.003	1.89	0.004	1.97	0.008	4.68
MN%	180	41.43	1.319	3.18	0.552	1.33	0.000	0.00	0.522	1.26	0.769	1.86	1.705	4.12
PMN%	180	58.57	1.319	2.25	0.552	0.94	0.000	0.00	0.522	0.89	0.769	1.31	1.705	2.91
TC-BF	180	0.307	0.007	2.26	0.005	1.69	0.000	0.15	0.004	1.32	0.002	0.52	0.010	3.16

*b. Linearity/assay reportable range:*

Not applicable

*c. Traceability, Stability, Expected values (controls, calibrators, or methods):*

Value assignment:

Value assignment for XN-CHECK™ BF was based on data collected across 3 XN-21 instruments. Data was collected across three separately manufactured lots. A 10-run reproducibility study was executed for the bi-level control on each lot at the beginning and end of the product dating claim (n=60 per level). Three operators conducted the value assignment study.

Assay values were assigned to the parameters assayed on the XN-11/XN 21 based on a statistical analysis of the data collected externally and at Streck. The assay ranges assigned to each parameter were based on the data collected and the acceptance criteria takes into account inter-operator, inter-laboratory, and inter-instrument variability.

Open-vial stability:

The open-vial stability claim was verified on the XN-21 instrument. Open-vial stability testing was performed real-time for the 30-day open-vial stability claim throughout the stated product life.

Two vials of control per level from each lot were analyzed in duplicate over a period of 30 days (i.e., analysis performed on days 1, 31 and four intermediate testing days (days 7, 14, 21 and 28); (n=24)). All of the data for this study was collected internally at Streck utilizing one operator. Four data points were collected at each testing event. Throughout the collection of the open-vial stability data each vial of control was stored between 2° to 8° C and removed from the refrigerator for testing. After testing, the vial was returned to the refrigerator until the next testing event. CV% was used to generate acceptance criteria of the open-vial stability study. The CV% selected was based on a compilation of the CV% shown in the precision performance studies as well as the performance specifications of the XN-11/XN-21 instruments. Selection of the acceptance criteria was based on the data collected internally at Streck and external sites. It takes into account inter-operator, inter-laboratory, and inter-instrument variability. The reported CV% for each measurand per level, per lot was deemed acceptable if less than the threshold value as reported in the XN CHECK BF CV% Summary Table (above).

Results show that the CV% values collected were within acceptable threshold values.

#### Closed-vial stability:

The 84-day Closed-Vial Stability claim was verified on the XN-21 with all three lots of control material. Two vials of control per level from each reference lot were used at each testing interval for the study. A minimum of four data points were collected at each testing event over the 84-day closed-vial stability claim. Data was collected internally with one operator. All data were collected and analysis of the assayed parameters on the XN-11/21 analyzers was performed using CLSI EP5-A2 methods. For each measurand, on each lot, using one instrument, imprecision estimates were calculated for each level of the 3 separately manufactured lots.

CV% was used to generate acceptance criteria of the closed-vial stability study. The CV% selected was based on a compilation of the CV% shown in the precision performance studies. Selection of the acceptance criteria was based on the data collected internally at Streck and external sites. It takes into account inter-operator, inter-laboratory, and inter-instrument variability. The reported CV% for each measurand per level, per lot was deemed acceptable if less than the threshold value as reported in the XN CHECK BF CV% Summary Table above.

Results show that the CV% values collected were within acceptable threshold values.

Open- and closed-vial stability of XN-CHECK™ BF was assessed in terms of the measurand drift as suggested in the CLSI EP-25 Guideline. Scatter plots were provided with fitted linear regression lines and corresponding 95% confidence intervals. The acceptance criteria were based on a specific percentage of change from mean level at time 0. All parameters were within the draft acceptance limits for the target time durations for both open- and closed-vial stability.

Maximum Allowable Change for Stability		
Parameter	Level 1 or 2	Drift Acceptance Limit (% Change from Baseline)
WBC-BF	L1	± 20%
	L2	± 30%
RBC-BF	L1	± 20%
	L2	± 10%
MN#	L1	± 20%
	L2	± 20%
PMN#	L1	± 20%
	L2	± 20%
MN%	L1	± 30%
	L2	± 30%
PMN%	L1	± 20%
	L2	± 30%
TC-BF	L1	± 20%
	L2	± 20%

*d. Detection limit:*

Not applicable

*e. Analytical specificity:*

Not applicable

*f. Assay cut-off:*

Not applicable

2. Comparison studies:

*a. Method comparison with predicate device:*

Not applicable

*b. Matrix comparison:*

Not applicable

3. Clinical studies:

*a. Clinical Sensitivity:*

Not applicable

*b. Clinical specificity:*

Not applicable

*c. Other clinical supportive data (when a. and b. are not applicable):*

Not applicable

4. Clinical cut-off:

Not applicable

5. Expected values/Reference range:

The end-user is instructed to refer to the product assay sheet accompanying the product information sheet.

**N. Proposed Labeling:**

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

**O. Conclusion:**

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