

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

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

k071811

**B. Purpose for Submission:**

New Device

**C. Measurand:**

Ethyl Alcohol (Ethanol)

**D. Type of Test:**

Quantitative

**E. Applicant:**

Dade Behring, Inc.

**F. Proprietary and Established Names:**

Dimension® Ethyl Alcohol (ETOH) Flex® Reagent Cartridge

**G. Regulatory Information:**

Product Code	Classification	Regulation Section	Panel
DIC	Class II	21 CFR§ 862.3040	91-Toxicology

**H. Intended Use:**

1. Intended use(s):

See Indications for use below

2. Indication(s) for use:

The ETOH method is an in-vitro diagnostic test for the quantitative measurement of ethyl alcohol in human serum, plasma and urine. Ethyl alcohol test results may be used in the diagnosis and treatment of alcohol intoxication and poisoning.

3. Special conditions for use statement(s):

For prescription use only

4. Special instrument requirements:

Dimension® Clinical Chemistry System

**I. Device Description:**

The Dimension® ETOH Flex® reagent cartridge is prepackaged in-vitro diagnostic test method that is specifically designed to be used on the Dade Behring Dimension® Clinical Chemistry System. The reagents contained in the Dimension® ETOH Flex® reagent cartridge are: Reagent 1 which contains the buffering system and; Reagent 2 which contains alcohol dehydrogenase (ADH), the coenzyme nicotinamide adenine dinucleotide (NAD), buffer, preservatives and stabilizers.

**J. Substantial Equivalence Information:**

	<b>Dimension® ETOH Flex® reagent cartridge</b>	<b>Dimension® ALC Flex® reagent Cartridge (k904302)</b>	<b>Syva® Emit® II Plus Ethyl Alcohol Assay (k010960)</b>
<b>Similarities</b>			
Intended Use	The Dimension® ETOH Flex® reagent cartridge is an <i>in-vitro</i> diagnostic test for the quantitative measurement of ethyl alcohol (ethanol) in human serum, plasma, and urine. Ethyl alcohol test results may be used in the diagnosis and treatment of alcohol intoxication and poisoning.	The ALC method used in the Dimension® clinical chemistry system is an <i>in vitro</i> diagnostic test intended to measure ethyl alcohol in human serum and supernatants from precipitated whole blood and to qualitatively detect ethyl alcohol in urine. Ethyl alcohol test results may be used in the diagnosis and treatment of alcohol intoxication and poisoning.	The EMIT® II Plus Ethyl Alcohol Assay is intended for use in the quantitative analysis of ethyl alcohol (ethanol) in human urine, serum, or plasma.

	<b>Dimension® ETOH Flex® reagent cartridge</b>	<b>Dimension® ALC Flex® reagent Cartridge (k904302)</b>	<b>Syva® Emit® II Plus Ethyl Alcohol Assay (k010960)</b>
<b>Similarities</b>			
Matrix	Plasma, serum, and urine.	Serum, supernatants from precipitated whole blood and urine.	Plasma, serum, and urine.
Principle	The ETOH method is based on an enzymatic reaction.	The ethyl alcohol (ALC) method is a modification of the alcohol dehydrogenase (ADH) enzymatic procedure.	The Emit®II Plus Ethyl Alcohol Assay is based on an enzymatic reaction.
Measurement	Bichromatic Rate	Bichromatic Rate	Bichromatic Rate
<b>Differences</b>			
Measuring Range	3 - 300 mg/dL	0 - 300 mg/dL	10 - 600 mg/dL
Sample	4 uL	3 uL	4 uL

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

<b>STANDARDS</b>			
<b>Title and Reference Number</b>			
BSI BS EN 13640 :Stability Testing of In Vitro Diagnostic Reagents			
CLSI: Interference Testing in Clinical Chemistry; Approved Guideline (EP 7-A)			
CLSI: Method Comparison and Bias Estimation Using Patient Samples; Approved Guideline (EP09-A2)			
CLSI: Evaluation of Precision Performance of Clinical Chemistry Devices; Approved Guideline (EP5-A)			

<b>Other Standards</b>			
<b>GUIDANCE</b>			
<b>Document Title</b>	<b>Office</b>	<b>Division</b>	<b>Web Page</b>
Format for Traditional and Abbreviated 510(k)s - Guidance for Industry and FDA Staff	OIVD		<a href="http://www.fda.gov/cdrh/ode/guidance/1567.html">http://www.fda.gov/cdrh/ode/guidance/1567.html</a>
In Vitro Diagnostic Devices: Guidance for the Preparation of 510(k) Submissions	OCER		<a href="http://www.fda.gov/cdrh/manual/ivdmanul.html">http://www.fda.gov/cdrh/manual/ivdmanul.html</a>

## L. Test Principle:

The Ethyl Alcohol Assay is based on an enzymatic reaction. Reagent 1 contains the buffering system. Reagent 2 contains alcohol dehydrogenase (ADH), the coenzyme nicotinamide adenine dinucleotide (NAD), buffer, preservatives, and stabilizers. The ADH catalyzes the oxidation of ethyl alcohol to acetaldehyde. During this reaction, NAD is reduced to NADH. The absorbance due to NADH (proportional to the ETOH concentration) is determined using a two-filter (340-383 nm) bichromatic rate technique.

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

### 1. Analytical performance:

#### a. *Precision/Reproducibility:*

Precision studies were conducted by testing three levels of a commercially available control, serum pool, plasma pool and a urine pool. The samples were run in duplicate, twice a day for twenty days using one lot and one instrument. The results are presented in the table below:

	Low Control		Medium Control		High Control		Serum Pool		Plasma Pool		Urine Pool	
	SD	CV%	SD	CV%	SD	CV%	SD	CV%	SD	CV%	SD	CV%
Mean	38.99		98.30		254.92		102.15		245.88		101.22	
Within run	0.32	0.81	0.74	0.75	1.49	0.58	1.19	1.16	1.43	0.58	0.88	0.87
Within lab	1.00	2.57	2.41	2.45	5.37	2.11	1.38	1.35	2.96	1.20	2.28	2.25

#### b. *Linearity/assay reportable range:*

Linearity samples for plasma, serum and urine were prepared from two pools of each sample type with ethanol concentrations near the extremes of the assay range (low pool 0 mg/dL and high pool 345 mg/dL). The two pools were mixed to create 7 additional pools of intermediate concentrations. Five determinations of each pool were tested and a linear regression analysis was performed by the method of least squares. The instrument generates a flag which states "Above Assay Range" or "Below Assay Range". In addition to this, automatic dilutions are performed by the instrument for results that fall outside the assay range. Automatic dilutions are defined in the method parameters and cannot be changed by an operator.

The data provided in the table below and the detection limit (M.1.d. below) support the claimed measuring range of 3 - 300 mg/dL:

Sample	Serum		Plasma		Urine	
	Theor. ETOH mg/dL	Observed ETOH mg/dL	Theor. ETOH mg/dL	Observed ETOH mg/dL	Theor. ETOH mg/dL	Observed ETOH mg/dL
1	0.0	-0.6	0.0	-0.8	0.0	1.1
2	62.8	62.3	65.7	68.8	66.7	68.3
3	94.1	94.1	98.6	102.9	100.1	98.7
4	125.5	127.4	131.5	137.1	133.5	130.6
5	156.9	159.3	164.4	167.6	166.8	162.5
6	188.3	193.1	197.2	200.3	200.2	195.1
7	219.7	223.1	230.1	231.8	233.6	228.1
8	251.1	256.1	263.0	250.7	266.9	256.0
9	313.8	313.8	328.7	328.7	333.7	333.7
Slope	1.0121		0.9806		0.9794	
intercept	-0.0725		4.0756		0.3799	
r	0.999		0.999		0.999	

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

This device does not include calibrators. The sponsor recommends using calibrators by Dade Behring Inc. ALC Calibrator, Catalog Number DC37A cleared k904308.

d. *Detection limit:*

The detection limit represents the lowest concentration of analyte that can be detected with at least 95% probability. CLSI EP17-A was followed using 60 replicate determinations at two concentration levels to determine Limit of the Blank (LoB) and Limit of Detection (LoD). The LoD is 3 mg/dL.

e. *Analytical specificity:*

The Dimension ETOH assay was evaluated for interference according to CLSI EP7-A2. The following substances demonstrated no significant bias (defined as < 10 %).

Substance Tested	Substance concentration	Ethyl Alcohol mg/dL	Bias %
Hemoglobin (hemolysate)	1000 mg/dL/ Hemoglobin	100	<10
Bilirubin (unconjugated)	80 mg/dL	96	<10
Bilirubin (conjugated)	80 mg/dL	97	<10
Lipemia (Intralipid)	3000 mg/dL	102	<10

An extensive list of other compounds was evaluated for interference and found to have no significant interference or cross reactivity. A list of these compounds is present in the product labeling.

*f. Assay cut-off:*

Not applicable.

## 2. Comparison studies:

*a. Method comparison with predicate device:*

A split sample method comparison between the Dimension ETOH and Dimension ALC (serum) and Emit II Plus (urine). The assays were performed following CLSI EP9-A2. The correlations are as follows:

Matrix	n	Slope	Intercept	R	Device range (mg/dL)	Predicate range (mg/dL)
Urine	58	1.02	-0.18	1.000	4.8- 277.0	5.0-273.0
Serum	136	1.01	0.03	1.000	8.8 – 293.7	9.1- 290.2

*b. Matrix comparison:*

A serum / plasma comparison test was performed for the Dimension® ETOH Flex® assay. Forty samples ranging from 19.9 to 404.6 mg/dL were compared and yielded the following linear regression line.  $y = 1.01x - 0.28$  with a correlation constant of 0.998.

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 sponsor's expected value was established through literature. The pharmacological response to blood alcohol levels may vary from individual to individual. The fatal concentration has been reported to be greater than 400 mg/dL [86.8 mmol/L].

(Sunshine I., Methodology for Analytical Toxicology, CRC Press, Inc, Cleveland, OH, 1975 pp 152-153.)

Tietz NW, ed. Textbook of Clinical Chemistry. Philadelphia, PA: Elsevier-Saunders Co; 2006:1300-1301

**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.