

STANDARD Q

# COVID-19 IgM/IgG Duo

STANDARD™ Q COVID-19 IgM/IgG Duo Test

PLEASE READ CAREFULLY BEFORE YOU PERFORM THE TEST



## KIT CONTENTS



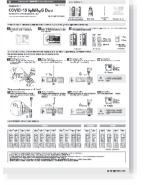
Test device (individually in a foil pouch with desiccant)



Buffer bottle



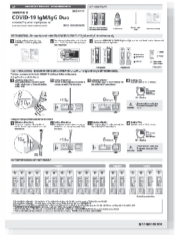
Capillary tube (10µl)



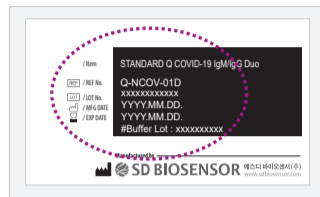
Instructions for use

## PREPARATION - Be sure to test both STANDARD Q COVID-19 IgM and IgG simultaneously.

**1** Carefully read instructions for using STANDARD Q COVID-19 IgM/IgG Duo Test.



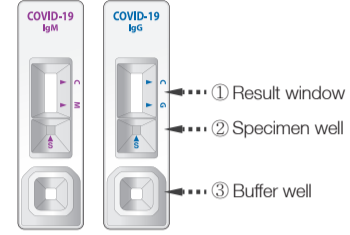
**2** Check the expiry date at the back of the foil pouch. Do not use the test device, if expiry date has passed.



**3** Open both STANDARD Q COVID-19 IgM and IgG pouches, and check the test devices and the desiccant in each pouches.



<Foil pouch>



<Test device>



Yellow: Valid  
Green: Invalid

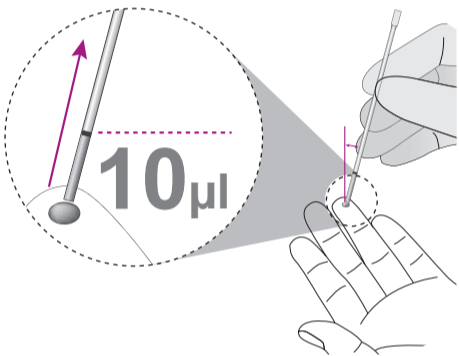
Yellow: Valid  
Green: Invalid

## TEST PROCEDURE - Be sure to test both STANDARD Q COVID-19 IgM and IgG simultaneously.

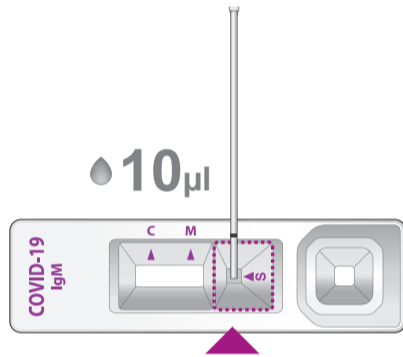
The test procedures for both COVID-19 IgM and IgG are the same.

### Using Capillary whole blood

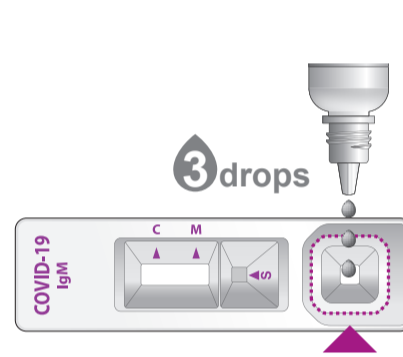
**1** Collecting of Specimen  
Using a capillary tube, collect the 10µl of capillary whole blood to the black line of the capillary tube.



**2** Adding of Specimen  
Add the collected capillary whole blood to the specimen well of the test device.



**3** Dropping of buffer  
Add 3 drops (90µl) of buffer vertically into the buffer well of the test device.



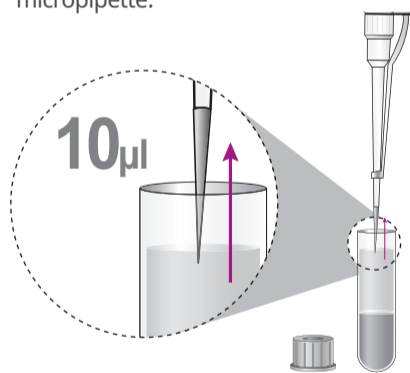
**4** Reading Time  
Read test result at 10~15 minutes.



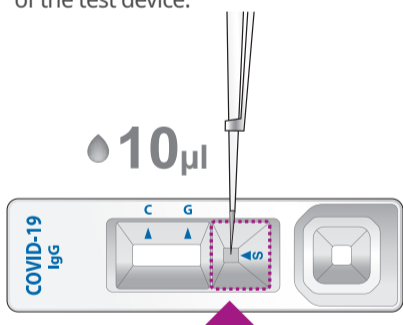
**CAUTION** Do not read test results after 15 minutes. It may give false results.

### Using serum/plasma/venous whole blood

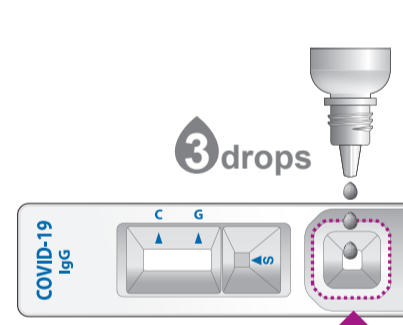
**1** Collecting of Specimen  
Using a micropipette, collect the 10µl of serum, plasma or venous whole blood with micropipette.



**2** Adding of Specimen  
Add the collected serum, plasma or venous whole blood to the specimen well of the test device.



**3** Dropping of buffer  
Add 3 drops (90µl) of buffer vertically into the buffer well of the test device.

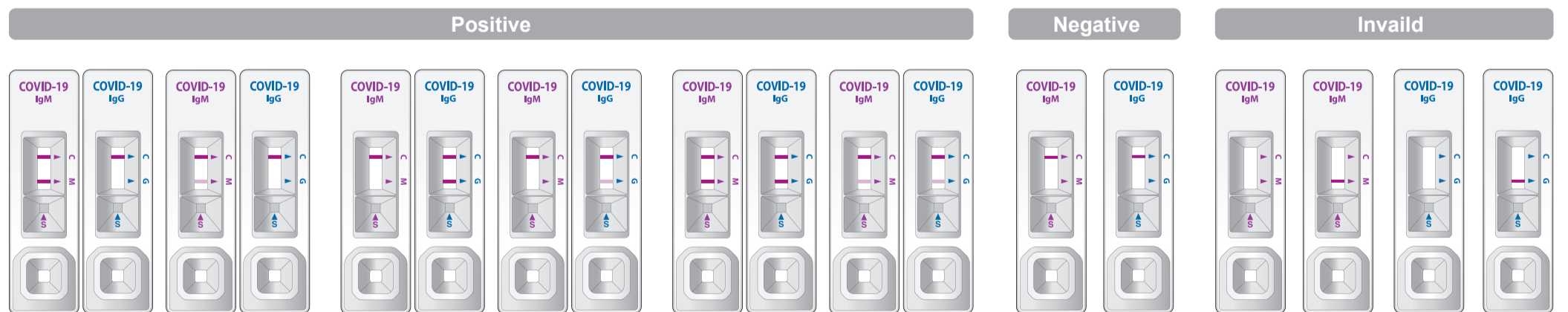


**4** Reading Time  
Read test result at 10~15 minutes.



**CAUTION** Do not read test results after 15 minutes. It may give false results.

## INTERPRETATION OF TEST RESULT



Re-test with a new test device.

- A colored band will appear in the top section of the result window to show that the test is working properly. This band is control line (C).
  - A colored band will appear in the lower section of the result window. These bands are test line of IgM/IgG (M, G).
  - Even if the control line is faint, or the test line isn't uniform, the test should be considered to be performed properly and the test result should be interpreted as a positive result.
- \* STANDARD Q COVID-19 IgM/IgG Duo Test may cross-react with antibody against SARS-Corona-1.
  - \* Results from antibody testing should not be used as the sole basis to diagnose or exclude SARS-CoV-2 infection or to inform infection status.
  - \* Positive results should be considered in conjunction with the clinical history, RT-PCR results and other data available.

## EXPLANATION AND SUMMARY

### [Introduction]

Coronavirus is a single-stranded positive-sense RNA virus with an envelope of about 80 to 120 nm in diameter. Its genetic material is the largest of all RNA viruses and is an important pathogen of many domestic animals, pets, and human diseases. It can cause a variety of acute and chronic diseases. Common signs of a person infected with a coronavirus include respiratory symptoms, fever, cough, shortness of breath, and dyspnea. In more severe cases, infection can cause pneumonia, severe acute respiratory syndrome, kidney failure, and even death. The 2019 new coronavirus, or "COVID-19", was discovered due to Wuhan Viral Pneumonia cases in 2019 and was named by the World Health Organization on January 12, 2020. WHO confirmed that COVID-19 can cause colds, the Middle East Respiratory Syndrome (MERS) and more serious diseases such as severe acute respiratory syndrome (SARS). This kit is helpful for the auxiliary diagnosis of coronavirus infection. The test results are for clinical reference only and cannot be used as a basis for confirming or excluding cases alone.

### [Intended use]

STANDARD Q COVID-19 IgM/IgG Duo Test is a rapid chromatographic immunoassay for the qualitative detection of specific antibodies to SARS-CoV-2 present in human serum, plasma or whole blood. This test is for in vitro professional diagnostic use and intended as an aid to diagnosis of SARS-CoV-2 infection in convalescent phase of patient with clinical symptoms with SARS-CoV-2 infection. It provides only an initial screening test result. More specific alternative diagnosis methods should be performed in order to obtain the confirmation of SARS-CoV-2 infection.

### [Test principle]

STANDARD Q COVID-19 IgM/IgG Duo Test has two pre-coated lines, "C" Control line, "G" Test line for the COVID-19 IgG Device and "C" Control line, "M" Test line for the COVID-19 IgM device on the surface of the nitrocellulose membrane. Both the control line and test line in the result window are not visible before applying any specimens. Goat polyclonal anti-mouse IgG antibody is coated on the control line region and SARS-CoV-2 recombinant protein is coated on the test line region. Monoclonal anti-human IgG antibody conjugated with colloidal gold particles are used as detectors for COVID-19 IgG Device and Monoclonal anti-human IgM antibody conjugated with colloidal gold particles are used as detectors for COVID-19 IgM Device. During the test, SARS-CoV-2 antibodies in the Specimen interact with Monoclonal anti-human IgG antibody conjugated with colloidal gold particles or Monoclonal anti-human IgM antibody conjugated with colloidal gold particles making antibody-antibody gold particle complex. This complex migrates on the membrane via capillary action until the test line, where it will be captured by the SARS-CoV-2 recombinant protein. A violet test line would be visible in the result window if SARS-CoV-2 antibodies are present in the Specimen. The intensity of violet test line will vary depending upon the amount SARS-CoV-2 antibodies present in the Specimen. If SARS-CoV-2 antibodies are not present in the Specimen, then no color appears in the test line. The control line is used for procedural control, and should always appear if the test procedure is performed properly and the test reagents of the control line are working.

### [Kit contents]

- ① Test device (individually in a foil pouch with desiccant)
- ② Buffer bottle
- ③ Capillary tube (10µl)
- ④ Instructions for use

## KIT STORAGE AND STABILITY

Store the kit at room temperature, 2-30°C / 36-86°F, out of direct sunlight. Kit materials are stable until the expiration date printed on the outer box. Do not freeze the kit.

## WARNINGS AND PRECAUTIONS

1. Do not re-use the test kit.
2. Do not use the test kit if the pouch is damaged or the seal is broken.
3. Do not use the buffer of another lot.
4. Do not smoke, drink or eat while handling specimen.
5. Wear personal protective equipment, such as gloves and lab coats when handling kit reagents. Wash hands thoroughly after the tests are done.
6. Clean up spills thoroughly using an appropriate disinfectant.
7. Handle all specimens as if they contain infectious agents.
8. Observe established precautions against microbiological hazards throughout testing procedures.
9. Dispose of all specimens and materials used to perform the test as bio-hazard waste. Laboratory chemical and biohazard wastes must be handled and discarded in accordance with all local, state, and national regulations.
10. Desiccant in foil pouch is to absorb moisture and keep humidity from affecting products. If the moisture indicating desiccant beads change from yellow to green, the test device in the pouch should be discarded.
11. Good laboratory practice recommends the use of the control materials. Users should follow the appropriate federal state, and local guidelines concerning the frequency of assaying external quality control materials.

## SPECIMEN COLLECTION AND PREPARATION

### [Serum]

1. Collect the whole blood into the commercially available plain tube, NOT containing anti-coagulants such as heparin, EDTA, Sodium citrate by venipuncture and leave to settle for 30 minutes for blood coagulation and then centrifuge blood to get serum specimen of supernatant.
2. If serum in the plain tube is stored in a refrigerator at 2-8°C/36-46°F, the specimen can be used for testing within 1 week after collection. Using the specimen in the long-term keeping more than 1 week can cause non-specific reaction. For prolonged storage, it should be at below -40°C/-40°F.
3. They should be brought to room temperature prior to use.

### [Plasma]

1. Collect the venous blood into the commercially available anti-coagulant tube such as heparin, EDTA, Sodium citrate by venipuncture and centrifuge blood to get plasma specimen.
2. If plasma in an anti-coagulant tube is stored in a refrigerator at 2-8°C/36-46°F, the specimen can be used for testing within 1 week after collection. Using the specimen in the long-term keeping more than 1 week can cause non-specific reaction. For prolonged storage, it should be at below -40°C/-40°F.
3. They should be brought to room temperature prior to use.

### [Whole blood]

#### • Capillary whole blood

1. Capillary whole blood should be collected aseptically by fingertip.
2. Clean the area to be lanced with an alcohol swab.
3. Squeeze the end of the fingertip and pierce with a sterile lancet.
4. Using a capillary tube, collect the 10µl of capillary whole blood to the black line of the capillary tube.
5. The capillary whole blood must be tested immediately after collection.

#### • Venous whole blood

1. Collect the venous whole blood into the commercially available anti-coagulant tube such as heparin, EDTA, Sodium citrate by venipuncture.
2. If venous whole blood in an anti-coagulant tube is stored in a refrigerator at 2-8°C/36-46°F, the specimen can be used for testing within 1-2 days after collection.
3. Do not use hemolyzed blood Specimens.



- As known relevant interference, hemolytic Specimen, rheumatoid factors-contained Specimen and lipemic, icteric Specimen can lead to impair the test results.
- Use separate disposable materials for each Specimen in order to avoid cross-contamination which can cause erroneous results.

## PERFORMANCE CHARACTERISTICS

### [Clinical evaluation]

Test were performed according to instructions for use of 'STANDARD Q COVID-19 IgM/IgG Duo Test' with residual serum from 33 positive patients confirmed by real-time PCR (2019-nCoV Real-time PCR kit) method and 30 healthy donors.

#### • Positive specimens

No.	Onset of Symptom date	Confirmation Test date	Blood collection date	Days after symptom onset	STANDARD Q COVID-19 IgM/IgG Duo Test result	
					IgM	IgG
1	Unknown	Feb. 09, 2020	Feb. 17, 2020	Unknown	Positive	Pos weak
2	Unknown	Jan. 30, 2020	Feb. 17, 2020	Unknown	Positive	Positive
3	Unknown	Feb. 02, 2020	Feb. 17, 2020	Unknown	Positive	Positive
4	Feb. 15, 2020	Feb. 23, 2020	Feb. 23, 2020	8	Pos weak	Pos weak
5	Feb. 15, 2020	Feb. 23, 2020	Feb. 27, 2020	12	Pos weak	Positive
6	Feb. 15, 2020	Feb. 23, 2020	Mar. 03, 2020	17	Pos weak	Positive
7	Feb. 06, 2020	Feb. 09, 2020	Feb. 13, 2020	7	Negative	Negative
8	Feb. 06, 2020	Feb. 09, 2020	Feb. 21, 2020	15	Pos weak	Positive
9	Feb. 06, 2020	Feb. 09, 2020	Mar. 03, 2020	26	Pos weak	Positive
10	Feb. 18, 2020	Feb. 19, 2020	Feb. 19, 2020	1	Negative	Negative
11	Feb. 18, 2020	Feb. 19, 2020	Feb. 26, 2020	8	Negative	Positive
12	Feb. 19, 2020	Feb. 19, 2020	Feb. 23, 2020	4	Negative	Negative
13	Feb. 15, 2020	Feb. 23, 2020	Feb. 23, 2020	8	Positive	Positive
14	Feb. 6, 2020	Feb. 9, 2020	Mar. 03, 2020	26	Positive	Positive
15	Jan. 30, 2020	Feb. 1, 2020	Feb. 09, 2020	10	Negative	Negative
16	Jan. 25, 2020	Feb. 1, 2020	Feb. 12, 2020	18	Positive	Positive
17	Feb. 25, 2020	Feb. 25, 2020	Mar. 03, 2020	7	Negative	Positive
18	Feb. 15, 2020	Feb. 23, 2020	Feb. 25, 2020	10	Positive	Positive
19	Feb. 6, 2020	Feb. 9, 2020	Feb. 21, 2020	15	Positive	Positive
20	Jan. 30, 2020	Feb. 1, 2020	Feb. 13, 2020	14	Positive	Positive
21	Jan. 25, 2020	Feb. 1, 2020	Feb. 09, 2020	15	Trace	Positive
22	Feb. 15, 2020	Feb. 23, 2020	Feb. 26, 2020	11	Positive	Positive
23	Feb. 6, 2020	Feb. 9, 2020	Feb. 17, 2020	11	Positive	Positive
24	Jan. 30, 2020	Feb. 1, 2020	Feb. 06, 2020	7	Negative	Negative
25	Feb. 18, 2020	Feb. 21, 2020	Feb. 26, 2020	8	Negative	Negative
26	Feb. 15, 2020	Feb. 23, 2020	Feb. 27, 2020	12	Positive	Positive
27	Feb. 6, 2020	Feb. 9, 2020	Mar. 01, 2020	24	Positive	Positive
28	Jan. 25, 2020	Feb. 1, 2020	Feb. 17, 2020	23	Positive	Positive
29	Feb. 25, 2020	Feb. 25, 2020	Mar. 02, 2020	6	Negative	Positive
30	Feb. 15, 2020	Feb. 23, 2020	Feb. 29, 2020	14	Positive	Positive
31	Feb. 22, 2020	Feb. 24, 2020	Mar. 06, 2020	13	Negative	Positive
32	Feb. 4, 2020	Feb. 4, 2020	Feb. 20, 2020	16	Negative	Positive
33	Feb. 4, 2020	Feb. 4, 2020	Feb. 20, 2020	16	Negative	Positive

#### • Negative specimens

No.	Blood collection date	STANDARD Q COVID-19 IgM/IgG Duo Test result	
		IgM	IgG
1	Mar. 6, 2020	Negative	Negative
2	Feb. 20, 2020	Negative	Negative
3	Mar. 4, 2020	Negative	Negative
4	Mar. 5, 2020	Negative	Negative
5	Mar. 9, 2020	Negative	Negative
6	Mar. 7, 2020	Negative	Negative
7	Mar. 11, 2020	Negative	Negative
8	Mar. 5, 2020	Negative	Negative
9	Mar. 11, 2020	Negative	Negative
10	Mar. 7, 2020	Negative	Negative
11	Mar. 9, 2020	Negative	Negative
12	Mar. 6, 2020	Negative	Negative
13	Mar. 4, 2020	Negative	Negative
14	Feb. 20, 2020	Negative	Negative
15	Feb. 19, 2020	Negative	Negative

No.	Blood collection date	STANDARD Q COVID-19 IgM/IgG Duo Test result	
		IgM	IgG
16	Feb. 18, 2020	Negative	Negative
17	Feb. 25, 2020	Negative	Negative
18	Feb. 20, 2020	Negative	Negative
19	Feb. 25, 2020	Negative	Pos weak
20	Feb. 17, 2020	Negative	Negative
21	Feb. 20, 2020	Negative	Negative
22	Feb. 20, 2020	Negative	Negative
23	Feb. 20, 2020	Negative	Negative
24	Feb. 19, 2020	Negative	Negative
25	Feb. 13, 2020	Negative	Negative
26	Feb. 10, 2020	Negative	Negative
27	Feb. 10, 2020	Negative	Negative
28	Feb. 2, 2020	Negative	Negative
29	Feb. 12, 2020	Negative	Negative
30	Feb. 6, 2020	Negative	Negative

- Due to the differing inter-patient time response to the virus, any individual positive result of IgM or IgG should be read as a positive result for SARS-CoV-2 and the combined positive test results are used to calculate total Duo test sensitivity.

Combined positive test results are used to calculate total Duo test sensitivity				
STANDARD Q COVID-19 IgM+IgG		PCR		Total
		Positive	Negative	
		Positive	27	
Negative	6	29	35	
Total		33	30	63
Sensitivity : 81.8%, Specificity : 96.6%				

- Test results of the specimens collected after 8 days and 10 days from the date of symptom onset below.

Test result of the specimens collected after 8 days from the date of symptom onset				
STANDARD Q COVID-19 IgM+IgG		PCR		Total
		Positive	Negative	
		Positive	25	
Negative	2	29	31	
Total		27	30	57
Sensitivity : 92.6%, Specificity : 96.6%				

Test result of the specimens collected after 10 days from the date of symptom onset				
STANDARD Q COVID-19 IgM+IgG		PCR		Total
		Positive	Negative	
		Positive	23	
Negative	1	29	30	
Total		24	30	54
Sensitivity : 95.8%, Specificity : 96.6%				

- Based on result of test with positive specimens, it was found that IgM antibody diagnosis with STANDARD Q COVID-19 IgM/IgG Duo Test was effective for diagnosis COVID-19 from the time when after about 7 days from the date of symptom onset. And STANDARD Q COVID-19 IgM/IgG Duo Test showed a high specificity in the test with negative specimens.

## ANALYTICAL PERFORMANCE

1. **Limit of Detection:** IgM-0.02 mg/ml, IgG-0.02 mg/ml
2. **Cross-Reactivity:** No cross-reactivity for HIV positive plasma, Japanese Encephalitis positive plasma, Zika virus positive plasma, Chikungunya positive plasma, Dengue IgM positive plasma, Salmonella typhi IgM positive plasma, Rubella IgM, CMV IgG/IgM, Tick borne encephalitis IgM positive plasma, West Nile Virus positive plasma, Treponema palladium, HAV IgM positive plasma, HAV IgG positive plasma, HBV Ab positive plasma, HCV Ab positive plasma, Influenza vaccine positive plasma, Leishmania positive plasma, Brucella IgM positive plasma, Chagas positive plasma, Toxoplasma positive plasma and Filariasis positive plasma for IgM and IgG
3. **Interference study:** No interference for Respiratory Specimens (Mucin: bovine submaxillary gland type I-S, Blood (human), EDTA anticoagulated, Biotin), Nasal sprays (Neo-Synephrine, Afrin Nasal Spray, Saline Nasal Spray), Homeopathic allergy relief medicine (Homeopathic Zicam Allergy Relief Nasal Gel, Sodium Cromoglycate, Olopatadine Hydrochloride), Anti-viral drugs (Zanamivir, Oseltamivir, Artemether-lumefantrine, Doxycycline hyclate, Quinine, Lamivudine, Ribavirin, Daclatasvir), Anti-inflammatory medication (Acetaminophen, Acetylsalicylic acid, Ibuprofen), Antibiotic (Mupirocin, Tobramycin, Erythromycin, Ciprofloxacin), Human anti-mouse antibody, Pregnant woman, Elevated levels of C-reactive protein for IgM and IgG
4. **High-dose Hook Effect:** No hook effect at the concentration of 1.25 mg/ml for IgM and 0.3 mg/ml for IgG
5. **Matrix Equivalency:** The difference of Matrix (Capillary whole blood, Venous whole blood, Plasma, Serum) and anticoagulant (EDTA, Heparin, Sodium citrate) does not affect the result.

Sort	Matrix	Anticoagulant	Spiked Concentration	Agreement to expected result	
COVID-19 IgG antibody spiked	Serum	NA	0.04 mg/ml	100%(25/25)	
		Plasma	Heparin	0.04 mg/ml	100%(25/25)
	EDTA		0.04 mg/ml	100%(25/25)	
	Venous whole blood		Sodium Citrate	0.04 mg/ml	100%(25/25)
			Heparin	0.04 mg/ml	100%(25/25)
	COVID-19 IgM antibody spiked	Serum	NA	0.04 mg/ml	100%(25/25)
Plasma			Heparin	0.04 mg/ml	100%(25/25)
		EDTA	0.04 mg/ml	100%(25/25)	
		Venous whole blood	Sodium Citrate	0.04 mg/ml	100%(25/25)
			Heparin	0.04 mg/ml	100%(25/25)
N/A		Serum	NA	N/A	100%(25/25)
	Plasma		Heparin	N/A	100%(25/25)
		EDTA	N/A	100%(25/25)	
		Venous whole blood	Sodium Citrate	N/A	100%(25/25)
			Heparin	N/A	100%(25/25)
	Capillary whole blood	EDTA	0.04 mg/ml	100%(25/25)	
EDTA		N/A	100%(25/25)		

6. **Stability schedule for 24months of claimed shelf life**
  - 1) Accelerated Aging Test: February, 2020 – August, 2020 (for 19 weeks)
  - 2) Real time stability Test: February, 2020 – May, 2022 (for 26 months)

## LIMITATION OF TEST

1. The test procedure, precautions and interpretation of results for this test must be followed strictly when testing.
2. This test detects the presence of SARS-CoV-2 IgM/IgG in the specimen and should not be used as the sole criteria for the diagnosis of SARS-CoV-2 infection.
3. Test results must be considered with other clinical data available to the physician.
4. For more accuracy of immune status, additional follow-up testing using other laboratory methods is recommended.
5. Neither the quantitative value nor the rate anti-SARS-CoV-2 IgM/IgG concentration can be determined by this qualitative test.
6. Failure to follow the test procedure and interpretation of test results may adversely affect test performance and/or produce invalid results.

## NOTIFICATION FOR COVID-19 ANTIBODY TESTS

1. This test has not been reviewed by the FDA.
2. Negative results do not rule out SARS-CoV-2 infection, particularly in those who have been in contact with the virus. Follow-up testing with a molecular diagnostic should be considered to rule out infection in these individuals.
3. Results from antibody testing should not be used as the sole basis to diagnose or exclude SARS-CoV-2 infection or to inform infection status.
4. Positive results may be due to past or present infection with non-SARS-CoV-2 coronavirus strains, such as coronavirus HKU1, NL63, OC43, or 229E or past or present infection with SARS virus (no. 6).
5. Not for the screening of donated blood.
6. The test procedure should be conducted in ambient temperature and pressure.
7. Results of these tests should be appropriately recorded in a test report.

## BIBLIOGRAPHY

1. Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected. Interim guidance. WHO.2020
2. Diagnostic detection of Wuhan coronavirus 2019 by real-time RT-PCR.2020
3. Diagnosis and treatment of pneumonia caused by new coronavirus (trial version 4) National Health Commission. 2020



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