WHO Prequalification of In Vitro Diagnostics
PUBLIC REPORT

Product: One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag
WHO reference number: PQDx 0330-074-00

One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag with product code **MHLRPD-02**, **MHLRPD-03, MHLRPD-04, and MHLRPD-05** manufactured by **Meril Diagnostics Pvt. Ltd.**, **CE mark regulatory version**, was accepted for the WHO list of prequalified in vitro diagnostics and was listed on 25 August 2020.

Summary of WHO prequalification assessment for One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag

	Date	Outcome
Prequalification listing	25 August 2020	listed
Dossier assessment	25 June 2020	MR
Site inspection(s) of quality management system	19-21 June 2023	MR
Product performance evaluation	2018	MR

MR: Meets Requirements

Report amendments and/or product changes

This public report has since been amended. Amendments may have arisen because of changes to the prequalified product for which WHO has been notified and has undertaken a review. Amendments to the report are summarized in the following table, and details of each amendment are provided below.

Version	Summary of amendment	Date of report amendment
2.0	Change of telephone number and fax number of the manufacturer on the labelling of MERISCREEN Malaria Pf/Pan Ag. Change of Regulatory Version of the prequalified product (30 T/kit) from Rest of the world (ROW) to CE marked version. Addition of new pack sizes 10 T/kit, 25 T/kit and 50 T/kit (CE-marked).	3 March 2022
3.0	Changed the specimen transfer device from the Sample loop to the Inverted cup.	24 July 2024.

Intended use:

According to the claim of intended use from Meril Diagnostics Pvt. Ltd. "*MERISCREEN Malaria Pf/Pan Ag test kit is an in-vitro diagnostic immunochromatographic assay for the qualitative detection of infection by Plasmodium falciparum (through P. falciparum-specific HRP2 antigens) and P. falciparum, P. vivax, P. malariae, P. ovale (through pan-pLDH antigens) in human capillary and/or venous whole blood specimens. It does not assess parasite densities.*
The assay is intended for trained users (in either laboratory or point-of-care settings) and for the diagnosis of malaria infection in symptomatic patients Note: Malaria RDTs can give positive results after successful anti-malarial treatment. Therefore, MERISCREEN Malaria Pf/Pan Ag test kit is not recommended for monitoring response to anti-malarial treatment".

Assay description:

According to the claim of assay description from **Meril Diagnostics Pvt. Ltd.** "[One Step test for Malaria Pf/Pan Ag] *MERISCREEN Malaria Pf/Pan Ag Test utilizes the principle of Immunochromatography in which nitrocellulose membrane is pre-coated with one monoclonal antibody (test line Pf) specific to Histidine-Rich Protein 2 (Pf-HRP2) of the Plasmodium falciparum and one monoclonal antibody (test line Pan) specific to lactate dehydrogenase of Plasmodium species (Pan-pLDH). Thus, the following Plasmodium antigens are detected in this test:*

- *Histidine rich protein 2 specific for P. falciparum (Pf-HRP2)*
- *Plasmodium lactate dehydrogenase common human Plasmodium species (P. falciparum, P. vivax, P. ovale & P. malariae) (Pan-pLDH)*

The cassette contains a test strip pre-coated with capture antibodies."

Test kit contents

Component	Multi kit 30 tests/kit (product code MHLRPD-02)	Multi kit 10 tests/kit (product code MHLRPD-03)	Multi kit 25 tests/kit (product code MHLRPD-04)	Multi kit 50 tests/kit (product code MHLRPD-05)
Test strip in test device packed in an individual pouch containing activated silica	30	10	25	50
Specimen transfer devices (Inverted cups)-5µL	30 × 1 × 5 µL	10 × 1 × 5 µL	25 × 1 × 5 µL	50 × 1 × 5 µL
Assay buffer (protein stabilizers, detergent, and preservatives)	2 x 3.0 ml	1 x 3.0 ml	2 x 3.0 ml	4 x 3.0 ml
Lancet	30	10	25	50
Alcohol swabs	30	10	25	50

Product insert	1	1	1	1

Items required but not provided

Item	Description
Consumables: Disposable micropipette tips Venipuncture blood collection kit Additional alcohol swabs Additional sterile lancets	NA
Durables: Biohazard waste container	NA
Equipment: Calibrated micropipette Timer	Micropipette should be capable to deliver 5µl of specimen

Storage

The test kit should be stored at 1 to 40 °C.

Shelf-life upon manufacture

24 months.

Warnings/limitations

Refer to current version of manufacturer's instructions for use.

Prioritization for prequalification

Based on the established criteria for acceptance in the WHO product testing of malaria RDTs Round 8 [1], One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag was given priority for WHO prequalification assessment.

Dossier assessment

Meril Diagnostics Pvt. Ltd. submitted a product dossier for One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag as per the "*Instructions for compilation of a product dossier*" (PQDx_018 version 3). The information (data and documentation) submitted in the product dossier was reviewed by WHO staff and external technical experts (assessors) appointed by WHO.

[1] https://www.who.int/malaria/publications/atoz/9789241514965/en/

The manufacturer's responses to the nonconformities found during dossier screening and assessment findings were accepted on 25 June 2020.

Based on the product dossier screening and assessment findings, the product dossier for One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag meets WHO prequalification requirements.

Manufacturing site inspection

A desk assessment of **Meril Diagnostics Pvt. Ltd** located on the second floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg, Chala, Vapi 396191, Gujarat, India, was conducted between 19-21 June 2023. At the time of considering the product application for Prequalification, the Manufacturer of the product had a well-established quality management system and manufacturing practices in place that would support the manufacture of the product of consistent quality. Routine inspections of the Manufacturer will be conducted with copies of these WHO Public Inspection Reports (WHOPIRs) published on the WHO Prequalification web page as per Resolution WHA57.14 of the World Health Assembly. To note that a WHOPIR reflects the information on the most current inspection performed at a manufacturing site for in vitro diagnostic products and gives a summary of the inspection findings.

Information on the most current inspection can be found at:

https://extranet.who.int/pqweb/vitro-diagnostics/who-public-inspection-reports

All published WHOPIRs are with the agreement of the manufacturer.

Product performance evaluation

One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag was evaluated in the eighth[2] round of WHO product testing of RDTs for malaria antigen detection, which was completed in 2018.

One Step test for Malaria Pf/Pan Ag MERISCREEN Malaria Pf/Pan Ag was evaluated against a *Plasmodium falciparum* cultured line panel, *P. falciparum wild type* parasite panel, *P. vivax* wild type parasite panel and a *P. falciparum* and *P.vivax* negative panel.

[2] https://www.who.int/publications/i/item/9789241514965

Performance characteristics		
	P. falciparum	***P. vivax***
Panel detection score at 200 parasites/µL (Pf N=100) (Pv N=35)	83	100
False-positive rate on *P. falciparum* and *P. vivax* panels at 200 parasites/ µL (Pf N=400) (v N=140)	1.3	0
False positive rate among clean negatives % (N= 208)	1.4	
Invalid rate % (N= 1210)	0.1	
Inter-reader variability* %	Not applicable	
Lowest concentration of HRP2/pLDH detected using the 1st WHO International standard for Pf antigens (NIBSC code: 16/376)*	Not applicable	

** Not applicable for assays evaluated in WHO product testing of RDTs for malaria antigen detection*

Operational characteristics and ease of use

This assay does not require laboratory equipment and can be performed in laboratories with limited facilities or in non-laboratory settings.

The assay was found easy to use by the operators performing the evaluation.

Key operational characteristics	
Number of steps*	2 steps in total
Time to result.	20 minutes
Endpoint stability (interval)	10 minutes (the test can be read between 20 and 30 minutes after the addition of diluent)
Internal QC	The test has a control line. The control line indicates the correct migration of the diluent. The control line does not indicate: • That the correct specimen type was used,

	• That the correct order of procedure was followed, • That the correct amount of specimen was added, • That the correct amount of diluent was added, • That the correct reading time was respected.

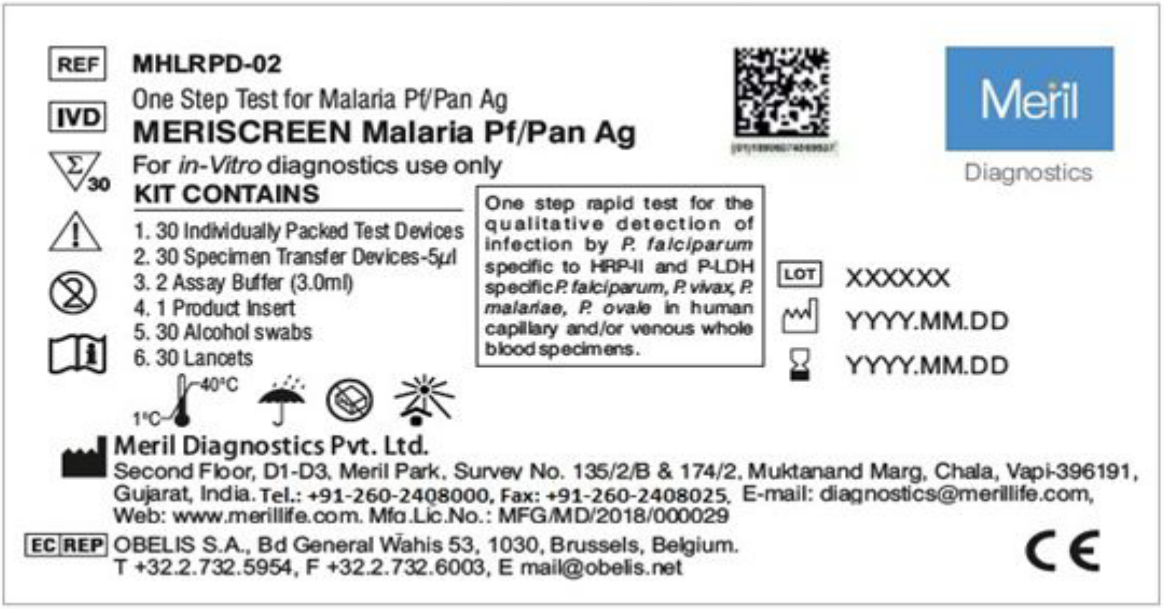
** Definition: each action required to obtain a result (excluding specimen collection, device preparation – opening the pouch), e.g. for RDTs: add specimen, add buffer (2 steps).*

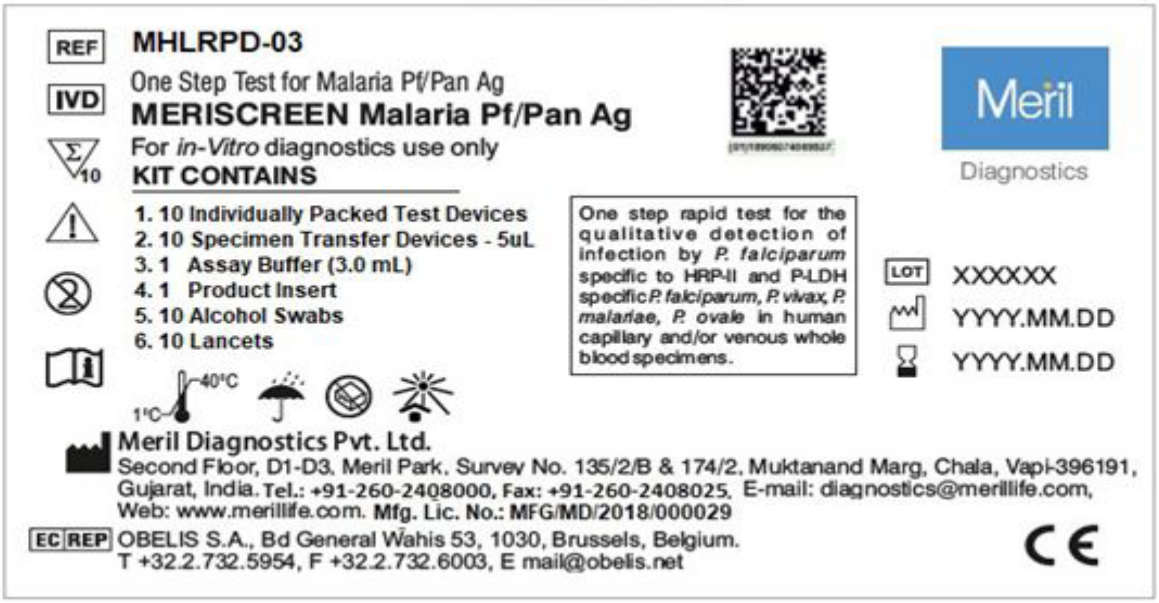
Labelling

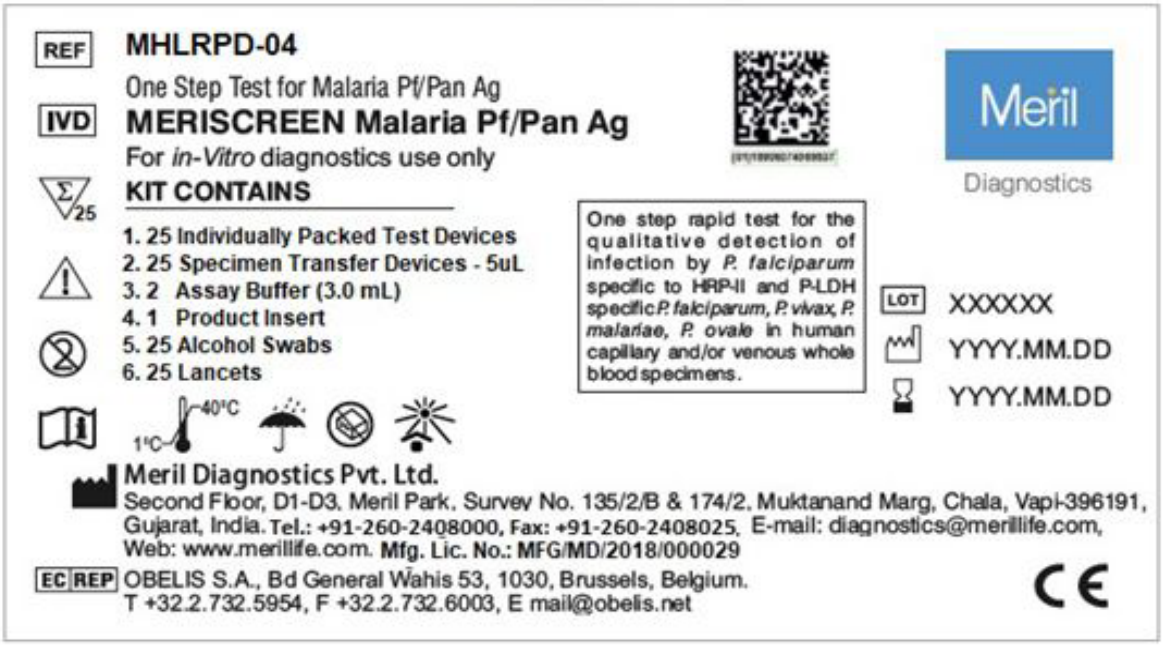
1. **Labels**
2. **Instructions for use**

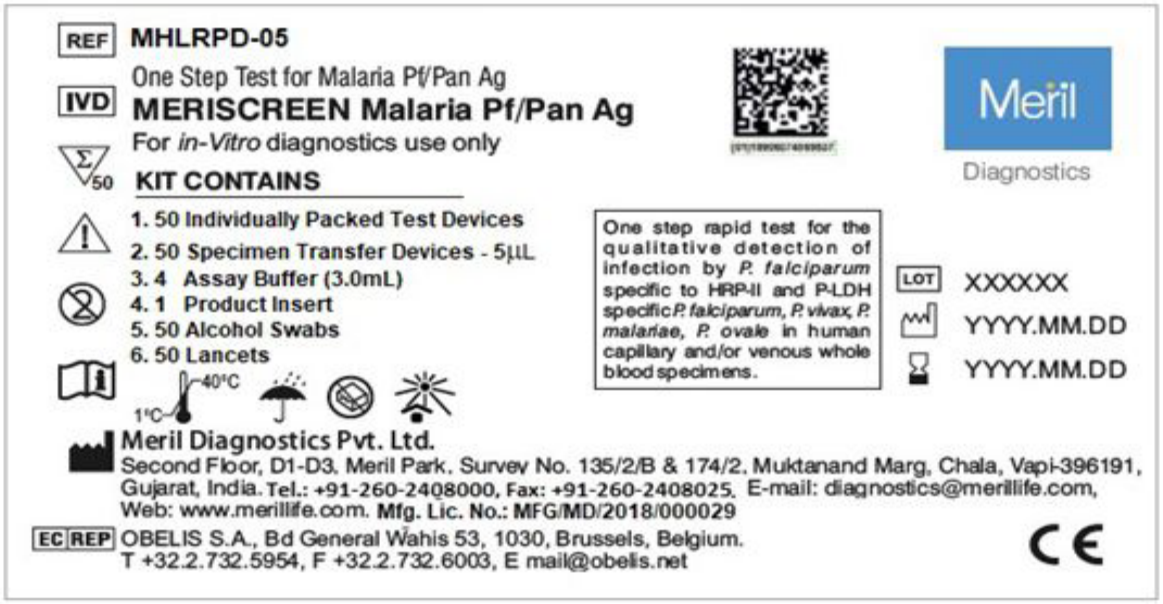
1. Labels

1.1 Kit box label






REF
MHLRPD-04
One Step Test for Malaria Pf/Pan Ag
IVD
MERISCREEN Malaria Pf/Pan Ag
For in-Vitro diagnostics use only
Σ 25
KIT CONTAINS
1. 25 Individually Packed Test Devices
2. 25 Specimen Transfer Devices - 5uL
3. 2 Assay Buffer (3.0 mL)
4. 1 Product Insert
5. 25 Alcohol Swabs
6. 25 Lancets
1°C
40°C
One step rapid test for the qualitative detection of infection by P. falciparum specific to HRP-II and P-LDH specific P. falciparum, P. vivax, P. malariae, P. ovale in human capillary and/or venous whole blood specimens.
Meril
Diagnostics
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
Second Floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg, Chala, Vapi-396191, Gujarat, India. Tel.: +91-260-2408000, Fax: +91-260-2408025, E-mail: diagnostics@merillife.com, Web: www.merillife.com. Mfg. Lic. No.: MFG/MD/2018/000029
EC REP OBELIS S.A., Bd General Wahis 53, 1030, Brussels, Belgium.
T +32.2.732.5954, F +32.2.732.6003, E mail@obelis.net
CE


REF
MHLRPD-05
One Step Test for Malaria Pf/Pan Ag
IVD
MERISCREEN Malaria Pf/Pan Ag
For in-Vitro diagnostics use only
Σ 50
KIT CONTAINS
1. 50 Individually Packed Test Devices
2. 50 Specimen Transfer Devices - 5µL
3. 4 Assay Buffer (3.0mL)
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5. 50 Alcohol Swabs
6. 50 Lancets
1°C
40°C
One step rapid test for the qualitative detection of infection by P. falciparum specific to HRP-II and P-LDH specific P. falciparum, P. vivax, P. malariae, P. ovale in human capillary and/or venous whole blood specimens.
Meril
Diagnostics
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
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CE

1.2 Pouch label


REF
MHLRPD-04
IVD
One Step Test for Malaria Pf/Pan Ag
MERISCREEN Malaria Pf/Pan Ag
For in-Vitro diagnostics use only
Meril
Diagnostics
Store at 1°C - 40°C
Do not open the foil pouch until it attains room temperature
1°C
40°C
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
Second Floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg, Chala, Vapi-396191, Gujarat, India. Tel.: +91-260-2408000, Fax: +91-260-2408025, E-mail: diagnostics@merillife.com, Web: www.merillife.com. Mfg. Lic. No.: MFG/MD/2018/000029
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CE


REF
MHLRPD-05
IVD
One Step Test for Malaria Pf/Pan Ag
MERISCREEN Malaria Pf/Pan Ag
For in-Vitro diagnostics use only
Meril
Diagnostics
Store at 1°C - 40°C
Do not open the foil pouch until it attains room temperature
1°C
40°C
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
Second Floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg, Chala, Vapi-396191, Gujarat, India. Tel.: +91-260-2408000, Fax: +91-260-2408025, E-mail: diagnostics@merillife.com, Web: www.merillife.com. Mfg. Lic. No.: MFG/MD/2018/000029
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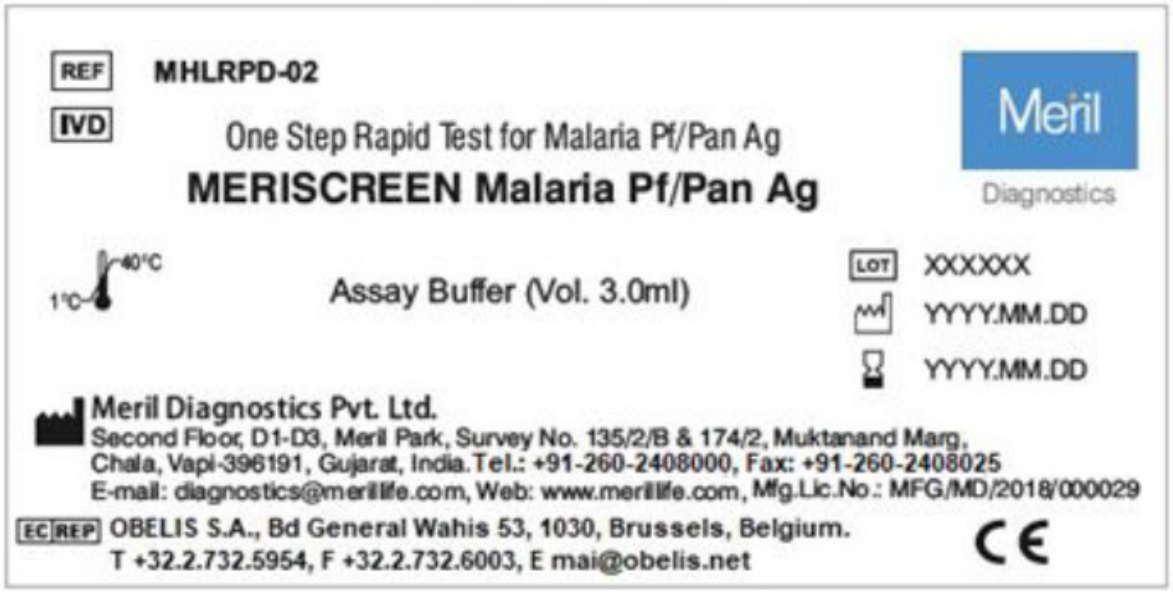
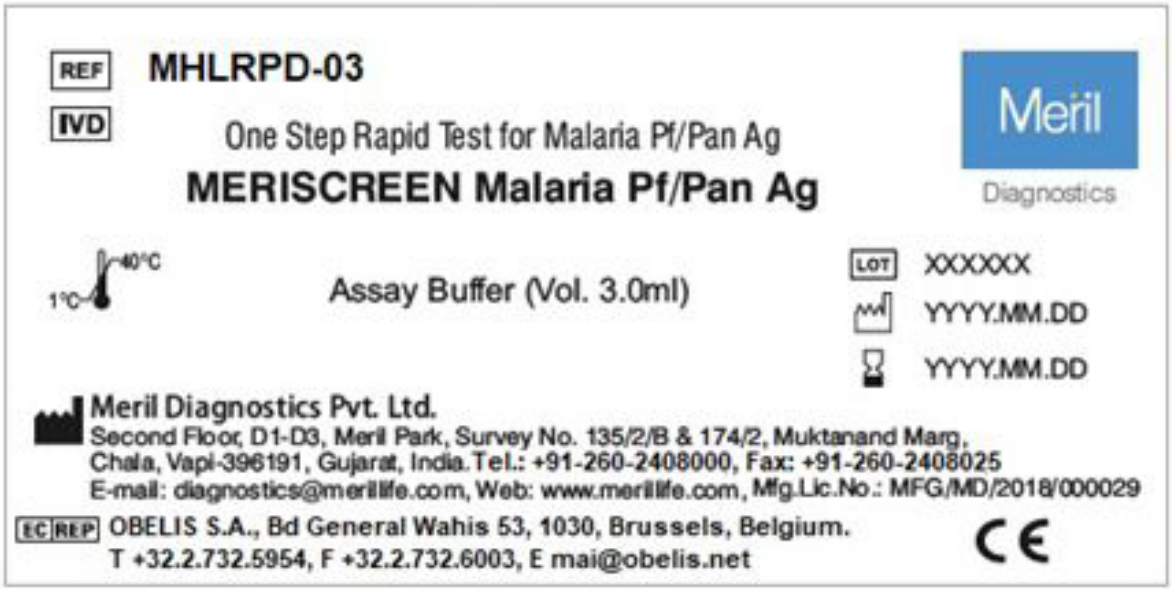
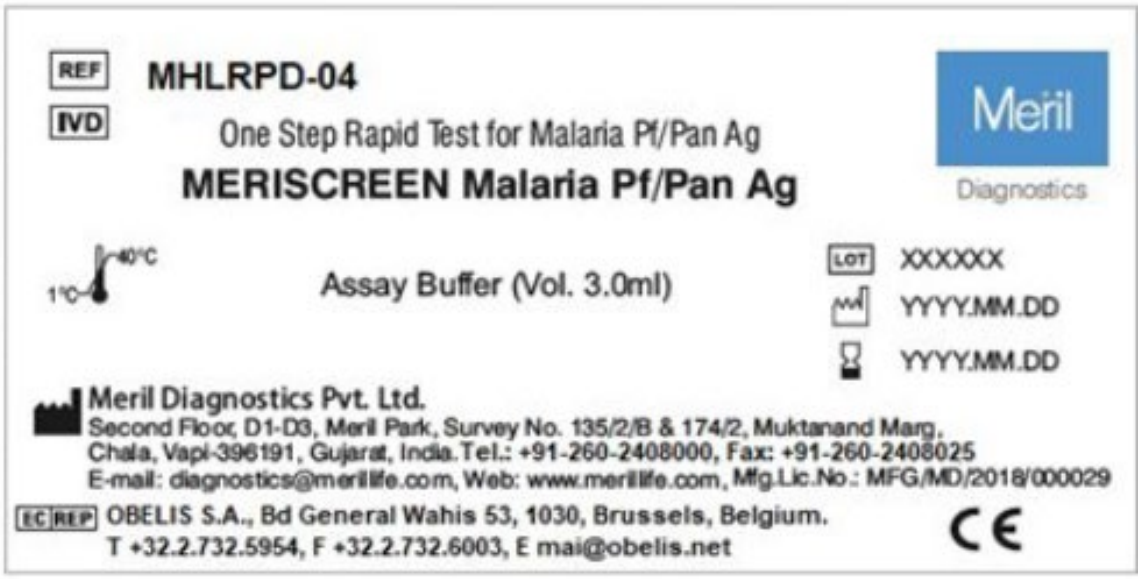
CE

1.3 Assay buffer label






REF
MHLRPD-04
IVD
One Step Rapid Test for Malaria Pf/Pan Ag
MERISCREEN Malaria Pf/Pan Ag
Meril
Diagnostics
1°C
40°C
Assay Buffer (Vol. 3.0ml)
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
Second Floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg,
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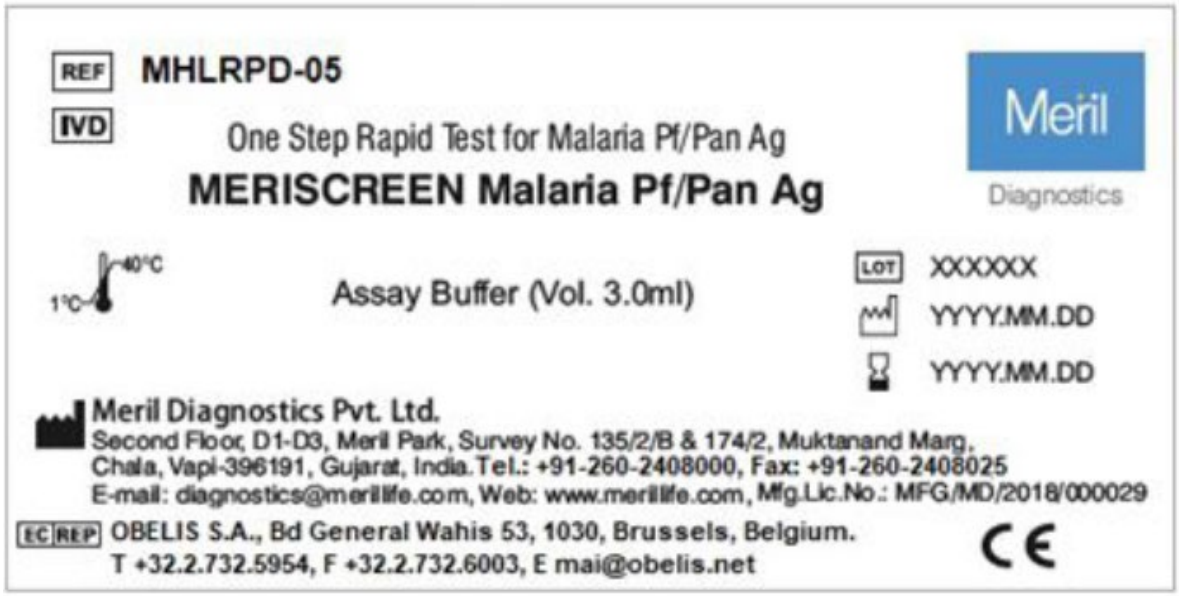
CE


REF
MHLRPD-05
IVD
One Step Rapid Test for Malaria Pf/Pan Ag
MERISCREEN Malaria Pf/Pan Ag
Meril
Diagnostics
1°C
40°C
Assay Buffer (Vol. 3.0ml)
LOT XXXXXX
YYYY.MM.DD
YYYY.MM.DD
Meril Diagnostics Pvt. Ltd.
Second Floor, D1-D3, Meril Park, Survey No. 135/2/B & 174/2, Muktanand Marg,
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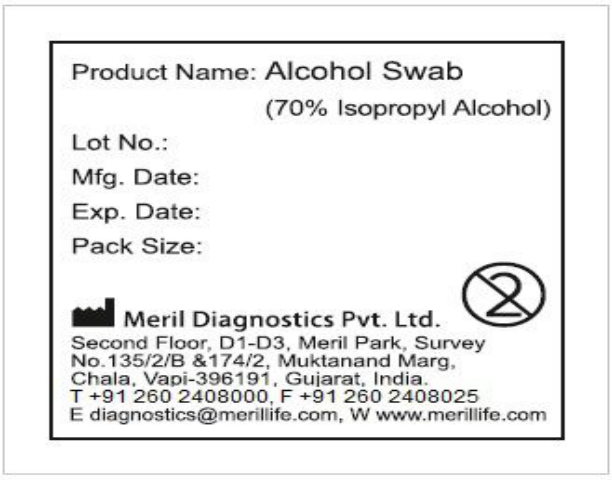
CE

1.4 Lancet label

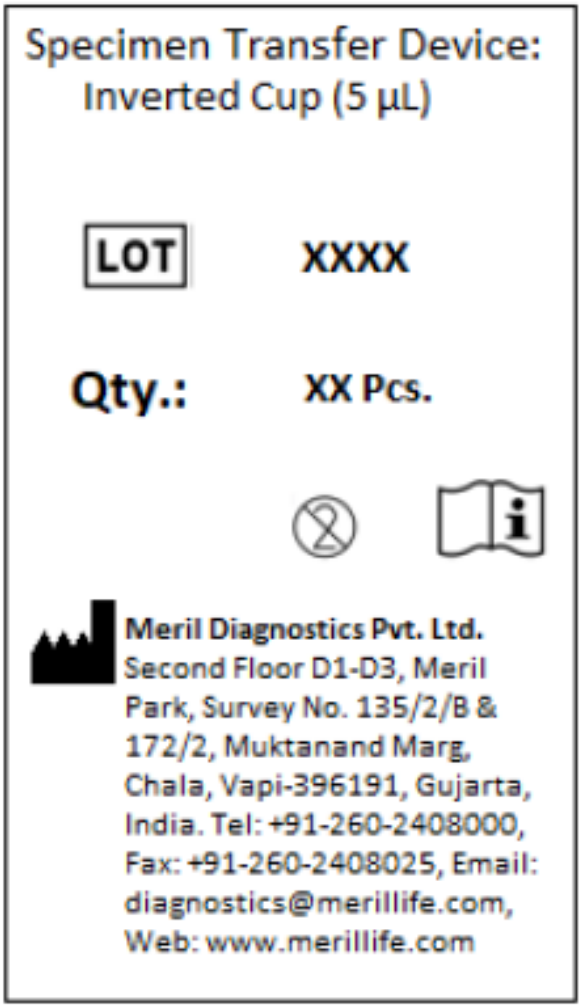
Size: 40mm x 40mm

1.5 Alcohol swab label



Size: 65mm x 65mm

1.6 Specimen transfer device label



2. Instructions for use[3]

[3] English version of the IFU was the one that was assessed by WHO. It is the responsibility of the manufacturer to ensure correct translation into other languages.

Types of Samples	% Sensitivity	% CI
Sensitivity of *P. falciparum*	100%	95% CI value 98.82% to 100%
Sensitivity of *Pan*	100%	95% CI value 96.07% to 100%
Total Sensitivity	100%	95% CI value 99.12% to 100%
Types of Samples	**% Specificity**	**% CI**
Specificity of *Plasmodium spp.* Negative samples	98.53%	95% CI value 99.12% to 100%

At site 2, 97 P. falciparum positive specimens, 17 P.vivax positive specimens, 03 mixed infection specimens form population including pregnant women & children and 200 Plasmodium negative specimens were tested with MERISCREEN Malaria Pf/Pan Ag kit to evaluate diagnostic sensitivity & specificity

Types of Samples	% Sensitivity	% CI
Sensitivity of *P. falciparum*	100%	95% CI value 96.27% to 100%
Sensitivity of *Pan*	100%	95% CI value 80.49% to 100%
Total Sensitivity	100%	95% CI value 96.90% to 100%
Types of Samples	**% Specificity**	**% CI**
Specificity of *Plasmodium spp.* Negative samples	98.53%	95% CI value 98.17% to 100%

B. Analytical Sensitivity (Limit of Detection)

The sensitivity of MERISCREEN Malaria Pf/Pan Ag for P. falciparum is ≥ 50 parasites/µl and for P. vivax is 200 parasites/ul.

C. Analytical Specificity (Cross reactivity)

To evaluate the interference of MERISCREEN Malaria Pf/Pan Ag test kit with known relevant interfering specimens, the hemolytic samples, rheumatoid factors-contained samples and lipemic, icteric samples were investigated. In this study, the performance of the MERISCREEN Malaria Pf/Pan Ag kit is not affected by interfering substances such as, bilirubin (conjugated & unconjugated), triglyceride, acetaminophen, total protein, vitamin B12, sodium azide, thimerosol, alcohol/ethanol, hemoglobin, lipids, aspirin, cross reacting samples such as, Rheumatoid Arthritis, typhoid, pneumonia, diarrhea, filariasis, Hepatits B, Hepatits C, syphilis, HIV, dengue and cross reacting antibodies such as, Human Anti-Mouse Antibody (HAMA), Systemic Lupus Erythematous (SLE), Anti-Nuclear Antibodies (ANA).

D. Precision (Repeatability & Reproducibility)

Inter-day, inter-operator, inter-lot, within-run, inter-site have been determined by using high, moderate and low parasite density samples and negative samples. The test results have met the acceptance criteria of the study.

BIBLIOGRAPHY:

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- Chandler, J. et al., (2000). The place of gold in rapid tests. IVD Technology, 7(2):37-49. Moody, A. (2002). Rapid Diagnostics tests for malaria parasites. Clin. Microbiol., 15(1): 66-78.
- Murray, C. et al., (2008). Update on Rapid Diagnostics Testing for malaria. Clin. Microbiol., 21(1): 97-110.
- Robinson, N. (2002). Immunogold conjugation for IVD applications. IVD Technology, 8(3): 33-36.
- Weiss, A. (1999). Concurrent engineering for lateral flow diagnostics. IVD Technology, 5(7): 48-57.
- Gamboa, D. et al., (2010). A large proportion of P. falciparum isolates in the Amazon region of Peru lack pfhrp2 and pfhrp3: implications for malaria rapid diagnostic tests. PLoS One, 5(1):e8091.
- Gillet, P. et al., (2011). Prozone in malaria rapid diagnostics tests: how many cases are missed? Malar J., 10:166.
- Jacobs, J. (2014). Harmonization of malaria rapid diagnostic tests: best practices in labelling including instructions for use. Malar J, 13:505.
- World Health Organization, Geneva. (2004). Laboratory biosafety manual, third edition.

Product Disclaimer:

Every precaution has been taken to ensure the diagnostic ability and accuracy of this product. The product is used outside of the control of the Manufacturer and Distributor and the result may accordingly be affected by environmental factors and/or user error. A person who is the subject of the diagnosis should consult a doctor for further confirmation of the result.

Warning:

The manufacturers and Distributors of this product shall not be liable for any losses, liability, claims, costs or damages whether direct or indirect or consequential arising out of or related to an incorrect diagnosis, whether positive or negative, in the use of this product.

IFU/MHLRPD02/06
Date:09/01/2023

Symbols used on Meril Diagnostics labels:

REF Catalogue No.	LOT Batch No.	Consult instruction for use
Manufacturer	Expiry date	For single use only do not reuse
Manufacturing date	Keep dry	Keep away from direct sunlight
Storage temperature	Sufficient for	Do not use if box open or damaged
IVD In Vitro Diagnostics	Caution	CE European health & safety product label

EC REP Authorized European representative in the European Community

One Step test for Malaria Pf/Pan Ag

MERISCREEN Malaria Pf/Pan Ag

Product Code	Pack Size
MHLRPD-02	30 Tests
MHLRPD-03	10 Tests
MHLRPD-04	25 Tests
MHLRPD-05	50 Tests

Meril Diagnostics

IVD For in vitro diagnostic use
Read this pack insert thoroughly before use

INTENDED USE:

MERISCREEN Malaria Pf/Pan Ag test kit is an in-vitro diagnostic immunochromatographic assay for the qualitative detection of infection by Plasmodium falciparum (through P. falciparum-specific HRP2 antigens) and P. falciparum, P. vivax, P. malariae, P. ovale (through pan-pLDH antigens) in human capillary and/or venous whole blood specimens. It does not assess parasite densities.

The assay is intended for trained users (in either laboratory or point-of-care settings) and for the diagnosis of malaria infection in symptomatic patients Note: Malaria RDTs can give positive results after successful anti-malarial treatment. Therefore, MERISCREEN Malaria Pf/Pan Ag test kit is not recommended for monitoring response to anti-malarial treatment.

PRINCIPLE:

MERISCREEN Malaria Pf/Pan Ag Test utilizes the principle of Immunochromatography in which nitrocellulose membrane is pre-coated with one monoclonal antibody (test line Pf) specific to Histidine-Rich Protein 2 (Pf-HRP2) of the Plasmodium falciparum and one monoclonal antibody (test line Pan) specific to lactate dehydrogenase of Plasmodium species (Pan-pLDH). Thus, the following Plasmodium antigens are detected in this test:

- Histidine rich protein 2 specific for P. falciparum (Pf-HRP2)
- Plasmodium lactate dehydrogenase common human Plasmodium species (P. falciparum, P. vivax, P. ovale & P. malariae) (Pan-pLDH)

The cassette contains a test strip pre-coated with capture antibodies.

The sequence of events is as follows:

1. Whole blood is applied to the specimen well (labelled well "S").
2. Next, buffer is applied to the buffer well (labelled well "B").
3. Migration of the blood/buffer mixture starts, towards the opposite end of the cassette.
4. The blood-buffer mixture passes the conjugate pad, which contains detection antibodies targeting Pf-HRP2 and Pan-pLDH. These detection antibodies are conjugated to colloidal gold. If present in the specimen, Plasmodium target antigens bind to this detection antibody-conjugate.
5. The antigen-antibody-conjugate complex migrates further and binds to the capture Plasmodium specific antibodies present on the test line. These capture antibodies bind to another site (epitope) of the Plasmodium target antigens.
6. The capture antibodies are applied on a narrow section of the test strip: as a result, the antibody conjugate with the colloidal gold will be concentrated and become visible as a Reddish-purple coloured line.
7. The excess of the detection antibody-conjugate that was not bound by the Plasmodium target antigens and the capture antibodies moves further to absorbent pad.
8. At control zone Goat anti-chicken IgY is immobilized (as blue coloured line) and it binds to IgY colloidal gold conjugate to give a Reddish-purple coloured control line. The visualization of the control line indicates that the migration was successful.

The main ingredients of the kit are:

- Test strip
  - o Detection antibodies conjugated to colloidal gold:
    - ■ Mouse monoclonal antibodies specific to Pf-HRP2-gold Colloid
    - ■ Mouse monoclonal antibodies specific to Pan-pLDH-gold Colloid
    - ■ Chicken IgY - gold colloid
  - o Capture antibodies:
    - ■ **Test lines:**

      P. falciparum (pf) line: Mouse monoclonal antibodies specific to Pf-HRP2

      Plasmodium species (Pan) line: Mouse monoclonal antibodies specific to Pan-pLDH
    - ■ Control line: Goat anti-Chicken IgY polyclonal antibodies (as blue coloured line
  - o **Assay Buffer**

    Protein stabilizers, detergent and preservatives

INTENDED USER

The test must be performed by a trained user (in either laboratory orpoint- of-care settings).

SPECIMEN REQUIRED:

- Capillary blood or venous blood with the following anticoagulants: EDTA, Heparin, Citrate
- Time between collection and analysis:
  - o Capillary: immediately
  - o Venous: immediately. If immediate testing is not possible, store the whole blood specimen at 2-8°C for maximum 72 hours (3 days).

Warnings and precautions

- For in vitro diagnostic use only.
- Read the instructions carefully before performing the test. The instruction must be followed exactly to get accurate results.
- Apply standard biosafety precautions for handling and disposalof potentially infective material/used kit/expired kit.
  - ○ Handle all specimens as potentially infectious.
  - ○ Wear gloves while handling specimens and performing the test.
  - ○ Avoid splashing and aerosol formation.
  - ○ Clean up spills thoroughly using an appropriate disinfectant.
- The buffer contains sodium azide as a preservative which may be toxic if ingested. When disposed of through a sink, flush with large quantities of water.
- Do not use any other buffer than the buffer supplied within this kit.
- Do not use the RDT kit beyond the expiration date. Do not use if the packaging is damaged.
- Do not use any other specimen than whole blood.
- Do not use if the product has been exposed to excessive heat or humidity. Perform the test immediately after opening of the cassette packaging.
- Do not re-use the test device.
- Do not touch the nitrocellulose part of the test device. Finger print or scratch on nitrocellulose membrane may give erroneous results. Do not use the lancet if the seal is broken.
- Do not touch the tip of buffer bottle, it might contaminate buffer.
- Allow all reagents and specimen(s) to attain room temperature (15°C to 30°C) before use.
- Do not smoke, eat or drink while handling specimens and performing a test.
- Do not use haemolysed specimen for testing.
- Contamination of specimen transfer devices, or reagents can lead to inaccurate results.
- Do not exchange or pool the components or reagents from different lots. This may lead to erroneous or invalid results.

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MATERIALS PROVIDED

Kit Contents	MHLRPD-02	MHLRPD-03	MHLRPD-04	MHLRPD-05
Cassette packaging, each containing: 1 device 1 desiccant	30	10	25	50
Assay buffer bottle	2 x 3.0 ml	1 x 3.0 ml	2 x 3.0 ml	4 x 3.0 ml
Specimen transfer devices (Inverted cups)-5 µL	30	10	25	50
Lancets	30	10	25	50
Alcohol Swabs	30	10	25	50
Pack insert	1	1	1	1

Materials required but not provided:

- New pair of disposable gloves
- Pen
- Timer
- Sharp box
- Non-sharps disposal container
- Venipuncture blood collection materials and precision pipette plus tips (if whole blood is collected by venipuncure)

TEST KIT STORAGE AND STABILITY

- Store the kit between 1-40 °C.
- Do not store the kit in the freezer.
- Protect the kit from heat and humidity.
- The kit has a shelf life of 24 months from the date of manufacture. The test kit is stable until the expiration date marked on the kit box and/or the packaging of individual components when stored as specified.
- Once opened the Test Device, it gives accurate results till 24 hours, but it is recommended to be used immediately.

PROCEDURE

BEFORE TESTING:

- Prepare all necessary materials:

o When stored in the refrigerator, bring the kit components to room temperature (15°C to 30°C) minimum 30 minutes before use.

o Prepare all the materials:

Materials Provided	Materials required but not provided
Test Device **Assay Buffer bottles** Specimen transfer device (Inverted cups) **Pack Insert** **Lancet** **Alcohol swabs**	**New pair of disposable gloves** **Pen** **Timer** **Sharp box** **Non-sharps disposal container** **Venipuncture blood collection materials and collected by venipuncture**

- Check the expiration date on the test device packaging. If expired, do not use it; take another test from an unexpired kit.
- Check that the test device packaging is not damaged. If damaged, discard the test device and use another test device.
- Open the test device packaging and check the desiccant. If there is a color change in desiccant pouch from blue to pink/white, do not use the test device.
- Dispose the desiccant in the non-sharps disposal container. Take the test device and place it on a horizontal flat surface.

  You see:

  o a result window (marked with C, Pan, Pf)

  o a circle well marked "S" (for specimen)

  o a square well "B" (for buffer)
- Write the patient name or patient identification number on the cassette.
- Put on gloves. Use new gloves for each patient.

Note: Perform the test immediately after opening of the test device packaging.

Do not re-use the test device.

TEST PROCEDURE

Capillary whole blood from finger prick

1. Wear gloves.
2. Choose a finger for the finger prick:

• Do not choose a finger that is swollen, bruised or scarred.

3. Preferably choose the 3rd or 4th finger of the hand. 4. Open the packaging of the alcohol swab. Take out the alcohol swab. Do not discard the empty packaging (wrapper) but keep it aside.
5. Wipe the complete fingertip with the alcohol swab. Wait until the finger has completely dried.
6. Place the alcohol swab in the wrapper and set it aside (you will use it again to stop the bleeding after you collected the patient's blood).
7. Take the safety-seal lancet.
8. Detach the cap of the lancet. Puncture the side of the pulp (ball) of the finger with the lancet, perpendicular to the lines of the fingerprint. Dispose the lancet immediately into the sharps box.
9. Make sure a well-formed drop of blood is present on the tip of the finger.
10. If there is no well-formed drop of blood, repeat the finger prick. Use a new lancet and choose a different puncture site.
11. Take the specimen transfer device and collect 5 µl of blood by dipping the circular end of the specimen transfer device into the whole blood drop.
12. Place the circular end of the specimen transfer device in the circle well (marked "S") so that it touches the strip (pad at the bottom of the well). Press down lightly to transfer the whole blood to the strip. Put the used specimen transfer device into the non-sharps disposal container.
13. Take the alcohol swab you put aside (step 5). Ask the patient to press it to the finger prick to stop the bleeding. After use, put the alcohol swab into the non-sharps disposal container.
14. Take the buffer bottle. Hold the open buffer bottle vertically above the square well (marked "B"). Squeeze the buffer bottle gently and apply exactly four drops into the square well (marked "B").

! Do not use any other buffer than the buffer supplied within this kit !	! Hold the buffer bottle vertically - this ensures that the drops contain the correct volume of buffer!

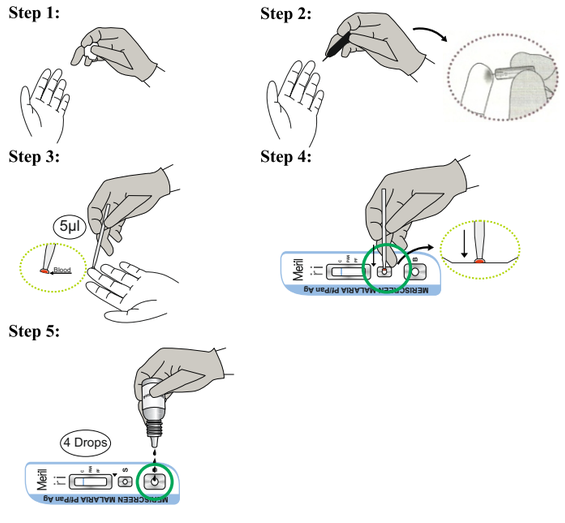
15. Remove your gloves and discard them into the non-sharps disposal container.
16. Write the time on the cassette or set a countdown timer to the required reading time.
17. Read test results at 20 minutes but no later than 30 minutes. Use a good light source when reading the test results.

Note: Don't read test results after 30 minutes. Reading too late can give false results.

Venous whole blood from venipuncture

1. Wear gloves.
2. Collect blood by standard veni-puncture procedure into a tube containing the correct anticoagulant (EDTA, heparin or Citrate).
3. Mix the tube gently.
4. Transfer 5 µl of whole blood using specimen transfer device in the circle well (marked "S") of the cassette.
5. Perform steps 12 - 16 of the previous section ("Capillary whole blood from finger prick")

PICTORIAL REPRESENTATION OF PROCEDURE



Interpretation of the test result:

1. At 20 minutes, but no later than 30 minutes: compare the test lines with the presentation in the table below.
2. Where possible, have the results confirmed by a second reader within this time frame.
3. Line intensities may vary from faint to strong intensity. Consider also a faint test line as a positive result.

Note: Test line of any Intensity (light to dark) should be considered positive.

4. Record the test results as noted in the table below. Consult the national guidelines for malaria case management to complement the table below.

Note: The faint blue line at "Control" position is always visible. This faint blue line should not be interpreted as Control line during result interpretation.

Lines that you see	Picture/ Drawing	Record the following result take the following action
Faint Blue line at Control position even after addition of samples and assay buffer	C Pan Pf C Pan Pf	Invalid. Take a new device and repeat the test.
NO Pink-Purple line at 'C', (=control)	C Pan Pf C Pan Pf C Pan Pf C Pan Pf	Invalid. Take a new device and repeat the test.
Pink-Purple Line at 'C' and **NO** other line	C Pan Pf	Negative
Pink-Purple Line at **'C'** and at **'pf**	C Pan Pf	Positive for *P. falciparum*
Pink-Purple Line at **'C'** and at **'Pan'**	C Pan Pf	Positive for Pan (*P. falciparum, P. vivax, P.ovale* or *P. malariae)*
Pink-Purple Line at **'C'** and **'Pf'** and at **'Pan'**	C Pan Pf	Positive for *P. falciparum* or a mixed infection with *P. vivax, P. ovale* and/or *p. malariae*

Limitations of the product, causes of false-negative and false-positive results

- The test procedure, precautions and interpretation of result for this test must be followed when testing.
- The test kit is intended for an initial screening as well as an aid to the diagnosis of infection. Other clinically available tests are required if questionable results are obtained. As with all diagnostic tests, definitive clinical diagnosis tests should not be based on the results of single test, but should only be made by physician after all clinical and laboratory findings have been evaluated.
- The performance of product may be degraded at temperature of 45°C.
- MERISCREEN Malaria Pf/Pan Ag kit was tested with interfering substances such as, bilirubin (conjugated & unconjugated), triglyceride, acetaminophen, total protein, vitamin B12, sodium azide, thimerosol, alcohol/ethanol, hemoglobin, lipids, aspirin, cross reacting samples such as, Rheumatoid Arthritis, typhoid, pneumonia, diarrhea, filariasis, Hepatitis B, Hepatitis C, syphilis, HIV, dengue and cross reacting antibodies such as, Human Anti- Mouse Antibody (HAMA), Systemic Lupus Erythematous (SLE), Anti- Nuclear Antibodies (ANA) and the performance of MERISCREEN Malaria Pf/Pan Ag kit was not affected by these interfering and cross-reacting samples. Interfering substances, cross reacting samples other than these may affect the performance of the kit.
- False positive result can occur amongst others in the following conditions:
- o Presence of heterophile antibodies in patient's sample with Rheumatic diseases and autoimmune disorder may lead to false results.

o Some viral infection (such as hepatitis B or hepatitis C, dengue)

- o Parasitic infection (e.g. Schistosomiasis and Trypanosomiasis)
- False negative result can occur in the following conditions:
- o Hook effect due to very high parasite densities i.e., >22,798 parasites/µl for P. falciparum and ≥24,167 parasites/µl for P. vivax. Repeat the test by using different dilutions of same sample.
- o If antigen concentration/parasite densities present in the specimen is below the detection limits of the assay or the analyte of interest that are detected are not present during the stage of disease in which a sample is collected.
- o deletion in the HRP2 gene resulting in no production of HRP2 antigen
- A positive test should be carefully interpreted to distinguish between new infections and effectively treated old infections. This is due to the persistence of HRP2 antigen in the blood for 1-3 weeks after effective treatment. Therefore, malaria RDTs are not recommended for monitoring treatment of malaria.
- This assay cannot be used for the diagnosis of infections other than P. falciparum, P.vivax, P.malariae, P.ovale infections.
- A negative result at any time does not preclude the possibility of exposure or infection.
- Repeat the test in case of very faint band or if have any doubt for test band. In case of strong clinical evidence of Malaria, a negative test should be repeated.
- This kit is intended for primary screening of malaria infection as well as an aid to the diagnosis of infection. This test kit can provide fast and easy way to get a result, but do not completely exclude the possibility of false positive or false negative results caused by various factors.
- Although the test is accurate in detecting HRP2 specific to P. falciparum or pLDH specific to P. vivax in blood samples, low incidence of false results may occur. Other clinically available tests should be used if questionable results are obtained.
- "Pan" band may turn negative after successful anti-malarial therapy. • In few cases, HRP2 band appears in certain post treatment malaria, however, such observations are also observed in certain untreated malaria. In such cases, re-testing after 2 days is recommended.
- In P. falciparum malaria infection, HRP2 is not secreted in gametogony stage. Hence, in "Carriers", the HRP2 band may be absent.

Note: The presence of the pink-purple control line only means that migration of the test occurred. It does not guarantee that:

-The correct specimen has been used

-The specimen has been applied correctly

-The specimen and test have been correctly stored

-The test procedure was followed correctly

Performance specifications:

A. Sensitivity and Specificity

In-house Testing:

Total of 84 P. falciparum positive specimens which includes 79 P. falciparum positive specimens, 02 pregnant women samples and 03 children samples, total of 83 P. vivax positive specimens which includes 71 P. vivax positive samples, 03 pregnant women and 09 children samples were tested with MERISCREEN Malaria Pf/Pan Ag to evaluate the diagnostic sensitivity of MERISCREEN Malaria Pf/Pan Ag kit. 1000 Plasmodium negative specimens, 107 Plasmodium negative blood donor samples, 54 Plasmodium negative pregnant women samples and 66 Plasmodium negative children samples were tested with MERISCREEN Malaria Pf/Pan Ag to evaluate the Diagnostic Specificity of MERISCREEN Malaria Pf/Pan Ag kit.

The status of the sample was determined by microscopic examination. The results are as follow:

Types of Samples	% Sensitivity	% CI
Sensitivity of *P. falciparum*	100%	95% CI value 95.70% to 100%
Sensitivity of *Pan*	100%	95% CI value 95.65% to 100%
Total Sensitivity	100%	95% CI value 97.89% to 100%
Types of Samples	**% Specificity**	**% CI**
Specificity of *Plasmodium spp.* Negative samples	98.53%	95% CI value 97.69% to 99.13%

TESTING AT TWO DIFFERENT SITES:

At site 1, 311 P. falciparum positive specimens, 92 P.vivax positive specimens, 12 mixed infection specimens form population including pregnant women & children and 815 Plasmodium negative specimens were tested with MERISCREEN Malaria Pf/Pan Ag kit to evaluate diagnostic sensitivity& specificity.