

# (Garuda)

Certificate No. 21T061/1274

## Certificate of Laboratory Accreditation

By virtue of National Standardization Act B.E. 2551 (2008)

Secretary-General, Thai Industrial Standards Institute

Issues this Certificate to

**Linde (Thailand) Public Company Limited**

Laboratory address

269 Sukhumvit Road, Map Ta Phut, Mueang Rayong, Rayong

This laboratory is accredited for testing

in accordance with the Thai Industrial Standard TIS 17025-2561 (2017) (ISO/IEC 17025 : 2017)

General requirements for the competence of testing and calibration laboratories

**Accreditation No. TESTING 0659**

The scope of accreditation is as annexed hereto.

Valid from 17<sup>th</sup> May B.E. 2564 (2021)

Valid until 22<sup>nd</sup> November B.E. 2566 (2023)

Issue date 27<sup>th</sup> May B.E. 2564 (2021)

(Signature)

(Mr. Ekanit Romyanon)

Director

Office of the National Standardization Council

For Secretary – General Thai Industrial Standards Institute

Translation approved



(Mr. Ekanit Romyanon)

Director

Office of the National Standardization Council

Date : 8<sup>th</sup> June 2021



Ministry of Industry, Thai Industrial Standards Institute

Translation Note: In the event of doubt or misunderstanding, the original in Thai shall be the authoritative.

## Scope of Accreditation for Testing

Certificate No. 21T061/1274

Laboratory name      Testing Laboratory  
 Linde (Thailand) Public Company Limited  
 Address                 269 Sukhumvit Road, Map Ta Phut, Mueang Rayong, Rayong  
 Accreditation No.     TESTING 0659  
 Laboratory status       Permanent     Site     Temporary     Mobile

Field of Testing	Parameter	Test Method
Petrochemicals field 1. Liquid carbon dioxide	<ul style="list-style-type: none"> <li>- Methane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.0 ppm mole)</li> <li>- Ethane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.2 ppm mole)</li> <li>- Ethylene 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.1 ppm mole)</li> <li>- Propane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.4 ppm mole)</li> <li>- Propylene 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.4 ppm mole)</li> <li>- Isobutane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.8 ppm mole)</li> <li>- Normal butane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 25.8 ppm mole)</li> <li>- Isopentane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 26.2 ppm mole)</li> <li>- Normal pentane 0.4 ppm to 25.0 ppm v/v (0.4 ppm mole to 26.6 ppm mole)</li> <li>- Hexane plus 0.4 ppm to 25.0 ppm v/v</li> </ul>	- WI-LAB 08 based on International Society of Beverage Technologists, 2019, procedure 10.0

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Laboratory status  Permanent  Site  Temporary  Mobile

Field of Testing	Parameter	Test Method
Petrochemicals field  1.Liquid carbon dioxide (cont.)	<ul style="list-style-type: none"> <li>- Acetaldehyde 0.1 ppm to 5.0 ppm v/v (0.1 ppm mole to 5.2 ppm mole)</li> <li>- Benzene 5.0 ppb to 50.0 ppb v/v (5.4 ppb mole to 53.6 ppb mole)</li> <li>- Hydrogen sulfide 0.1 ppm to 1.0 ppm v/v (0.1 ppm mole to 1.0 ppm mole)</li> <li>- Carbonyl sulfide 0.05 ppm to 1.0 ppm v/v (0.05 ppm mole to 1.0 ppm mole)</li> <li>- Dimethyl disulfide 0.05 ppm to 1.0 ppm v/v (0.06 ppm mole to 1.1 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	<ul style="list-style-type: none"> <li>- WI-LAB05 based on International Society of Beverage Technologists, 2019, procedure 11.0</li> <li>- WI-LAB03 based on International Society of Beverage Technologists, 2019, procedure 12.0</li> <li>- WI-LAB04 based on International Society of Beverage Technologists, 2019, procedure 13.0</li> <li>- WI-LAB06 based on ASTM D8098-17</li> </ul>

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Field of Testing	Parameter	Test Method
Petrochemicals field  2.Gaseous carbon dioxide	<ul style="list-style-type: none"> <li>- Acetaldehyde 0.1 ppm to 5.0 ppm v/v (0.1 ppm to 5.2 ppm mol)</li> <li>- Benzene 5.0 ppb to 50.0 ppb v/v (5.4 ppb to 53.6 ppb mol)</li> <li>- Hydrogen sulfide 0.1 ppm to 1.0 ppm v/v (0.1 ppm mole to 1.0 ppm mole)</li> <li>- Carbonyl sulfide 0.05 ppm to 1.0 ppm v/v (0.05 ppm mole to 1.0 ppm mole)</li> <li>- Dimethyl disulfide 0.05 ppm to 1.0 ppm v/v (0.06 ppm mole to 1.1 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	<ul style="list-style-type: none"> <li>- WI-LAB05 based on International Society of Beverage Technologists, 2019, procedure 11.0</li> <li>- WI-LAB03 based on International Society of Beverage Technologists, 2019, procedure 12.0</li> <li>- WI-LAB04 based on International Society of Beverage Technologists, 2019, procedure 13.0</li> <li>- WI-LAB06 based on ASTM D8098-17</li> </ul>

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Field of Testing	Parameter	Test Method
Petrochemicals field		
3. Gaseous carbon monoxide	<ul style="list-style-type: none"> <li>- Hydrogen sulfide 0.1 ppm to 1.0 ppm v/v (0.1 ppm mole to 1.0 ppm mole)</li> <li>- Carbonyl sulfide 0.05 ppm to 1.0 ppm v/v (0.05 ppm mole to 1.0 ppm mole)</li> <li>- Dimethyl disulfide 0.05 ppm to 1.0 ppm v/v (0.06 ppm mole to 1.1 ppm mole)</li> <li>- Carbon dioxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> </ul>	<ul style="list-style-type: none"> <li>- WI-LAB04 based on International Society of Beverage Technologists, 2019, procedure 13.0</li> <li>- WI-LAB06 based on ASTM D8098-17</li> </ul>
4. Gaseous and liquid oxygen	<ul style="list-style-type: none"> <li>- Carbon dioxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	<ul style="list-style-type: none"> <li>- WI-LAB06 based on ASTM D8098-17</li> </ul>

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Field of Testing	Parameter	Test Method
Petrochemicals field  5. Gaseous and liquid Nitrogen	<ul style="list-style-type: none"> <li>- Carbon dioxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	- WI-LAB06 based on ASTM D8098-17
6. Gaseous and liquid Argon	<ul style="list-style-type: none"> <li>- Carbon dioxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	- WI-LAB06 based on ASTM D8098-17

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Field of Testing	Parameter	Test Method
Petrochemicals field 7. Gaseous Hydrogen	<ul style="list-style-type: none"> <li>- Carbon dioxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> <li>- Oxygen 0.7 ppm to 5.0 ppm v/v (0.7 ppm mole to 5.0 ppm mole)</li> <li>- Nitrogen 1.0 ppm to 9.0 ppm v/v (1.0 ppm mole to 9.0 ppm mole)</li> <li>- Carbon monoxide 0.5 ppm to 6.0 ppm v/v (0.5 ppm mole to 6.0 ppm mole)</li> </ul>	- WI-LAB06 based on ASTM D8098-17

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