

Linde (Thailand) Public Company Limited



269 SUKHUMVIT ROAD, MAPTAPHUT, AMPHUR MUANG, RAYONG 21150 THAILAND TEL.: (66) 2 3386100 ext. 5109



CERTIFICATION OF ANALYSIS (ISBT - CO2 BEVERAGE GRADE SPECIFICATIONS) REPORT DESCRIPTION: REPORT No. : REPORT DATE : ANALYSIS No. : ANALYSIS DATE : SERVICE ORDER AGREEMENT No. : SAMPLE RECEIVED DATE : ANALYSIS BY : CUSTOMER DESCRIPTION :

CUSTOMER NAME :
CUSTOMER ADDRESS :
TEL. No. / FAX. No. :
Attn. to :

SAMPLE DESCRIPTION (By Customer) :

SAMPLE TYPE :
SAMPLE POINT / LOCATION :
SAMPLING DATE :
SAMPLING TIME :

SAMPLING By

SAMPLING RECEIVED IN
- Cylinder No. :

- Sampling Kit : Small Cylinder no Beaker no.

Sampling Bags no. :

SAMPLING BY .		Sampling bags no. :				
ANALYSIS DESCRIPTION:						
TEST PARAMETER	UNIT	TEST METHOD	ISBT Reference no.	TEST RESULT	DL	SPECIFICATION
CO2 Purity (Assay)*	% v/v	Zahm & Nagel	ISBT 2.0	99.99	99.90	Min. 99.90
Moisture Content / Water (H2O)*	ppm v/v	Moisture Analyzer	ISBT 3.0	2.0	0.25	Max. 20.0
Oxygen (O2)*	ppm v/v	Inhouse method 2	ISBT 4.0	5.6	0.7	Max. 30.0
Nitrogen (N2)*	ppm v/v	Inhouse method 2	150	17.8	1.0	na
Carbon Monoxide (CO)	ppm v/v	Inhouse method 2	ISBT 5.0	nd	0.5	Max. 10.0
Acetaldehyde (C2H4O, or AA)	ppm v/v	Inhouse method 5	ISBT 11.0	nd	0.1	Max. 0.2
Methanol (CH3OH)*	ppm v/v	GC - FID	ISBT 9.0	nd	0.1	Max. 10.0
Ethylene Oxide*	ppm v/v	GC - FID	ISBT 20.0	nd	0.1	Not Detectable
Vinyl Chloride*	ppm v/v	GC - FID	ISBT 18.0	nd	0.1	Not Detectable
Other Volatile Oxygenate*	ppm v/v	GC - FID	151	nd nd	0.1	na
Aromatic Hydrocarbon (Benzene)	ppb v/v	Inhouse method 3	ISBT 12.0	nd	5.0	Max. 20.0
Ammonia (NH3)*	ppm v/v	Detector Tube	ISBT 6.0	d	0.1	Max. 2.5
Oxides of Nitrogen (NOx)*	ppm v/v	Detector Tube	ISBT 7.0		0.1	Max. 5.0
Nitrogen Dioxide (NO2)*	ppm v/v	Detector Tube	ISBT 7	ne	0.1	Max. 2.5
Nitric Oxide (NO)*	ppm v/v	Detector Tube	2	nd	0.25	Max. 2.5
Phosphine*	ppm v/v	Detector Tube	SBT 1	nd	0.1	Max. 0.3
Hydrogen Cyanide*	ppm v/y	Detect Tub	3T 17	nd	0.2	Not Detectable
Non-Volatile Residue (NVR)*	ppm v	Gravim	1. JT 8.0	nd	1.5	Max. 10.0
Non-Volatile Organic Residue (NVOR)*	ppm v/v	im	ISBT 8.0	nd	1.5	Max. 5.0
Total Hydrocarbon (THC)(as CH4)*	ppm v/v	- FID	ISBT 10.0	nd	0.4	Max. 50.0
Methane	ppm v/v	nmouse method 1	-	nd	0.4	-
Ethane	ppm v/v	Inhouse method 1	1(5)	nd	0.4	-
Propane	ppm v/v	Inhouse method 1	-	nd	0.4	-
Butane	ppm v/v	Inhouse method 1	127	nd	0.4	-
Pentane	ppm v/v	Inhouse method 1	100	nd	0.4	-
Hexane plus	ppm v/v	Inhouse method 1	121	nd	0.4	-
Total Non-Methane Hydrocarbon (as CH4)*	ppm v/v	GC - FID	ISBT 10.1	nd	0.4	Max. 20.0
Total Sulfur - (TS) (Excluding Sulfur Dioxide)*	ppm v/v	GC - SCD	ISBT 13.0	nd	0.05	Max. 0.1
Sulfur Dioxide (SO2)*	ppm v/v	GC - SCD	ISBT 14.0	nd	0.05	Max. 1.0
Carbonyl Sulfide	ppm v/v	Inhouse method 4	ISBT 13.0	nd	0.05	na
Hydrogen Sulfide	ppm v/v	Inhouse method 4	ISBT 13.0	nd	0.1	na
C1-C4 Mercaptans, Sulfides, Disulfides*	ppm v/v	GC - SCD	ISBT 13.0	nd	0.05	na
Odor of Solid CO2 (Snow)*	-	Organoleptic	ISBT 15.0	No Foreign Odor	na	No Foreign Odor
Appearance of Solid CO2 (Snow)*	-	Organoleptic	ISBT 15.0	Normal appearance , Colorless snow	na	Normal appearance , Colorless snov
Odor & Taste in Water*	-	Organoleptic	ISBT 16.0	No Foreign Odor or Taste	na	No Foreign Odor or Taste
Appearance of Water*		Organoleptic	ISBT 16.0	No Color or Turbidity	na	No Color or Turbidity

Note:

- (1) Inhouse method WI-LAB08 based on International Society of Beverage Technologists (ISBT)- 3rd Revision, 09 Mar 2019, Procedure 10.0
- (2) Inhouse method WI-LAB06 based on ASTM D8098-17.
- (3) Inhouse method WI-LABO3 based on International Society of Beverage Technologists (ISBT)- 3rd Revision, 09 Mar 2019, Procedure 12.0
- (4) Inhouse method WI-LAB04 based on International Society of Beverage Technologists (ISBT) 3rd Revision, 09 Mar 2019, Procedure 13.0
- (5) Inhouse method WI-LAB05 based on International Society of Beverage Technologists (ISBT)- 3rd Revision, 09 Mar 2019, Procedure 11.0
- (*) Test marked "Not TISI Accredited" in this certificate are not included in the TISI Accreditation Schedule for our laboratory.

 The reported uncertainty is an expanded uncertainty calculated using a coverage factor of k=2 which gives a level of confidence of approximately 95%
- DL = Detection Limit. nd = less than the detection Limit. ppm = parts per million. ppb = parts per billion. na = not available.

Review by : Approved by :

Remark ·

- Partial duplication of this certificate without documentary permission from Laboratory is prohibited.
- This certificate is valid only for the test and mentioned sample(s).
- $The \ laboratory \ disclaims \ responsibility \ for \ The \ information \ is \ supplied \ by \ the \ customer \ and \ can \ affect \ the \ validity \ of \ results.$
- The certificate that the results apply to the sample as received.
- The definition of the results apply to the sample as received.
 The laboratory does not have a policy to reporting opinions, interpretations and statements of conformity.
- $\hbox{-} The \ laboratory \ disclaims in the \ report \ indicating \ which \ results \ may \ be \ affected \ by \ the \ deviation.$