



ANEXO I

Certificado de Gases Patrones

MEDICIONES DE CONCENTRACIÓN DE CONTAMINANTES DE
ACUERDO CON NORMA DE EMISIÓN PARA INCINERACIÓN,
COINCINERACIÓN Y COPROCESAMIENTO D.S N°29

Bío Bío Cementos S.A. – Planta Teno – Horno de Clinker
2021



ANEXO I: CERTIFICADO GASES PATRONES



Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02NI99E15A63G8 Reference Number: 160-401688891-1
Cylinder Number: EB0128772 Cylinder Volume: 144.3 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12019 Valve Outlet: 350
Gas Code: CH4,BALN Certification Date: Dec 27, 2019

Expiration Date: Dec 27, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	33.00 PPM	32.73 PPM	G1	+/- 0.3% NIST Traceable	12/27/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15050910	CC462585	49.57 PPM METHANE/AIR	0.3	Jul 28, 2021

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR CH4 000829060	FTIR	Dec 11, 2019

Triad Data Available Upon Request

NOTES: GROSS WEIGHT: 28.7 KG

NET WEIGHT: 4.6 KG



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Airgas
an Air Liquide company

Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E02NI99E15A0511 Reference Number: 160-401688886-1
Cylinder Number: EB0133436 Cylinder Volume: 144.3 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12019 Valve Outlet: 350
Gas Code: CH4,BALN Certification Date: Dec 27, 2019

Expiration Date: Dec 27, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	55.00 PPM	55.28 PPM	G1	+/- 0.3% NIST Traceable	12/27/2019
NITROGEN	Balance				
CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15050910	CC462585	49.67 PPM METHANE/AIR	0.3	Jul 28, 2021
ANALYTICAL EQUIPMENT					
Instrument/Make/Model		Analytical Principle		Last Multipoint Calibration	
MKS FTIR CH4 000929060		FTIR		Dec 11, 2019	

Triad Data Available Upon Request

NOTES: GROSS WEIGHT: 28.2 KG

NET WEIGHT: 4.5 KG



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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
600 Union Landing Road
Cinnaminson, NJ 08077-0000
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A1436	Reference Number:	82-124616780-1
Cylinder Number:	CC502729	Cylinder Volume:	144.3 CF
Laboratory:	124 - Riverton (SAP) - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52017	Valve Outlet:	350
Gas Code:	CH4,BALN	Certification Date:	May 02, 2017

Expiration Date: May 02, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
METHANE	90.00 PPM	90.86 PPM	G1	+/- 0.7% NIST Traceable	05/02/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12060907	CC356112	98.05 PPM METHANE/AIR	+/- 0.6%	Dec 07, 2017

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS 2031	FTIR	Apr 06, 2017

Triad Data Available Upon Request



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Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15A0183 Reference Number: 160-401396453-1
Cylinder Number: EB0118397 Cylinder Volume: 144.4 Cubic Feet
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12019 Valve Outlet: 660
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Feb 04, 2019

Expiration Date: Feb 04, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	150.0 PPM	148.6 PPM	G1	+/- 0.5% NIST Traceable	01/25/2019, 02/04/2019
SULFUR DIOXIDE	100.0 PPM	101.0 PPM	G1	+/- 0.8% NIST Traceable	01/25/2019, 02/04/2019
NITRIC OXIDE	150.0 PPM	148.6 PPM	G1	+/- 0.5% NIST Traceable	01/25/2019, 02/04/2019
CARBON MONOXIDE	250.0 PPM	252.3 PPM	G1	+/- 0.3% NIST Traceable	01/25/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	17060418	CC485021	98.32 PPM SULFUR DIOXIDE/NITROGEN	0.8%	Dec 07, 2022
NTRM	18060131	KAL004315	249.9 PPM NITRIC OXIDE/NITROGEN	+/- 0.4%	Nov 08, 2023
NTRM	18060131	KAL004315	250.1 PPM NOx/NITROGEN	+/- 0.4%	Nov 08, 2023
NTRM	14060337	CC434197	252.5 PPM CARBON MONOXIDE/NITROGEN	0.3%	Feb 21, 2020

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Jan 21, 2019
MKS FTIR - NO - 000928781	FTIR	Jan 10, 2019
MKS FTIR - NOx - 000928781	FTIR	Jan 10, 2019
MKS FTIR - SO2 - 000928781	FTIR	Jan 24, 2019

Triad Data Available Upon Request

NOTES: Gross Weight: 28.0 Kg, Net Weight: 4.7 Kg.




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Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04NI99E15A0186
Cylinder Number: EB0129651
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12020
Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-401873499-1
Cylinder Volume: 144.4 Cubic Feet
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
Certification Date: Aug 27, 2020

Expiration Date: Aug 27, 2028

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	270.0 PPM	270.6 PPM	G1	+/- 0.5% NIST Traceable	08/20/2020, 08/27/2020
SULFUR DIOXIDE	180.0 PPM	180.6 PPM	G1	+/- 0.8% NIST Traceable	08/20/2020, 08/27/2020
NITRIC OXIDE	270.0 PPM	270.6 PPM	G1	+/- 0.5% NIST Traceable	08/20/2020, 08/27/2020
CARBON MONOXIDE	450.0 PPM	447.5 PPM	G1	+/- 0.7% NIST Traceable	08/20/2020
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15080620	CC450449	248.1 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.6%	Dec 17, 2020
NTRM	15010111	KAL003443	494.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	Sep 01, 2021
NTRM	15010111	KAL003443	495.0 PPM NOx/NITROGEN	+/- 0.5%	Sep 01, 2021
NTRM	13010139	ND48580	495.4 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jul 03, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Aug 01, 2020
MKS FTIR - NO - 000928781	FTIR	Aug 20, 2020
MKS FTIR - NOx - 000928781	FTIR	Aug 20, 2020
MKS FTIR - SO2 - 000928781	FTIR	Aug 06, 2020

Triad Data Available Upon Request

NOTES: Gross Weight: 27.8 Kg, Net Weight: 4.6 Kg.



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Airgas.
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI75E15A00M2 Reference Number: 160-401097414-1
Cylinder Number: CC706145 Cylinder Volume: 152.9 CF
Laboratory: 124 - Plumsteadville - PA Cylinder Pressure: 2015 PSIG
PGVP Number: A12018 Valve Outlet: 590
Gas Code: CO2,O2,BALN Certification Date: Jan 17, 2018

Expiration Date: Jan 17, 2026

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	12.50 %	12.37 %	G1	+/- 0.6% NIST Traceable	01/17/2018
OXYGEN	12.50 %	12.54 %	G1	+/- 0.3% NIST Traceable	01/17/2018
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	100104	K022884	17.87 % CARBON DIOXIDE/NITROGEN	0.61%	Mar 01, 2019
NTRM	103014	K012186	22.454 % OXYGEN/NITROGEN	0.22%	Aug 05, 2021

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
AGILENT 490 TCD - CO2 - CN13176004	GC-TCD	Jan 16, 2018
SIEMENS OXYMAT 81 - V1-0407	PARAMAGNETIC	Jan 03, 2018

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Airgas.
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E03NI58E15A02X7
Cylinder Number: EB0133432
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12019
Gas Code: CO₂, O₂, BALN

Reference Number: 160-401688884-1
Cylinder Volume: 160.6 CF
Cylinder Pressure: 2014 PSIG
Valve Outlet: 590
Certification Date: Dec 24, 2019

Expiration Date: Dec 24, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON DIOXIDE	21.00 %	21.13 %	G1	+/- 0.1% NIST Traceable	12/24/2019
OXYGEN	21.00 %	20.96 %	G1	+/- 0.3% NIST Traceable	12/24/2019
NITROGEN	Balance				

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12062015	CC367566	22.883 PPM OXYGEN/NITROGEN	0.2	May 14, 2024
NTRM	060118	K008735	23.04 % CARBON DIOXIDE/NITROGEN	+/- 0.1%	Jun 27, 2022

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HORIBA VA5011 T5V6VU9P NDIR CO ₂	NDIR	Dec 04, 2019
SIEMENS OXYMAT 6 - N1-W5-951 - O ₂	PARAMAGNETIC	Dec 17, 2019

Triad Data Available Upon Request

NOTES: NET WEIGHT: 4.84 kg

GROSS WEIGHT: 29.701 kg



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