

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 3410-a01



## Nitrogen for LNG Analysis

This certified reference material (CRM) was produced in accordance with the NMIJ's management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended for use in the calibration of instruments and source material of nitrogen reference gas mixtures for liquefied natural gas (LNG) analysis.

**Certified Value**

The certified value for nitrogen in this CRM is given in the table below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ) of 2, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified value, Amount-of-substance fraction (mol/mol)	Expanded uncertainty Amount-of-substance fraction (mol/mol)	Cylinder Number
Nitrogen	7727-37-9	0.999996	0.000004	4MK-20833

**Analysis**

The amount-of-substance fraction of each impurity was determined by the analytical instruments listed below. The certified value was determined by the subtraction method (ISO 6142-1:2015).

Impurities	Analytical Instruments
Oxygen, Argon	Gas chromatograph with thermal-conductivity detector
Carbon dioxide	Gas chromatograph with flame ionization detector and methanizer
Total hydrocarbons	Total hydrocarbon analyzer
Water	Chilled mirror hygrometer

**Metrological Traceability**

The gas chromatographs and the total hydrocarbon analyzer used for the certification were calibrated using NMIJ's primary reference gases prepared by the gravimetric method in accordance with ISO 6142-1:2015. The chilled mirror hygrometer was calibrated using a reference dew point meter which was traceable to the International System of Units (SI). Therefore, the certified value is traceable to SI.

**Expiration of Certification**

This certificate is valid from the date of shipment to March 31, 2023, provided that this CRM is stored in accordance with the instructions given in this certificate.

**Description of the material**

This CRM, which is colorless and odorless gas, is supplied in a manganese steel high-pressure gas cylinder with an inner volume of 10 L. Specification of the outlet of the cylinder is W22-14 threads right (male). The residual pressure of this CRM in the cylinder is more than 10 MPa.

**Precautions for Storage**

This CRM should be stored in compliance with your country’s regulation for high pressure gases. This CRM should be kept temperature below 40 °C and stored at a place with good ventilation. Refer to the safety data sheet (SDS) on this CRM.

**Instructions for Use**

This CRM should be used around room temperature. This certificate is valid when residual pressure of this CRM is 1.5 MPa or more in gauge pressure. It is recommended that a high-pressure regulator made of stainless steel and stainless steel tubes should be used. Operation for their purge should be repeated sufficiently, in order to avoid the contamination.

**Precautions for Handling**

Refer to the SDS on this CRM before use. This CRM should be returned to Center for Quality Management of Metrology of AIST after use or after the expiry date.

**Preparation**

High-purity nitrogen gas was filled in the 10 L manganese cylinder by JAPAN FINE PRODUCTS CO., LTD.

**NMIJ Analysts**

The technical manager for this CRM is T. Shimosaka. The production manager is N. Matsumoto. The analysts are N. Matsumoto and K. Takada.

**Technical Information**

Customer registration on the NMIJ Website (given below) will facilitate notification of any revisions of the information given above. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko  
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
National Institute of Advanced Industrial Science and Technology,  
National Metrology Institute of Japan,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Phone: +81-29-861-4059; Fax: +81-29-861-4009, <https://www.nmij.jp/english/service/C/>

Revision history

May 26, 2022: The description in “Expiration of Certification” was changed to “March 31, 2023 from the date of shipment.”

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 3410-a02



## Nitrogen for LNG Analysis

This certified reference material (CRM) was produced in accordance with the NMIJ's management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended for use in the calibration of instruments and source material of nitrogen reference gas mixtures for liquefied natural gas (LNG) analysis.

**Certified Value**

The certified value for nitrogen in this CRM is given in the table below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ) of 2, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified value, Amount-of-substance fraction (mol/mol)	Expanded uncertainty Amount-of-substance fraction (mol/mol)	Cylinder Number
Nitrogen	7727-37-9	0.999996	0.000004	4MK-20834

**Analysis**

The amount-of-substance fraction of each impurity was determined by the analytical instruments listed below. The certified value was determined by the subtraction method (ISO 6142-1:2015).

Impurities	Analytical Instruments
Oxygen, Argon	Gas chromatograph with thermal-conductivity detector
Carbon dioxide	Gas chromatograph with flame ionization detector and nickel as catalyst
Total hydrocarbons	Total hydrocarbon analyzer
Water	Chilled mirror hygrometer

**Metrological Traceability**

The gas chromatographs and the total hydrocarbon analyzer used for the certification were calibrated using NMIJ's primary reference gases prepared by the gravimetric method in accordance with ISO 6142-1:2015. The chilled mirror hygrometer was calibrated using a reference dew point meter which was traceable to the International System of Units (SI). Therefore, the certified value is traceable to SI.

**Expiration of Certification**

This certificate is valid from the date of shipment to March 31, 2023, provided that this CRM is stored in accordance with the instructions given in this certificate.

**Description of the material**

This CRM, which is colorless and odorless gas, is supplied in a manganese steel high-pressure gas cylinder with an inner volume of 10 L. Specification of the outlet of the cylinder is W22-14 threads right (male). The residual pressure of this CRM in the cylinder is more than 10 MPa.

**Precautions for Storage**

This CRM should be stored in compliance with your country’s regulation for high pressure gases. This CRM should be kept temperature below 40 °C and stored at a place with good ventilation. Refer to the safety data sheet (SDS) on this CRM.

**Instructions for Use**

This CRM should be used around room temperature. This certificate is valid when residual pressure of this CRM is 1.5 MPa or more in gauge pressure. It is recommended that a high-pressure regulator made of stainless steel and stainless steel tubes should be used. Operation for their purge should be repeated sufficiently, in order to avoid the contamination.

**Precautions for Handling**

Refer to the SDS on this CRM before use. This CRM should be returned to Center for Quality Management of Metrology of AIST after use or after the expiry date.

**Preparation**

High-purity nitrogen gas was filled in the 10 L manganese cylinder by JAPAN FINE PRODUCTS CO., LTD.

**NMIJ Analysts**

The technical manager for this CRM is T. Shimosaka. The production manager is N. Matsumoto. The analysts are N. Matsumoto and K. Takada.

**Technical Information**

Customer registration on the NMIJ Website (given below) will facilitate notification of any revisions of the information given above. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko  
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
National Institute of Advanced Industrial Science and Technology,  
National Metrology Institute of Japan,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Phone: +81-29-861-4059; Fax: +81-29-861-4009, <https://www.nmij.jp/english/service/C/>

Revision history

May 26, 2022: The description in “Expiration of Certification” was changed to “March 31, 2023 from the date of shipment.”

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 3410-a03



## Nitrogen for LNG Analysis

This certified reference material (CRM) was produced in accordance with the NMIJ's management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended for use in the calibration of instruments and source material of nitrogen reference gas mixtures for liquefied natural gas (LNG) analysis.

**Certified Value**

The certified value for nitrogen in this CRM is given in the table below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ) of 2, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified value, Amount-of-substance fraction (mol/mol)	Expanded uncertainty Amount-of-substance fraction (mol/mol)	Cylinder Number
Nitrogen	7727-37-9	0.999996	0.000004	4MK-20835

**Analysis**

The amount-of-substance fraction of each impurity was determined by the analytical instruments listed below. The certified value was determined by the subtraction method (ISO 6142-1:2015).

Impurities	Analytical Instruments
Oxygen, Argon	Gas chromatograph with thermal-conductivity detector
Carbon dioxide	Gas chromatograph with flame ionization detector and nickel as catalyst
Total hydrocarbons	Total hydrocarbon analyzer
Water	Chilled mirror hygrometer

**Metrological Traceability**

The gas chromatographs and the total hydrocarbon analyzer used for the certification were calibrated using NMIJ's primary reference gases prepared by the gravimetric method in accordance with ISO 6142-1:2015. The chilled mirror hygrometer was calibrated using a reference dew point meter which was traceable to the International System of Units (SI). Therefore, the certified value is traceable to SI.

**Expiration of Certification**

This certificate is valid from the date of shipment to March 31, 2023, provided that this CRM is stored in accordance with the instructions given in this certificate.

**Description of the material**

This CRM, which is colorless and odorless gas, is supplied in a manganese steel high-pressure gas cylinder with an inner volume of 10 L. Specification of the outlet of the cylinder is W22-14 threads right (male). The residual pressure of this CRM in the cylinder is more than 10 MPa.

**Precautions for Storage**

This CRM should be stored in compliance with your country's regulation for high pressure gases. This CRM should be kept temperature below 40 °C and stored at a place with good ventilation. Refer to the safety data sheet (SDS) on this CRM.

**Instructions for Use**

This CRM should be used around room temperature. This certificate is valid when residual pressure of this CRM is 1.5 MPa or more in gauge pressure. It is recommended that a high-pressure regulator made of stainless steel and stainless steel tubes should be used. Operation for their purge should be repeated sufficiently, in order to avoid the contamination.

**Precautions for Handling**

Refer to the SDS on this CRM before use. This CRM should be returned to Center for Quality Management of Metrology of AIST after use or after the expiry date.

**Preparation**

High-purity nitrogen gas was filled in the 10 L manganese cylinder by JAPAN FINE PRODUCTS CO., LTD.

**NMIJ Analysts**

The technical manager for this CRM is T. Shimosaka. The production manager is N. Matsumoto. The analysts are N. Matsumoto and K. Takada.

**Technical Information**

Customer registration on the NMIJ Website (given below) will facilitate notification of any revisions of the information given above. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko  
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
National Institute of Advanced Industrial Science and Technology,  
National Metrology Institute of Japan,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Phone: +81-29-861-4059; Fax: +81-29-861-4009, <https://www.nmij.jp/english/service/C/>

Revision history

May 26, 2022: The description in "Expiration of Certification" was changed to "March 31, 2023 from the date of shipment."

National Institute of Advanced Industrial Science and Technology

## National Metrology Institute of Japan



## Reference Material Certificate

NMIJ CRM 3410-a04



## Nitrogen for LNG Analysis

This certified reference material (CRM) was produced in accordance with the NMIJ's management system and in compliance with ISO GUIDE 34:2009 and ISO/IEC 17025:2005. This CRM is intended for use in the calibration of instruments and source material of nitrogen reference gas mixtures for liquefied natural gas (LNG) analysis.

**Certified Value**

The certified value for nitrogen in this CRM is given in the table below. The uncertainty of the certified value is the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ) of 2, which gives a level of confidence of approximately 95 %.

	CAS No.	Certified value, Amount-of-substance fraction (mol/mol)	Expanded uncertainty Amount-of-substance fraction (mol/mol)	Cylinder Number
Nitrogen	7727-37-9	0.999996	0.000004	4MK-20836

**Analysis**

The amount-of-substance fraction of each impurity was determined by the analytical instruments listed below. The certified value was determined by the subtraction method (ISO 6142-1:2015).

Impurities	Analytical Instruments
Oxygen, Argon	Gas chromatograph with thermal-conductivity detector
Carbon dioxide	Gas chromatograph with flame ionization detector and nickel as catalyst
Total hydrocarbons	Total hydrocarbon analyzer
Water	Chilled mirror hygrometer

**Metrological Traceability**

The gas chromatographs and the total hydrocarbon analyzer used for the certification were calibrated using NMIJ's primary reference gases prepared by the gravimetric method in accordance with ISO 6142-1:2015. The chilled mirror hygrometer was calibrated using a reference dew point meter which was traceable to the International System of Units (SI). Therefore, the certified value is traceable to SI.

**Expiration of Certification**

This certificate is valid from the date of shipment to March 31, 2023, provided that this CRM is stored in accordance with the instructions given in this certificate.

**Description of the material**

This CRM, which is colorless and odorless gas, is supplied in a manganese steel high-pressure gas cylinder with an inner volume of 10 L. Specification of the outlet of the cylinder is W22-14 threads right (male). The residual pressure of this CRM in the cylinder is more than 10 MPa.

**Precautions for Storage**

This CRM should be stored in compliance with your country’s regulation for high pressure gases. This CRM should be kept temperature below 40 °C and stored at a place with good ventilation. Refer to the safety data sheet (SDS) on this CRM.

**Instructions for Use**

This CRM should be used around room temperature. This certificate is valid when residual pressure of this CRM is 1.5 MPa or more in gauge pressure. It is recommended that a high-pressure regulator made of stainless steel and stainless steel tubes should be used. Operation for their purge should be repeated sufficiently, in order to avoid the contamination.

**Precautions for Handling**

Refer to the SDS on this CRM before use. This CRM should be returned to Center for Quality Management of Metrology of AIST after use or after the expiry date.

**Preparation**

High-purity nitrogen gas was filled in the 10 L manganese cylinder by JAPAN FINE PRODUCTS CO., LTD.

**NMIJ Analysts**

The technical manager for this CRM is T. Shimosaka. The production manager is N. Matsumoto. The analysts are N. Matsumoto and K. Takada.

**Technical Information**

Customer registration on the NMIJ Website (given below) will facilitate notification of any revisions of the information given above. Technical reports regarding this CRM can be obtained from the contact details given below.

**Reproduction of Certificate**

In reproducing this certificate, it should be clearly indicated that the document is a copy.

April 1, 2020

ISHIMURA Kazuhiko  
President

National Institute of Advanced Industrial Science and Technology

If you have any questions about this CRM, please contact:  
National Institute of Advanced Industrial Science and Technology,  
National Metrology Institute of Japan,  
Center for Quality Management of Metrology, Reference Materials Office,  
1-1-1 Umezono, Tsukuba, Ibaraki 305-8563, Japan  
Phone: +81-29-861-4059; Fax: +81-29-861-4009, <https://www.nmij.jp/english/service/C/>

Revision history

May 26, 2022: The description in “Expiration of Certification” was changed to “March 31, 2023 from the date of shipment.”