



IndianOil

इंडियन ऑयल कॉर्पोरेशन लिमिटेड व्यवसाय समूह(क्रायोजेनिक)

Indian Oil Corporation Limited, BG (CRYOGENICS)

विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/131

Revision Number :- 0

Date :- 3/11/2023

Title :- Natural Gas Mass Flow Meter (8000 SCMH)

Item	Mass flow meter along with integral transmitter for Natural Gas
Operating Fluid	Natural Gas
Application	Natural Gas Flow Measurement For Custody Transfer
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C
Natural Gas Flow rate	Min : 6000 SCMH Nor : 8000 SCMH Max : 10000 SCMH (Flow meter should give both instantaneous and totalized flow output (For given time span))
Line Operating Pressure	Min : 15 Bar(g) Normal : 26 Bar(g) Max : 36 bar(g)
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4
Type	Coriolis Mass flow meter
Power Supply	24 V DC
Batch Accuracy	Better than or equal to +/- 0.5 %
Repeatability	Better than or equal to +/- 0.3 %
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.
End connection	100NB x 300# ASME B16.5 Flange End
Language	English
TPIA	As per Enquiry/PO
IP rating	IP 65 or better.
Output connectivity	4-20 mA and Modbus.
Certificate	Manufacturer test certificate. PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.

Prepared By :-

Authorized By :-



इंडियन ऑयल कॉर्पोरेशन लिमिटेड व्यवसाय समूह (क्रायोजेनिक)
Indian Oil Corporation Limited, BG (CRYOGENICS)
विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/131

Revision Number :- 0

Date :- 3/11/2023

Title :- Natural Gas Mass Flow Meter (8000 SCMH)

Drawing

GA Drawing of the system

3d .step/.iges/.prt of the Flow meter

Prepared By :-

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Indian Oil Corporation Limited, BG (CRYOGENICS)

विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/93

Revision Number :- 2

Date :- 8/3/2022

Title :- Natural Gas Mass Flow Meter

Item	Mass flow meter along with integral transmitter for Natural Gas
Operating Fluid	Natural Gas
Application	Natural Gas Flow Measurement For Custody Transfer
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C
Natural Gas Flow rate	Min : 10 Kg/hr Nor : 40 Kg/hr Max : 60 Kg/hr {Flow meter should give both instantaneous and totalized flow output (For given time span)}
Line Operating Pressure	Min : 1 Bar(g) Normal : 2 Bar(g) Max : 10 bar(g)
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4
Type	Coriolis Mass flow meter
Power Supply	24 V DC
Batch Accuracy	Better than or equal to +/- 0.5 %
Repeatability	Better than or equal to +/- 0.3 %
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.
End connection	25 NB x 150# ASME B16.5 Flange end
Language	English
TPIA	As per Enquiry/PO
IP rating	IP 65 or better.
Output connectivity	4-20 mA and Modbus.
Maximum Pressure Drop	0.5 Bar @ 2Bar Pressure and 40Kg/hr Flow
Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.

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Indian Oil Corporation Limited, BG (CRYOGENICS)

विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/07

Revision Number :- 3

Date :- 7/17/2023

Title :- SPECIFICATIONS FOR CNG MASS FLOW METER

Item	CNG Mass flow meter along with integral transmitter for L-CNG station.
Operating Fluid	Compressed Natural Gas.
Application	Natural Gas Flow Measurement For Custody Transfer
Fluid Operating Temperature range	-15 deg C to 60 deg C.
Natural Gas Flow rate	0 to 2000 Nm ³ /Hr. (0 to 1350 Kg/hr) {Flow meter should give both instantaneous and totalized flow output (For given time span)}
Line Operating Pressure	10 bar(g) to 300 bar (g).
Hazardous Area Classification	Meter & its accessories connected in CNG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4
Type	Coriolis Mass flow meter
Power Supply	24 V DC
Batch Accuracy	Better than or equal to +/- 0.6 % of Measured Value (When minimum flow rate is 2 kg/min)
Repeatability	Better than or equal to +/- 0.3 % of Measured Value (When minimum flow rate is 2 kg/min)
MOC of Wetted part	316/316 L/SS904L
End connection	¾" Female NPT
Language	English
TPIA	As per Enquiry/PO
IP rating	IP 65 or better.
Output connectivity	4-20 mA and Modbus.
Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like IS barrier, flow meter etc. Indian Weight and Measure Approval Certificate.
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.

Prepared By :-

Authorized By :-



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इंडियन ऑयल कॉर्पोरेशन लिमिटेड व्यवसाय समूह(क्रायोजेनिक)

Indian Oil Corporation Limited, BG (CRYOGENICS)

विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/71

Revision Number :- 1

Date :- 12/3/2021

Title :- Specifications for LNG Mass Flow Meter

Item	Mass Flow meter along with integral Transmitter for LNG/CGD Station.
Operating Fluid	LNG
Fluid Operating Temperature Range	-10 deg C to 40 deg C
LNG Flow rate	400 LPM min. (Pressure drop across flow meter should not exceed 1 bar)
Hazardous Area Classification	Meter & its accessories connected in LNG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4
Type	Coriolis Mass flow meter , With In-line mounting design
Batch Accuracy	Better than or equal to +/- 0.5 %(When minimum flow rate is 50 LPM)
Repeatability	Better than or equal to +/- 0.3 %(When minimum flow rate is 50LPM)
Operating Fluid Properties (LNG)	Temperature Range :- -162 to -120 deg C LNG Desity :- 0.42 Kg/Liters to 0.47 Kg/Liters Dynamic Viscosity :- 0.117 to 0.146 cP
Operating Pressure	4 Kg/cm ² to 14 Kg/cm ²
MOC of Wetted part	316/316 L/SS904L
End connection	ASME B16.5 40NB x 300#
Interface Language	English
TPIA	As per Enquiry/PO
IP rating	IP 65 or better.
Output connectivity	4-20 mA and Modbus.
Input Supply	24 VDC
Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like IS barrier, flow meter etc. Weight and Measure Approval Certificate.
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.

Prepared By :-

Authorized By :-



इंडियन ऑयल कॉर्पोरेशन लिमिटेड व्यवसाय समूह (क्रायोजेनिक)

Indian Oil Corporation Limited, BG (CRYOGENICS)

विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/110

Revision Number :- 2

Date :- 2/20/2024

Title :- Natural Gas Mass Flow Meter (5000 Nm³/hr) Flow

Item	Mass flow meter along with integral transmitter for Natural Gas
Operating Fluid	Natural Gas
Application	Natural Gas Flow Measurement For Custody Transfer
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C
Natural Gas Flow rate	Min : 3000 Nm ³ /hr Nor : 5000 Nm ³ /hr Max : 6500 Nm ³ /hr (Flow meter should give both instantaneous and totalized flow output (For given time span))
Line Operating Pressure	Min : 15 Bar(g) Normal : 26 Bar(g) Max : 36 bar(g)
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4
Type	Coriolis Mass flow meter
Power Supply	24 V DC
Batch Accuracy	Better than or equal to +/- 0.5 %
Repeatability	Better than or equal to +/- 0.3 %
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.
End connection	50NB x 300# ASME B16.5 Flange End
Language	English
TPIA	As per Enquiry/PO
IP rating	IP 65 or better.
Output connectivity	4-20 mA and Modbus.
Certificate	Manufacturer test certificate. PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.

Prepared By :-

Authorized By :-



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Indian Oil Corporation Limited, BG (CRYOGENICS)
विशेष विवरण/STANDARD SPECIFICATION

Specification Number :- LCNG/110

Revision Number :- 2

Date :- 2/20/2024

Title :- Natural Gas Mass Flow Meter (5000 Nm³/hr) Flow

Documents(In English language)

Operation and Maintenance manual of mass flow meter.
GA diagram

3d .step/.iges/.prt of the Flow meter

Prepared By :-

Authorized By :-



Indian Oil Corporation Limited, BG (CRYOGENICS) Technical Check List

Technical Checklist Number :- TC@LCNG/131

Date :- 3/11/2023

Technical Checklist For :- Natural Gas Mass Flow Meter (8000 SCMH)

<u>Item</u>	<u>Description</u>	<u>Compliance</u>
Item	Mass flow meter along with integral transmitter for Natural Gas	Yes / No
Operating Fluid	Natural Gas	Yes / No
Application	Natural Gas Flow Measurement For Custody Transfer	Yes / No
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C	Yes / No
Natural Gas Flow rate	Min : 6000 SCMH Nor : 8000 SCMH Max : 10000 SCMH (Flow meter should give both instantaneous and totalized flow output (For given time span))	Yes / No
Line Operating Pressure	Min : 15 Bar(g) Normal : 26 Bar(g) Max : 36 bar(g)	Yes / No
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4	Yes / No
Type	Coriolis Mass flow meter	Yes / No
Power Supply	24 V DC	Yes / No
Batch Accuracy	Better than or equal to +/- 0.5 %	Yes / No
Repeatability	Better than or equal to +/- 0.3 %	Yes / No
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.	Yes / No
End connection	100NB x 300# ASME B16.5 Flange End	Yes / No
Language	English	Yes / No
TPIA	As per Enquiry/PO	Yes / No
IP rating	IP 65 or better.	Yes / No
Output connectivity	4-20 mA and Modbus.	Yes / No

Seal and Sign of bidder :-



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**Indian Oil Corporation Limited, BG (CRYOGENICS)
Technical Check List**

Technical CheckList Number :- TC@LCNG/131

Date :- 3/11/2023

Technical Checklist For :- Natural Gas Mass Flow Meter (8000 SCMH)

Certificate	Manufacturer test certificate. PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.	Yes / No
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.	Yes / No
Drawing	GA Drawing of the system 3d .step/.iges/.prt of the Flow meter	Yes / No

Seal and Sign of bidder :-



Indian Oil Corporation Limited, BG (CRYOGENICS) Technical Check List

Technical Checklist Number :- TC@ LCNG/93

Date :- 8/3/2022

Technical Checklist For :- Natural Gas Mass Flow Meter

<u>Item</u>	<u>Description</u>	<u>Compliance</u>
Item	Mass flow meter along with integral transmitter for Natural Gas	Yes / No
Operating Fluid	Natural Gas	Yes / No
Application	Natural Gas Flow Measurement For Custody Transfer	Yes / No
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C	Yes / No
Natural Gas Flow rate	Min : 10 Kg/hr Nor : 40 Kg/hr Max : 60 Kg/hr {Flow meter should give both instantaneous and totalized flow output (For given time span)}	Yes / No
Line Operating Pressure	Min : 1 Bar(g) Normal : 2 Bar(g) Max : 10 bar(g)	Yes / No
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4	Yes / No
Type	Coriolis Mass flow meter	Yes / No
Power Supply	24 V DC	Yes / No
Batch Accuracy	Better than or equal to +/- 0.5 %	Yes / No
Repeatability	Better than or equal to +/- 0.3 %	Yes / No
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.	Yes / No
End connection	25 NB x 150# ASME B16.5 Flange end	Yes / No
Language	English	Yes / No
TPIA	As per Enquiry/PO	Yes / No
IP rating	IP 65 or better.	Yes / No
Output connectivity	4-20 mA and Modbus.	Yes / No
Maximum Pressure Drop	0.5 Bar @ 2Bar Pressure and 40Kg/hr Flow	Yes / No

Seal and Sign of bidder :-



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**Indian Oil Corporation Limited, BG (CRYOGENICS)
Technical Check List**

Technical CheckList Number :- TC@ LCNG/93

Date :- 8/3/2022

Technical Checklist For :- Natural Gas Mass Flow Meter

Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.	Yes / No
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.	Yes / No

Seal and Sign of bidder :-



Indian Oil Corporation Limited, BG (CRYOGENICS) Technical Check List

Technical Checklist Number :- TC@LCNG/07

Date :- 7/17/2023

Technical Checklist For :- SPECIFICATIONS FOR CNG MASS FLOW METER

<u>Item</u>	<u>Description</u>	<u>Compliance</u>
Item	CNG Mass flow meter along with integral transmitter for L-CNG station.	Yes / No
Operating Fluid	Compressed Natural Gas.	Yes / No
Application	Natural Gas Flow Measurement For Custody Transfer	Yes / No
Fluid Operating Temperature range	-15 deg C to 60 deg C.	Yes / No
Natural Gas Flow rate	0 to 2000 Nm ³ /Hr. (0 to 1350 Kg/hr) {Flow meter should give both instantaneous and totalized flow output (For given time span)}	Yes / No
Line Operating Pressure	10 bar(g) to 300 bar (g).	Yes / No
Hazardous Area Classification	Meter & its accessories connected in CNG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4	Yes / No
Type	Coriolis Mass flow meter	Yes / No
Power Supply	24 V DC	Yes / No
Batch Accuracy	Better than or equal to +/- 0.6 % of Measured Value (When minimum flow rate is 2 kg/min)	Yes / No
Repeatability	Better than or equal to +/- 0.3 % of Measured Value (When minimum flow rate is 2 kg/min)	Yes / No
MOC of Wetted part	316/316 L/SS904L	Yes / No
End connection	¾" Female NPT	Yes / No
Language	English	Yes / No
TPIA	As per Enquiry/PO	Yes / No
IP rating	IP 65 or better.	Yes / No
Output connectivity	4-20 mA and Modbus.	Yes / No
Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like IS barrier, flow meter etc. Indian Weight and Measure Approval Certificate.	Yes / No
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.	Yes / No

Seal and Sign of bidder :-



Indian Oil Corporation Limited, BG (CRYOGENICS) Technical Check List

Technical Checklist Number :- TC@ LCNG/71

Date :- 12/3/2021

Technical Checklist For :- Specifications for LNG Mass Flow Meter

<u>Item</u>	<u>Description</u>	<u>Compliance</u>
Item	Mass Flow meter along with integral Transmitter for LNG/CGD Station.	Yes / No
Operating Fluid	LNG	Yes / No
Fluid Operating Temperature Range	-10 deg C to 40 deg C	Yes / No
LNG Flow rate	400 LPM min. (Pressure drop across flow meter should not exceed 1 bar)	Yes / No
Hazardous Area Classification	Meter & its accessories connected in LNG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4	Yes / No
Type	Coriolis Mass flow meter , With In-line mounting design	Yes / No
Batch Accuracy	Better than or equal to +/- 0.5 %(When minimum flow rate is 50 LPM)	Yes / No
Repeatability	Better than or equal to +/- 0.3 %(When minimum flow rate is 50LPM)	Yes / No
Operating Fluid Properties (LNG)	Temperature Range :- -162 to -120 deg C LNG Density :- 0.42 Kg/Liters to 0.47 Kg/Liters Dynamic Viscosity :- 0.117 to 0.146 cP	Yes / No
Operating Pressure	4 Kg/cm ² to 14 Kg/cm ²	Yes / No
MOC of Wetted part	316/316 L/SS904L	Yes / No
End connection	ASME B16.5 40NB x 300#	Yes / No
Interface Language	English	Yes / No
TPIA	As per Enquiry/PO	Yes / No
IP rating	IP 65 or better.	Yes / No
Output connectivity	4-20 mA and Modbus.	Yes / No
Input Supply	24 VDC	Yes / No
Certificate	Manufacturer test certificate.PESO approval certificate for all the electrical/electronic items used in the system like IS barrier, flow meter etc. Weight and Measure Approval Certificate.	Yes / No
Documents(In English language)	Operation and Maintenance manual of mass flow meter.P &ID and GA diagram of system.	Yes / No

Seal and Sign of bidder :-



Indian Oil Corporation Limited, BG (CRYOGENICS) Technical Check List

Technical Checklist Number :- TC@LCNG/110

Date :- 2/20/2024

Technical Checklist For :- Natural Gas Mass Flow Meter (5000 Nm³/hr) Flow

<u>Item</u>	<u>Description</u>	<u>Compliance</u>
Item	Mass flow meter along with integral transmitter for Natural Gas	Yes / No
Operating Fluid	Natural Gas	Yes / No
Application	Natural Gas Flow Measurement For Custody Transfer	Yes / No
Fluid Operating Temperature range	Min : -10 Deg C Normal : 10 Deg C Max : 40 Deg C	Yes / No
Natural Gas Flow rate	Min : 3000 Nm ³ /hr Nor : 5000 Nm ³ /hr Max : 6500 Nm ³ /hr (Flow meter should give both instantaneous and totalized flow output (For given time span))	Yes / No
Line Operating Pressure	Min : 15 Bar(g) Normal : 26 Bar(g) Max : 36 bar(g)	Yes / No
Hazardous Area Classification	Meter & its accessories connected in NG pipeline shall be suitable for Hazardous Zone 1, gas group II B, T4	Yes / No
Type	Coriolis Mass flow meter	Yes / No
Power Supply	24 V DC	Yes / No
Batch Accuracy	Better than or equal to +/- 0.5 %	Yes / No
Repeatability	Better than or equal to +/- 0.3 %	Yes / No
MOC of Wetted part	316/316 L/904L/or other suitable grade of SS as per manufacturer standard.	Yes / No
End connection	50NB x 300# ASME B16.5 Flange End	Yes / No
Language	English	Yes / No
TPIA	As per Enquiry/PO	Yes / No
IP rating	IP 65 or better.	Yes / No
Output connectivity	4-20 mA and Modbus.	Yes / No

Seal and Sign of bidder :-



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**Indian Oil Corporation Limited, BG (CRYOGENICS)
Technical Check List**

Technical Checklist Number :- TC@LCNG/110

Date :- 2/20/2024

Technical Checklist For :- Natural Gas Mass Flow Meter (5000 Nm³/hr) Flow

Certificate	Manufacturer test certificate. PESO approval certificate for all the electrical/electronic items used in the system like flow meter etc. Indian Weight and Measure Approval Certificate.	Yes / No
Documents(In English language)	Operation and Maintenance manual of mass flow meter. GA diagram 3d .step/.iges/.prt of the Flow meter	Yes / No

Seal and Sign of bidder :-