



THE LINDE GROUP 	<b>PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.</b>	 An affiliate of Air Products & Chemicals, Inc., USA
<b>Linde Project No.: 47000173</b>	<b>Linde Doc. No.: 0100 P-QA 1106</b>	<b>Client Project No.: IMPACT-4L</b>

## 200 TPD LIQUID AIR SEPARATION PLANT

### Performance Guarantee Test Report



Modinagar, U.P., India

LINDE Project No.: 47000173

LINDE Document No.: 0100-P-QA-1106

01	1.0	15.06.2021	Performance Guarantee Test Report	MC	MS	MC
<b>Status</b>	<b>Issue</b>	<b>Date</b>	<b>Description</b>	<b>Prepared</b>	<b>Checked</b>	<b>Approved</b>



	<b>PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.</b>	
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## 1. Performance Test Period

The performance test has been carried out for a period of <u>24</u> hours	Date	Time
Performance test Start	08/06/2021	09:00
Performance test End	09/06/2021	09:00
<b>Evaluation hours: 09:00 hrs to 09:00 hrs =</b>	<b>24 Hours</b>	

## 2. Ambient Conditions

Property	Units	Design value	PG Test (Actual recorded values)
Ambient Dry Bulb temperature	°C	35	36.3
Relative Humidity	%	70	44.24
Barometric Pressure	Bar (A)	0.989	0.9872
CWS temperature	°C	33	28.62
Frequency	Hz	50	50

## 3. Plant Performance

Parameters	Unit	Design Case	Actual – PG Test
<b>LOX - Produciton</b>	Nm <sup>3</sup> /hr	4350	4385.79
	TPD	149.1	150.37
<b>LOX - Purity</b>	% O <sub>2</sub>	99.5	100.16
<b>LIN - Produciton</b>	Nm <sup>3</sup> /hr	1800	1854
	TPD	54	55.62
<b>LIN - Purity</b>	PPM O <sub>2</sub>	1	0.485
<b>LAR - Produciton</b>	Nm <sup>3</sup> /hr	140	164.13
	TPD	6	7.034
<b>LAR - Purity</b>	PPM O <sub>2</sub>	1	0.84
	PPM N <sub>2</sub>	1	0.06

## 4. Electrical Power Consumption

Parameter	Design - Guaranteed	PG Test – Actual Recorded	Final Power Consumption (Corrected for ambient conditions at site & excess liquid production)
Total Power consumption at 200 m elevation from sea level (KWh)	5462	5542.5	<b>5509.157</b>
Power with tolerance of +1%	<b>5516.62</b>		<b>Met Performance Guarantee</b>

**NOTE:** 1. PG test actual power included in the consumption values are all continuous consumers required for the production, process tolerances and losses in the LT transformers.

2. Electricity consumption is measured at the 6.6 kV incoming switchgear.



**Corrections for-**

- # Ambient Temperature
- # Cooling Water Temperature
- # Humidity
- # Excess / Shortfall of Liquid Production

Parameters	Unit	Design	Actual 24 hr avg	Actual	Effect	MAC power corrected for ambient
Electric Frequency	Hz	50	50	5212.5	0	5146.85
Voltage	V	6.6	6.6		0	
Dry Bulb Temperature	°C	35	36.3		-6.65	
CWS Temperature	°C	33	28.62		+57.3	
Barometric Pressure	Mbar	989	987.2		-4.2	
Altitude	m	200	219			
R.H.	%	70	44.24		+19.2	
Power correction for MAC	KWh				65.65	

Parameters	Unit	Design	Actual 24 hr avg	Design power during PGT at switch gear (for 200 m elevation)	Actual power during PGT at switch gear	Plant power corrected for ambient conditions & Excess production
Electric Frequency	Hz	50	50	5462 + 1% tolerance = 5516.62	5542.54	5608.15
Voltage	V	6.6	6.6			
Dry Bulb Temperature	°C	35	36.3			
CWS Temperature	°C	33	28.62			
Barometric Pressure	Mbar	989	987.2			
Altitude	m	200	219			
R.H.	%	70	44.24			
Design Production	Nm <sup>3</sup> /hr	6290		Power Correction for excess production	98.9933	5509.157
Actual Production	Nm <sup>3</sup> /hr		6404			
Excess Production	Nm <sup>3</sup> /hr	114				

**Note:** Refer raw data collected during PG test period given below as annexure





**PGTR ACCEPTANCE CERTIFICATE  
FOR  
200 TPD IMPACT-4L ASU,  
MODINAGAR, U.P.**



**Performance Guarantee Test Conclusion**

**PG test has met the performance guarantee condition as per the contract.**

**On behalf of Linde**

**Date: 15/06/21**

**Name: Manish Sharma**



**Signature:**

**On behalf of InoxAP**

**Date:**

**Name:**

**Signature:**



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# PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.

 Linde Project No.: <b>47000173</b>	<b>PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.</b> Linde Doc. No.: <b>0100 P-QA 1106</b>	 Client Project No.: <b>IMPACT-4L</b>
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Buyer:	INOXAP		
Seller:	LINDE INDIA LTD.		
Buyer job / Order No:			Contract date:
LINDE-Project No:	47000173	Client Code:	IMPACT-4L
Plant:	200 TPD AIR SEPARATION UNIT, MODINAGAR, U.P.		
Date of Mechanical Completion:	10-Aug-2020		
Date of Start-up:	30-Sept-2020		
<b>Particulars of Completion of Commissioning and PG test:</b>			
1	<p>The guarantee test run for demonstration of the contractually specified performances and consumption values as well as purities has been carried out as follows:</p> <p>Start Date: 08-Jun-2021 Time: 09:00 hrs End Date: 09-Jun-2021 Time: 09:00 hrs</p> <p>For duration of 24 hours, the Plant had achieved the contractually specified performances, consumption and purities as per Performance Test Report (Attachment 1). The performance test had been stopped after continuous run of 24 hours by Linde management to establish the rated production of LOX, LIN, LAR as per the requirement of final customer M/s INOXAP.</p>		
2	The work listed in the Punch List remains to be carried out. Both parties confirm that this work does not impair the observance of safety regulations nor the operation of the Plant.		
3	The Buyer confirms that his operating personnel has been acquainted by Linde or his representatives with the operation and maintenance of the Plant, both theoretically and practically and has been instructed on the safety equipments of the Plant.		
4	The Plant is hereby accepted as per the Date _____ (Date)		
5	<p>The following shall form part of this Acceptance Certificate:</p> <p>Attachment 1: Performance Test Report      Dated: _____</p> <p>Attachment 2: Final Punch Point List</p>		
<p><b>MODINAGAR, U.P.</b>      <b>09-June-2021</b></p> <p>Location      Date</p> <p><b>INOXAP</b>      <b>LINDE INDIA LIMITED</b></p> <p>Buyer      Seller:</p>			

  
(INOX PLANT MANAGER)

  
(LIL-COMMISSIONING) 09/06/21



  
(LIL-COMMISSIONING) 09/06/21  
(10/6/21)



# PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.


**INOX AIR  
PRODUCTS**

An affiliate of Air Products &amp; Chemicals, Inc., USA

	<b>PGTR ACCEPTANCE CERTIFICATE FOR 200 TPD IMPACT-4L ASU, MODINAGAR, U.P.</b>	
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## PERFORMANCE TEST RESULTS

### 1. Performance Test Period

The performance Test has been carried out for a period of:			24 hours
Performance Test Start:			08/06/2021 @ 09:00
Performance Test End:			09/06/2021 @ 09:00
Evaluation of 24 hours:	From	08/06/2021 @ 09:00	To 09/06/2021 @ 09:00

### 2. Production Results LOX

LOX	Unit	Guarantee Data	Measured Data
Flow average	Nm <sup>3</sup> /h	4350	4385.79
Purity minimum	% O <sub>2</sub>	99.5	100.16

### 3. Production Results LIN

LIN	Unit	Guarantee Data	Measured Data
Flow average	Nm <sup>3</sup> /h	1800	1854
Purity minimum	O <sub>2</sub> PPM	1 PPM	0.485

### 4. Production Results LAR

LAR	Unit	Guarantee Data	Measured Data
Flow average	Nm <sup>3</sup> /h	140	164.13
Purity minimum	PPM O <sub>2</sub>	1	0.84
Purity minimum	PPM N <sub>2</sub>	1	0.06

### 5. Power Consumption

Total Agreed upon Power at switch gear	kWh	5462
Contractual Measuring Tolerance (+/- 1%)	kWh	5408 to 5516
Power Readings during PGT		
Total Power (24 hour average)	kWh	5542.54

MAC POWER TO BE CORRECTED FOR AMBIENT'S CH-5 TEMPERATURES AS PER DESIGN BASIS.

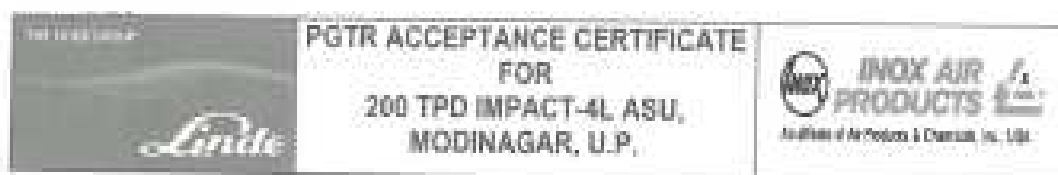
### 6. Specific Power Consumption

Design SPC (KW/Nm <sup>3</sup> )	0.368
Actual SPC during PGT (KW/Nm <sup>3</sup> )	0.885

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20/06/21

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20/06/21  
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### PERFORMANCE TEST DATA

	START READING (with Date & Time)	END READING (with Date & Time)	AVERAGE READING
LOX (TPD)	403.02 (08/06/2021 @ 09:00AM)	553.39 (08/06/2021 @ 09:00AM)	150.37 T = 4385.79 Nm <sup>3</sup> /hr
LIN (TPD) (LIN Tank A in filling)	73.06 (08/06/2021 @ 09:00 AM)	128.68 (08/06/2021 @ 09:00AM)	55.82 T = 1854 Nm <sup>3</sup> /hr
LAR (TPD)	10.983 (08/06/2021 @ 09:00 AM)	18.017 (08/06/2021 @ 09:00AM)	7.034 T = 164.13 Nm <sup>3</sup> /hr
AVG. MAC POWER CONSUMPTION (MWh)	32958.2 (08/06/2021 @ 09:00 AM)	33083.3 (08/06/2021 @ 09:00AM)	125.1 MWh = 5212.5 KWh
AVG POWER CONSUMPTION (LT power*) <small>* excludes lighting/ Admin bldg / TP compressor connections</small>			330.04 KWh

*Data is verified and mutually  
agreed upon*

  
**VINAY TYAGI**  
 (IMPACT PLANT MANAGER)

  
 (MOHAR CHATTOPADHYAY)  
 LINDE COMMISSIONING



**7. Remarks**

No.	Remarks	LINDE	INOXAP
1	We have 7 No Butterfly (Performance) control valve out of 7 we are doing calibration issue & having issues in 5 No valve. FU 3987-1 is having huge vibration & humming sound in side unit code.		
2	In Turbine section oil pressure, redundancy over cranker pump is not working. Machine got stalled/skipped during running due to low oil pressure.		
3	Unit 4 LIN Liquid Recomp Pump are getting Trip (OL Trip) after VITS of killed gas.		
4			
5			
6			
7			
8			