1 Title: Procure Fully Interchangeable Replacement Liquid Nitrogen Pump 12

2 Background:

The National Transonic Facility is a high-pressure, cryogenic, closed-circuit wind tunnel that uses supercold nitrogen gas at high pressure to duplicate true flight aerodynamics. The Liquid Nitrogen Pump 12 (P12) is one of the pumps that supplies liquid nitrogen to the facility. Liquid Nitrogen is stored in the 3000 Ton tank and then transferred to the 800 Ton tank. This task is to procure a fully interchangeable critical spare for P12.

3 Description of work to be performed:

This task is to procure a Liquid Nitrogen Pump with the same mechanical, electrical, and controls interfaces as the existing Cryostar CS400/355/20L Pump with Serial Number 96013/02.

3.1 Existing Pump Specifications:

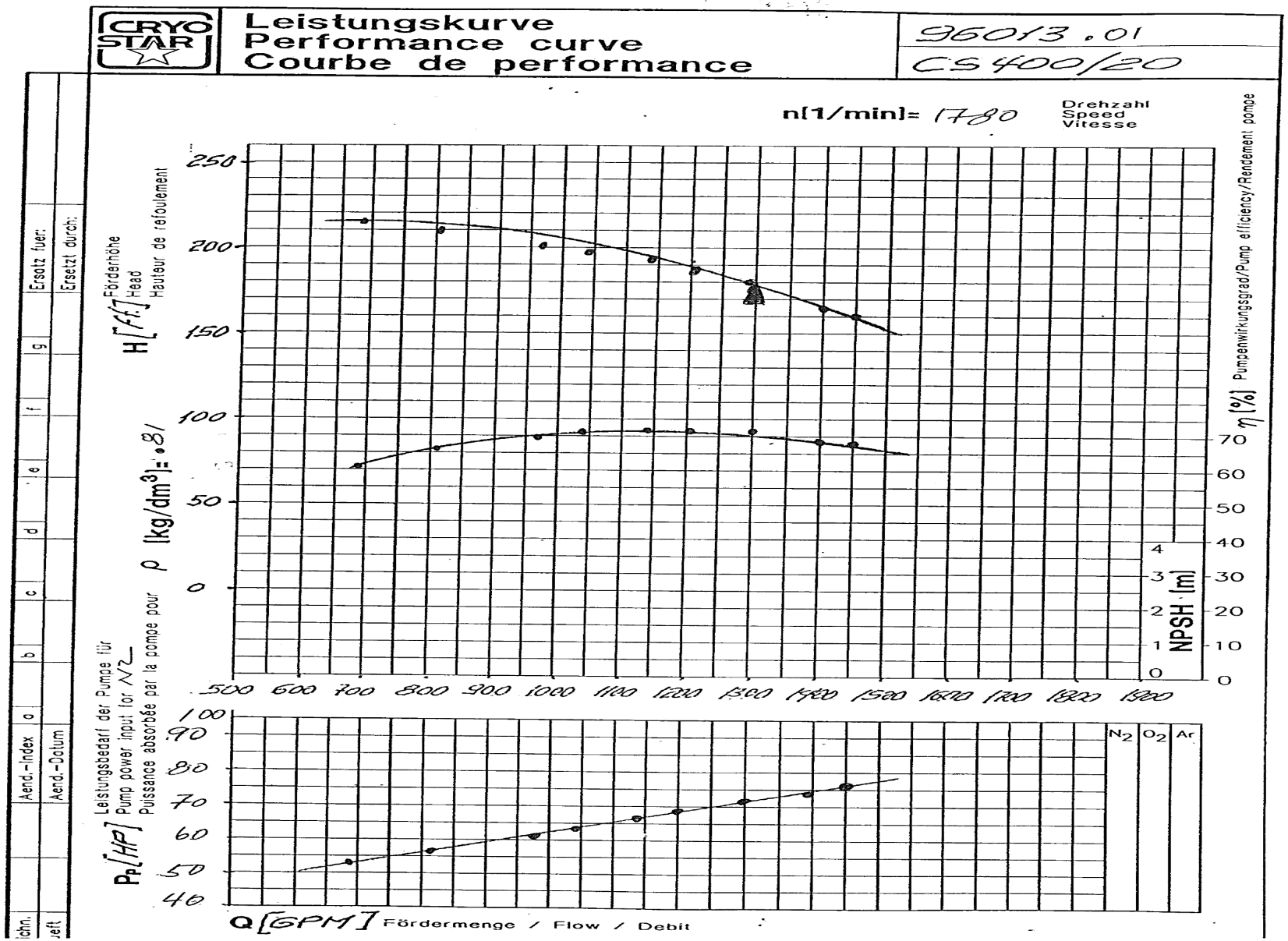
- Single Stage
- 400 mm nominal impeller diameter
- 355 mm trimmed impeller diameter
- 20 mm tip width
- 1780 rpm

3.2 Operating Data

- LN2
- (-195°C) Liquid Temperature
- 5 barg Maximum Suction Pressure
- Minimum NPSH 1.4m
- 1300 gpm Flow Rate
- Differential Head 180 ft.

3.3 Existing Motor Specifications

- 405 TD, NEMA
- 60 Hz, 3 Phase, 480V, 100 Hp
- Unclog and verify orifice plug.
- Clean cable block in prep for unit assembly.


CRYO STAR
Leistungskurve
Performance curve
Courbe de performance
96013.01
CS 400/20
n[1/min]= 1780
Drehzahl
Speed
Vitesse
H[ft] Förderhöhe
Head
Hauteur de refoulement
ρ [kg/dm³]= .81
η [%] Pumpenwirkungsgrad/Pump efficiency/Rendement pompe
NPSH [m]
250
200
150
100
50
0
70
60
50
40
30
20
10
4
3
2
1
500 600 700 800 900 1000 1100 1200 1300 1400 1500 1600 1700 1800 1900
Pe [HP] Leistungsbedarf der Pumpe für
Pump power input for N2
Puissance absorbée par la pompe pour
100
90
80
70
60
50
40
N2
O2
Ar
Q [GPM] Fördermenge / Flow / Debit
Ersatz für:
Ersetzt durch:
Aend.-Index
Aend.-Datum
ichn.
eft

3.5 New Pump Specifications

- LIN Transfer – MCP 400/20L-1.7-CB-WB C/0
    - Vertical centrifugal pump
    - PT100 Sensor in lantern for seal leakage detection
    - Heating cable for thermal barrier
    - Grease retaining chamber with N2 purge
    - Close warm box with N2 purge
    - 2-chamber labyrinth seal
    - Cold box isolation plate
- Electric motor LSES280SD of 75kW – 4 poles – fixed speed – 480V – 60 Hz
    - Anticondensation heater 120V in separate Junction Box
    - 3xPTC in winding
    - 2XPT100 at Drive End bearing
    - Grease nipples
    - Painting type C3 according to ISO 12944-2
- Seal gas control panel (installed and fully wired onto the pump)
- Labyrinth seal Low Pressure Drop control panel according to preliminary panel drawing No 763206054 and to preliminary P&ID No 704206221-41
- Including mechanical performance test in cryogenic conditions with LIN on duty point
- Documentation as per Cryostar standard limited to IOM, Assembly checklist and Performance test report in PDF sent by email

3.6 Spare parts

- Commissioning Kit for Installation and Start-up

3.7 Seaworth Packing

4 Period of Performance

This valve shall be procured and delivered to Langley prior to June 30, 2027.

5 Shipping Address

NASA Langley Research Center
Central Receiving
4 South Marvin Street
Building 1206
Hampton, VA 23681-2199