RF02-38065

API 610, 8TH EDITION CENTRIFUGAL PUMP DATA SHEET US UNITS / US STANDARDS (1.2.2)

JOB NO. ____ ITEM NO. ____
REQ / SPEC NO. ____ / ____
PURCH ORDER NO. ____ DATE ____
INQUIRY NO. ____ BY ____
REVISION ____ DATE ____

1 APPLICABLE TO: [X] PROPOSAL ○ PURCHASE [O] AS BUILT
2 FOR NASA AMES RESEARCH CENTER UNIT ____
3 SITE N238 DI PUMP STATION SERVICE ____
4 NO. REQ 5 PUMP SIZE 2000 HP TYPE ____ NO. STAGES ____
5 MANUFACTURER ____ MODEL ____ SERIAL NO. ____
6 NOTE: ○ INDICATES INFORMATION COMPLETED BY PURCHASER [ ] BY MANUFACTURER [O] BY MANUFACTURER OR PURCHASER

7 ○ GENERAL (3.1.1)
8 PUMPS TO OPERATE IN (PARALLEL) NO. MOTOR DRIVEN 5 NO. TURBINE DRIVEN ____
9 (SERIES) WITH ____ PUMP ITEM NO. ____ PUMP ITEM NO. ____
10 GEAR ITEM NO. ____ MOTOR ITEM NO. ____ TURBINE ITEM NO. ____
11 GEAR PROVIDED BY ____ MOTOR PROVIDED BY ____ TURBINE PROVIDED BY ____
12 GEAR MOUNTED BY ____ MOTOR MOUNTED BY ____ TURBINE MOUNTED BY ____
13 GEAR DATA SHEET NO. ____ MOTOR DATA SHEET NO. ____ TURBINE DATA SHEET NO. ____

14 OPERATING CONDITIONS
15 [X] CAPACITY, NORMAL ____ (GPM) RATED 2500 (GPM)
16 OTHER ____
17 ○ SUCTION PRESSURE MAX/RATED ____ / ____ (PSIG)
18 [X] DISCHARGE PRESSURE 900 (PSIG)
19 ○ DIFFERENTIAL PRESSURE ____ (PSIG)
20 ○ DIFFERENTIAL HEAD ____ (FT) NPSHA 41 (FT)
21 ○ PROCESS VARIATIONS ____ (3.1.2)
22 ○ STARTING CONDITIONS ____ (3.1.3)
23 SERVICE: ○ CONTINUOUS [X] INTERMITTENT (START/DAY) 10
24 [X] PARALLEL OPERATION REQ'D (2.1.11)

25 SITE AND UTILITY DATA
26 LOCATION: (2.1.29)
27 ○ INDOOR ○ HEATED ○ UNDER ROOF
28 [X] OUTDOOR ○ UNHEATED ○ PARTIAL SIDES
29 ○ GRADE ○ MEZZANINE ○ ____
30 ○ ELECTRICAL AREA CLASSIFICATION (2.1.22 / 3.1.5)
31 CL ____ GR ____ DIV ____
32 ○ WINTERIZATION REQ'D ○ TROPICALIZATION REQ'D
33 SITE DATA (2.1.29)
34 [X] ALTITUDE 5 (FT) BAROMETER ____ (PSIA)
35 [X] RANGE OF AMBIENT TEMPS: MIN/MAX 20 / 105 (°F)
36 [X] RELATIVE HUMIDITY: MIN/MAX 40 / 100 (%)
37 UNUSUAL CONDITIONS (2.1.23) ○ DUST ○ FUMES
38 [X] OTHER WATER MIST
39 [X] UTILITY CONDITIONS:
40 STEAM: DRIVERS HEATING
41 MIN ____ (PSIG) ____ (°F) ____ (PSIG) ____ (°F)
42 MAX ____ (PSIG) ____ (°F) ____ (PSIG) ____ (°F)
43 ELECTRICITY: DRIVERS HEATING CONTROL SHUTDOWN
44 VOLTAGE 4160
45 HERTZ 60
46 PHASE 3
47 COOLING WATER: (2.1.17)
48 TEMP INLET ____ (°F) MAX RETURN ____ (°F)
49 PRESS NORMAL ____ (PSIG) DESIGN ____ (PSIG)
50 MIN RETURN ____ (PSIG) MAX ALLOW DP ____ (PSI)
51

SITE AND UTILITY DATA (CONT.)
WATER SOURCE ____
CHLORIDE CONCENTRATION (PPM) ____ (3.5.2.6)
INSTRUMENT AIR: MAX/MIN PRESS ____ / ____ (PSIG)

LIQUID
[X] TYPE/NAME OF LIQUID DE-IONIZED WATER
[X] PUMPING TEMPERATURE:
NORMAL 68 (°F) MAX 100 (°F) MIN 40 (°F)
[X] VAPOR PRESSURE 0.95 (PSIA) @ 100 (°F)
[X] RELATIVE DENSITY (SPECIFIC GRAVITY):
NORMAL 1.0 MAX 1.0 MIN 1.0
○ SPECIFIC HEAT, Cp ____ (BTU/LB °F)
○ VISCOSITY ____ (cP) @ ____ (°F)
○ MAX VISCOSITY ____ (cP)
[X] CORROSIVE/EROSIVE AGENT DE-IONIZED WATER (2.11.1.8)
[X] CHLORIDE CONCENTRATION (PPM) 0 (3.5.2.6)
[X] H_2S CONCENTRATION (PPM) 0 (2.11.1.11)
LIQUID (2.1.3) ○ HAZARDOUS ○ FLAMMABLE
[X] OTHER 25 MicroMHO, Ph: 5.8-6.8

PERFORMANCE
PROPOSAL CURVE NO. ____ [ ] RPM ____
[ ] IMPELLER DIA RATED ____ MAX ____ MIN ____ (IN)
[ ] RATED POWER ____ (BHP) EFFICIENCY ____ (%)
[ ] MINIMUM CONTINUOUS FLOW:
THERMAL ____ (GPM) STABLE ____ (GPM)
[ ] PREFERRED OPERATING REGION ____ TO ____ (GPM)
[ ] ALLOWABLE OPERATING REGION ____ TO ____ (GPM)
[ ] MAX HEAD @ RATED IMPELLER ____ (FT)
[ ] MAX POWER @ RATED IMPELLER ____ (BHP)
[ ] NPSHR AT RATED CAPACITY ____ (FT) (2.1.8)
[O] SUCTION SPECIFIC SPEED ____ (2.1.9)
○ MAX SOUND PRESS. LEVEL REQ'D ____ (dBA) (2.1.14)
[ ] EST MAX SOUND PRESS. LEVEL ____ (dBA) (2.1.14)
REMARKS ____

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API 610, 8TH EDITION CENTRIFUGAL PUMP DATA SHEET US UNITS / US STANDARDS (1.2.2)

JOB NO. _____ ITEM NO. _____
REQ / SPEC NO. _____ / _____
PURCH ORDER NO. _____ DATE _____
INQUIRY NO. _____ BY _____
REVISION _____ DATE _____

CONSTRUCTION

APPLICABLE STANDARD:

[X] API 610 8TH EDITION
O OTHER _____ (SEE REMARKS)

PUMP TYPE: (1.1.2)

O OH2	O BB1	O VS1	O VS6
O OH3	O BB2	O VS2	O VS7
O OH6	[X] BB3	O VS3	O OTHER
	O BB4	O VS4	
	O BB5	O VS5	

[ ] NOZZLE CONNECTIONS: (2.3.2)

	SIZE (IN)	FLANGE RATING (LBS)	FACING	POSITION
SUCTION				
DISCHARGE				
BALANCE DRUM				

PRESSURE CASING CONNECTIONS: (2.3.3)

	NO.	SIZE (NPS)	TYPE
[ ] DRAIN			
[ ] VENT			
[ ] PRESSURE GAUGE			
[ ] TEMP GAUGE			
[ ] WARM-UP			
[ ] BALANCE / LEAK-OFF			

O CYLINDRICAL THREADS REQUIRED (2.3.3)

CASING MOUNTING: (SEE SEPARATE SHEET FOR VERTICALS)

[ ] CENTERLINE [ ] NEAR CENTERLINE
[ ] FOOT [ ] SEPARATE MOUNTING PLATE
[ ] IN-LINE

CASING SPLIT:

[ ] AXIAL [ ] RADIAL

CASING TYPE:

[ ] SINGLE VOLUTE [ ] MULTIPLE VOLUTE [ ] DIFFUSER
O OVERHUNG [X] BETWEEN BEARINGS O BARREL

CASE PRESSURE RATING:

[ ] MAX ALLOWABLE WORKING PRESSURE _____ (PSIG)
@ _____ (° F)
[ ] HYDROTEST PRESSURE _____ (PSIG)

O SUCTION PRESS. REGIONS MUST BE DESIGNED FOR MAWP (2.2.4)

ROTATION: (VIEWED FROM COUPLING END)

[ ] CW [ ] CCW

O IMPELLERS INDIVIDUALLY SECURED (5.2.2.2)

REMARKS: _____

O BOLT OH3 PUMP TO PAD/FOUNDATION (5.1.2.4)

SHAFT:

[ ] SHAFT DIAMETER AT COUPLING _____ (IN)

CONSTRUCTION (CONT)

[ ] SHAFT DIAMETER BETWEEN BEARINGS _____ (IN)
[ ] SPAN BETWEEN BEARING CENTERS _____ (IN)
[ ] SPAN BETWEEN BEARING & IMPELLER _____ (IN)

REMARKS _____

COUPLINGS: (3.2.2) DRIVER - PUMP

O MAKE _____
O MODEL _____
[ ] RATING (HP/100 RPM) _____
O LUBRICATION _____
O LIMITED END FLOAT REQUIRED _____
O SPACER LENGTH _____ (IN)
O SERVICE FACTOR _____

DRIVER HALF COUPLING MOUNTED BY:

O PUMP MFR. [X] DRIVER MFR. O PURCHASER
O COUPLING PER API 671 (5.2.7)

BASEPLATES:

[ ] API BASEPLATE NUMBER _____ (APPENDIX M)
O NON-GROUT (CONSTRUCTION: (3.3.13/5.3.8.3.5)

REMARKS: _____

MATERIAL

[X] APPENDIX H CLASS C-6 (2.11.1.1)
[X] MIN DESIGN METAL TEMP (2.11.4.5) 20 (° F)
[ ] BARREL/CASE _____ IMPELLER _____
[ ] CASE/IMPELLER WEAR RINGS _____
[ ] SHAFT _____
[ ] DIFFUSERS _____
[ ] COUPLING SPACER/HUBS _____
[ ] COUPLING DIAPHRAGMS (DISKS) _____

REMARKS _____

BEARINGS AND LUBRICATION

BEARING (TYPE/NUMBER):

[ ] RADIAL _____ / _____
[ ] THRUST _____ / _____
[X] REVIEW AND APPROVE THRUST BEARING SIZE (5.2.5.2.4)

LUBRICATION: (2.10)

O GREASE O FLOOD O RING OIL
O FLINGER O PURGE OIL MIST O PURE OIL MIST

O CONSTANT LEVEL OILER PREFERENCE (SEE REMARKS) (2.9.2.2)
O PRESSURE LUBE SYS (5.2.6) O API-610 O API-614
O OIL VISC. ISO GRADE (5.2.6.5) _____

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API 610, 8TH EDITION CENTRIFUGAL PUMP DATA SHEET US UNITS / US STANDARDS (1.2.2)

JOB NO. _____ ITEM NO. _____
REQ / SPEC NO. _____ / _____
PURCH ORDER NO. _____ DATE _____
INQUIRY NO. _____ BY _____
REVISION _____ DATE _____

BEARINGS AND LUBRICATION (cont)

☒ OIL HEATER REQ'D ○ ELECTRIC ○ STEAM (2.9.2.9/5.2.6.3)
○ OIL PRESS TO BE GREATER THAN COOLANT PRESS (5.2.6.2.b)
REMARKS _____

MECHANICAL SEAL OR PACKING

SEAL DATA: (2.7.2)
○ SEE ATTACHED API-682 DATA SHEET
○ NON-API 682 SEAL (2.7.2)
○ APPENDIX H SEAL CODE _____ (2.11.1.1)
☒ SEAL MANUFACTURER _____
☒ SIZE AND TYPE _____ / MECHANICAL
☒ MANUFACTURER CODE _____

SEAL CHAMBER DATA: (2.1.6/2.1.7)
☒ TEMPERATURE _____ (° F)
☒ PRESSURE _____ (PSIG)
☒ FLOW _____ (GPM)
☐ SEAL CHAMBER SIZE (TABLE 2.3) _____
☐ TOTAL LENGTH _____ (IN) ☐ CLEAR LENGTH _____ (IN)

SEAL CONSTRUCTION:
☐ SLEEVE MATERIAL _____
☐ GLAND MATERIAL _____
○ AUX SEAL DEVICE (2.7.3.20) _____
☒ JACKET REQUIRED (2.7.3.17)

GLAND TAPS: (2.7.3.14)
☒ FLUSH (F) ☒ DRAIN (D) ☒ BARRIER/BUFFER(B)
☒ QUENCH (Q) ☒ COOLING (C) ☒ LUBRICATION (G)
☒ HEATING (H) ☒ LEAKAGE ☒ PUMPED FLUID (P)
☒ BALANCE FLUID (E) ☒ EXTERNAL FLUID INJECTION (X)

SEAL FLUIDS REQUIREMENT AND AVAILABLE FLUSH LIQUID:
NOTE: IF FLUSH LIQUID IS PUMPAGE LIQUID (AS IN FLUSH PIPING PLANS 11 TO 41), FOLLOWING FLUSH LIQUID DATA IS NOT REQ'D.
○ SUPPLY TEMPERATURE MAX/MIN _____ / _____ (° F)
○ RELATIVE DENSITY (SPECIFIC GRAVITY) _____ @ _____ (° F)
○ NAME OF FLUID _____
○ SPECIFIC HEAT, Cp _____ (BTU/LB ° F)
○ VAPOR PRESSURE _____ (PSIA) @ _____ (° F)
○ HAZARDOUS ○ FLAMMABLE ○ OTHER _____
☐ FLOW RATE MAX/MIN _____ / _____ (GPM)
☐ PRESSURE REQUIRED MAX/MIN _____ / _____ (PSIG)
☐ TEMPERATURE REQUIRED MAX/MIN _____ / _____ (° F)

BARRIER/BUFFER FLUID (2.7.3.21):
○ SUPPLY TEMPERATURE MAX/MIN _____ / _____ (° F)
○ RELATIVE DENSITY (SPECIFIC GRAVITY) _____ @ _____ (° F)
○ NAME OF FLUID _____

MECHANICAL SEAL OR PACKING (CONT)

○ VAPOR PRESSURE _____ (PSIA) @ _____ (° F)
○ HAZARDOUS ○ FLAMMABLE ○ OTHER _____
☐ FLOW RATE MAX/MIN _____ / _____ (GPM)
☐ PRESSURE REQUIRED MAX/MIN _____ / _____ (PSIG)
☒ TEMPERATURE REQUIRED MAX/MIN _____ / _____ (° F)

QUENCH FLUID:
○ NAME OF FLUID _____
☐ FLOW RATE _____ (GPM)

SEAL FLUSH PIPING: (2.7.3.19 AND APPENDIX D)
○ SEAL FLUSH PIPING PLAN _____
☒ TUBING ☒ CARBON STEEL
☒ PIPE ☒ STAINLESS STEEL
○ AUXILIARY FLUSH PLAN _____
☒ TUBING ☒ CARBON STEEL
☒ PIPE ☒ STAINLESS STEEL
○ PIPING ASSEMBLY: (3.5.2.10.1)
☒ THREADED ☒ UNIONS ☒ SOCKET WELDED
☒ FLANGED ☒ TUBE TYPE FITTINGS
☒ PRESSURE SWITCH (PLAN 52/53) TYPE _____
○ PRESSURE GAUGE (PLAN 52/53)
☒ LEVEL SWITCH (PLAN 52/53) TYPE _____
○ LEVEL GAUGE (PLAN 52/53)
○ TEMP INDICATOR (PLANS 21, 22, 23, 32, 41)
○ HEAT EXCHANGER (PLAN 52/53)
REMARKS _____

PACKING DATA: (APPENDIX C)
MANUFACTURER _____
TYPE _____
SIZE _____ NO. OF RINGS _____
☐ PACKING INJECTION REQUIRED
☐ FLOW _____ (GPM) @ _____ (° F)
☐ LANTERN RING _____

STEAM AND COOLING WATER PIPING

☒ COOLING WATER PIPING PLAN _____ (3.5.4.1)
☐ COOLING WATER REQUIREMENTS
SEAL JACKET/BRG HSG _____ (GPM) @ _____ (PSIG)
SEAL HEAT EXCHANGER _____ (GPM) @ _____ (PSIG)
QUENCH _____ (GPM) @ _____ (PSIG)
TOTAL COOLING WATER _____ (GPM)
○ STEAM PIPING: ○ TUBING ○ PIPE
REMARKS _____

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CENTRIFUGAL PUMP DATA SHEET
US UNITS / US STANDARDS (1.2.2)

JOB NO. _____ ITEM NO. _____
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INSTRUMENTATION

VIBRATION:

O NONCONTACTING (API 670) O TRANSDUCER
O PROVISION FOR MOUNTING ONLY (2.9.2.11)
X FLAT SURFACE REQ'D (2.9.2.12)
O SEE ATTACHED API-670 DATA SHEET
X ~~MONITORS AND~~ CABLES (3.4.3.3)
REMARKS _____

TEMPERATURE AND PRESSURE:

O RADIAL BRG METAL TEMP O THRUST BRG METAL TEMP
O PROVISION FOR INSTRUMENTS ONLY
O SEE ATTACHED API-670 DATA SHEET
O TEMP GAUGES (WITH THERMOWELLS) (3.4.1.3)
OTHER _____
O PRESSURE GAUGE TYPE (3.4.2.2) _____
LOCATION _____
REMARKS _____

SPARE PARTS (TABLE 6.1)

O START-UP O NORMAL MAINTENANCE
O SPECIFY _____

MOTOR DRIVE (3.1.5)

O MANUFACTURER _____
X 2000 (HP) O _____ (RPM)
X HORIZONTAL O VERTICAL
O FRAME _____
O SERVICE FACTOR _____
X VOLTS/PHASE/HERTZ 4160 / 3 / 60
O TYPE _____
O ENCLOSURE _____
O MINIMUM STARTING VOLTAGE (3.1.6) _____
X TEMPERATURE RISE CLASS B
O FULL LOAD AMPS _____
O LOCKED ROTOR AMPS _____
X INSULATION CLASS F
X STARTING METHOD ACROSS THE LINE
O LUBE _____
O VERTICAL THRUST CAPACITY
UP _____ (LBS) DOWN _____ (LBS)
BEARINGS (TYPE / NUMBER):
O RADIAL _____ / _____
O THRUST _____ / _____

MOTOR DRIVE (cont) (3.1.5)

REMARKS _____

SURFACE PREPARATION AND PAINT

O MANUFACTURER'S STANDARD
O OTHER (SEE BELOW)
PUMP:
O PUMP SURFACE PREPARATION _____
O PRIMER _____
O FINISH COAT _____
BASEPLATE: (3.3.18)
O BASEPLATE SURFACE PREPARATION _____
O PRIMER _____
O FINISH COAT _____
SHIPMENT: (4.4.1)
O DOMESTIC O EXPORT O EXPORT BOXING REQUIRED
O OUTDOOR STORAGE MORE THAN 6 MONTHS
SPARE ROTOR ASSEMBLY PACKAGED FOR:
O HORIZONTAL STORAGE O VERTICAL STORAGE
O TYPE OF SHIPPING PREPARATION _____
REMARKS _____

O WEIGHTS

MOTOR DRIVEN:
WEIGHT OF PUMP (LBS) _____
WEIGHT OF BASEPLATE (LBS) _____
WEIGHT OF MOTOR (LBS) _____
WEIGHT OF GEAR (LBS) _____
TOTAL WEIGHT (LBS) _____
TURBINE DRIVEN:
WEIGHT OF BASEPLATE (LBS) _____
WEIGHT OF TURBINE (LBS) _____
WEIGHT OF GEAR (LBS) _____
TOTAL WEIGHT (LBS) _____
REMARKS _____

OTHER PURCHASER REQUIREMENTS

X COORDINATION MEETING REQUIRED (6.1.3)
X REVIEW FOUNDATION DRAWINGS (2.1.27)
X REVIEW PIPING DRAWINGS
O OBSERVE PIPING CHECKS
O OBSERVE INITIAL ALIGNMENT CHECK
O CHECK ALIGNMENT AT OPERATING TEMPERATURE
O CONNECTION DESIGN APPROVAL (2.11.3.5.4)

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API 610, 8TH EDITION CENTRIFUGAL PUMP DATA SHEET US UNITS / US STANDARDS (1.2.2)

JOB NO. _____ ITEM NO. _____
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PURCH ORDER NO. _____ DATE _____
INQUIRY NO. _____ BY _____
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OTHER PURCHASER REQUIREMENTS (cont)

- O RIGGING DEVICE REQ'D FOR TYPE OH3 PUMP (5.1.2.7)
- X HYDRODYNAMIC THRUST BRG SIZE REVIEW REQ'D (5.2.5.2.4)
- O LATERAL ANALYSIS REQUIRED (5.1.4.3/5.2.4.1)
- O ROTOR DYNAMIC BALANCE (5.2.4.2)
- O MOUNT SEAL RESERVOIR OFF BASEPLATE (3.5.1.4)
- O INSTALLATION LIST IN PROPOSAL (6.2.3L)
- O SPARE ROTOR VERTICAL STORAGE (5.2.9.2)
- X TORSIONAL ANALYSIS/REPORT (2.8.2.6)
- O PROGRESS REPORTS REQUIRED (6.3.4)

REMARKS: _____

QA INSPECTION AND TEST

- X REVIEW VENDORS QA PROGRAM (4.1.7)
- X PERFORMANCE CURVE APPROVAL
- X SHOP INSPECTION (4.1.4)
- O TEST WITH SUBSTITUTE SEAL (4.3.3.1.2)

TEST	NON-WIT	WIT	OBSERVE
HYDROSTATIC (4.3.2)	O	X	O
PERFORMANCE (4.3.3)	O	X	O
NPSH (4.3.4.1)	O	X	O
COMPLETE UNIT TEST (4.3.4.2)	O	O	O
SOUND LEVEL TEST (4.3.4.3)	O	O	O
O CLEANLINESS PRIOR TO FINAL ASSEMBLY (4.2.3.1)	O	O	O
O NOZZLE LOAD TEST (3.3.6)	O	O	O
O BRG HSG RESONANCE TEST (4.3.4.5.)	O	O	O
O REMOVE/INSPECT HYDRODYNAMIC BEARINGS AFTER TEST (5.2.8.5)	O	O	O
O AUXILIARY EQUIPMENT TEST (4.3.4.4)	X	O	O
O _____	O	O	O
O _____	O	O	O

- X MATERIAL CERTIFICATION REQUIRED (2.11.1.7)
  - X CASING X IMPELLER X SHAFT
  - O OTHER _____
- O CASTING REPAIR PROCEDURE APPROVAL REQ'D (2.11.2.5)
- O INSPECTION REQUIRED FOR CONNECTION WELDS (2.11.3.5.6)
  - O MAG PARTICLE O LIQUID PENETRANT
  - O RADIOGRAPHIC O ULTRASONIC
- O INSPECTION REQUIRED FOR CASTINGS (4.2.1.3)
  - O MAG PARTICLE O LIQUID PENETRANT
  - O RADIOGRAPHIC O ULTRASONIC

QA INSPECTION AND TEST (cont)

- O ADDITIONAL INSPECTION REQUIRED FOR: _____ (4.2.1.3)
  - O MAG PARTICLE O LIQUID PENETRANT
  - O RADIOGRAPHIC O ULTRASONIC
- O ALTERNATIVE ACCEPTANCE CRITERIA (SEE REMARKS) (4.2.2.1)
- O HARDNESS TEST REQUIRED FOR: _____ (4.2.3.2)
- O WETTING AGENT HYDROTEST (4.3.2.5)
- X VENDOR SUBMIT TEST PROCEDURES (4.3.1.2/6.2.5)
- O RECORD FINAL ASSEMBLY RUNNING CLEARANCES
- O INSPECTION CHECK-LIST (APPENDIX N) _____ (4.1.6)

REMARKS _____

GENERAL REMARKS

REMARK 1: _____

REMARK 2: _____

REMARK 3: _____

REMARK 4: _____

REMARK 5: _____

REMARK 6: _____