

HOWDEN ExVeI TURBO FANS

SUPPLIER:	HOWDEN ROOTS	FAN MODEL NO.:	HBXrG-20/675-LG0
HOWDEN ORDER NO.:	RX19105	CUSTOMER PO NO.:	RRB120-0036
HOWDEN PROJECT NO.	RX19105 (NFF00019)	CUSTOMER PROJECT NO.:	408084-14122
SERIAL NO.:	NFF00019-10	EQUIPMENT TAG NO.:	Lakeview, OR U.S.A.
MAXIMUM INLET VOLUME:	3.18 m ³ /s 6738.99 ACFM	MAXIMUM FAN TOTAL PRESSURE RISE:	290.96 kPa 42.20 PSI
MAXIMUM INLET TEMPERATURE	176.7 °C 350.1 °F	MAXIMUM OUTLET TEMPERATURE:	196.0 °C 384.8 °F
MAXIMUM IMPELLER POWER:	1196 kW 1603.9 HP	NOMINAL OPERATION SPEED:	5681 rpm
DESIGN TEMPERATURE:	230.0 °C 446.0 °F	DESIGN PRESSURE:	1878 kPa(a) 272.4 PSI
FAN TOTAL WEIGHT : (EXCLUDE MOTOR, LUBE UNITS, AND HOSES)	5089 kg 11219 lb		

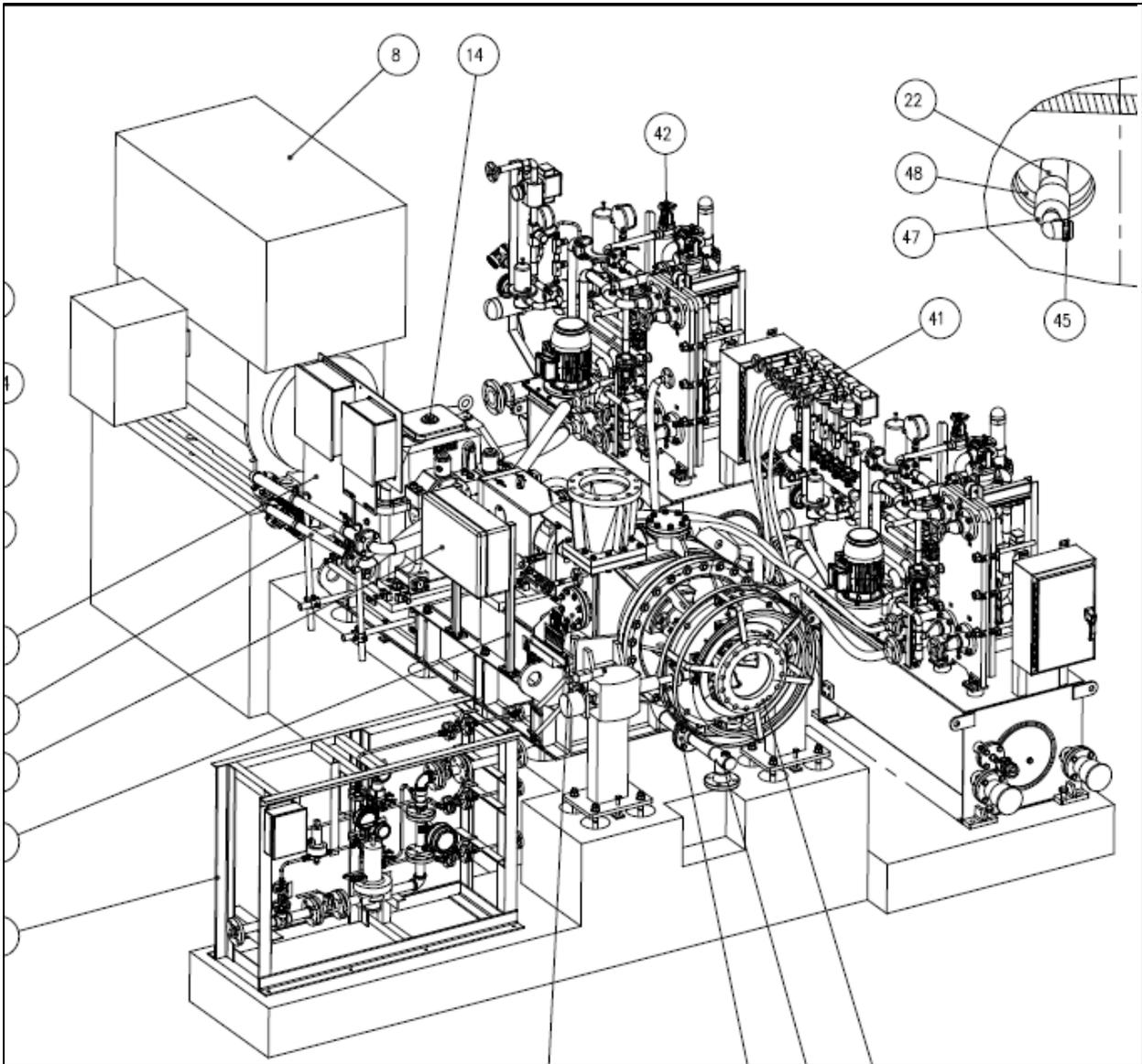
MADE IN FRANKENTHAL, GERMANY 2020



		1	1	PLATE	SS	2 mm x 200 mm x 250 mm			
		QTY.	NO.	DESCRIPTION	MATERIAL	DIMENSIONS			
				NAMEPLATE		Item No.	REV		
			DATE:	RX19105 (NFF00019)		NFF000191004914	-		
			30-Apr-20	HBXrG-20/675-LG0					

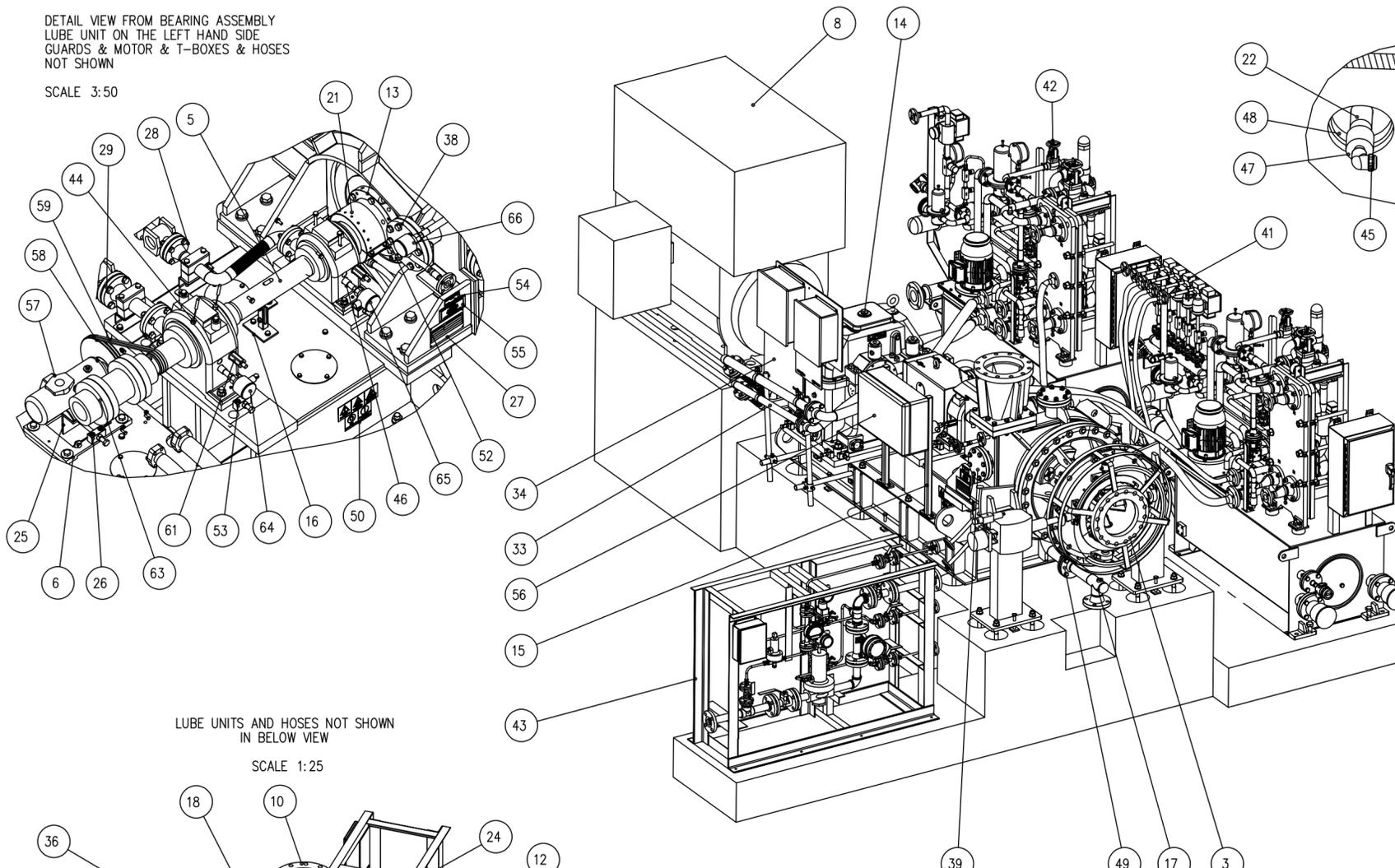
SCALE: NOT IN SCALE
BY: SX

Item	QTY	Part No.	Internal Project Code	COMMERCIAL SUMMARY
1	1			Turbo-Fan and Electric Motor - Model HBXrG-25/850
1	1	FE0005		- Turbo-Fan (per Page 19 of the Proposal which includes ancillary equipment)
1	1	FE0005		- Main Drive Electric Motor (per Page 19 of the Proposal which includes ancillary equipment)
1	1	FE0005		- Siemens 1500 Series PLC and Bentley Nevada 3500 series Monitor System
All Items as Specified per Proposal HROBNB-BUDGET-Rev1				
ALL GOODS MUST BE NEW AND OF ORIGINAL DESIGN				
Technical Approval By: <u>Creg Hughes</u>			Date: 8/23/2019	
Authorized By: <u>Adam Cotton</u>			Date: 8/23/2019	



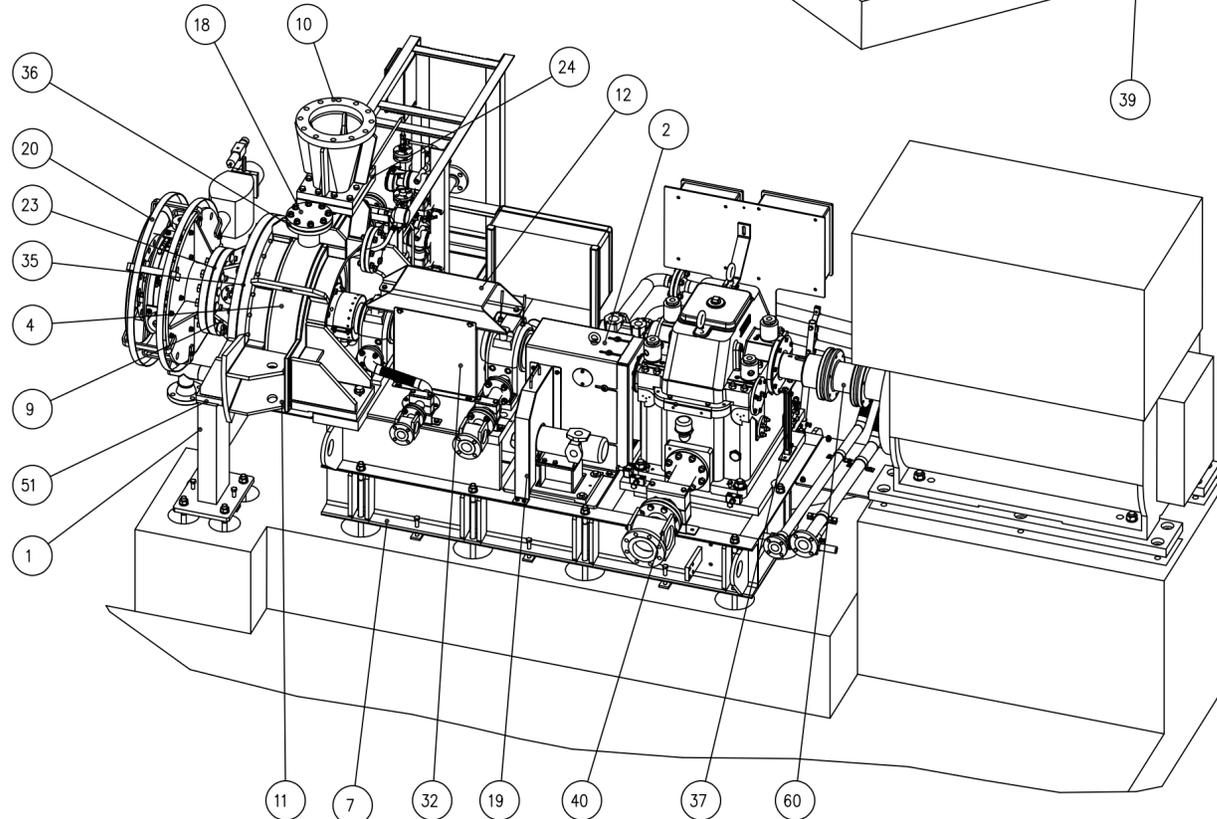
DETAIL VIEW FROM BEARING ASSEMBLY
LUBE UNIT ON THE LEFT HAND SIDE
GUARDS & MOTOR & T-BOXES & HOSES
NOT SHOWN

SCALE 3:50



LUBE UNITS AND HOSES NOT SHOWN
IN BELOW VIEW

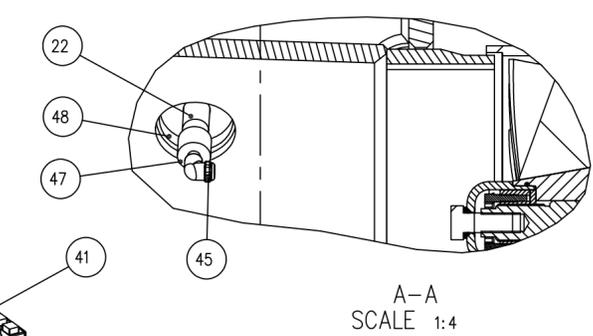
SCALE 1:25



NOTES:
BOMs OF THE LUBRICATION UNITS & NITROGEN PURGE ARE NOT INCLUDED ON THIS DRAWING.
SEALS:
- O-RING FOR IN-PROCESS LOCATION:
VITON TM / FPM
WORLEY DOCUMENT NO.
408084-14122-03-(200-KB-103A)-A01-0001-001

HRO Project No.: RX19105 (NFF00019)
Project Name: Red Rock Biomass to Jet Fuel
Customer: TCG Energy (Worley Parsons)
Customer PO No.: RRB120-0036
Customer Project No.: 408084-14122
Site Identification: Lakeview, OR U.S.A.
Equipment Tag: 200-KB-103
Fan Model: HBXRg-20/675
Rotation: CCW (view from motor to fan)
Control Method: VFD & IGW

FOR GENERAL ASSEMBLY, SEE DRG. NFF000191000594 SHEET 1
FOR FOUNDATION AND CoG's, SEE DRG. NFF000191000594 SHEET 2
FOR MAIN ASSEMBLY BOM, SEE DRG. NFF000191000594 SHEET 3
FOR PLAN VIEW, SEE DRG. NFF000191000594 SHEET 4
FOR ROTOR ASSY & CLEARANCE, SEE DRG. NFF000191000594 SHEET 5
FOR HARDWARE AND HOSES, SEE DRG. NFF000191000594 SHEET 6



A-A
SCALE 1:4

PART 5, BEARING ASSEMBLY NFF000191001127, SEE IOM SECTION 8E
PART 13, SHAFT SEAL ASSEMBLY NFF000191002873, SEE IOM SECTION 9E
PART 4, IMPELLER ASSEMBLY NFF000191000900, SEE IOM SECTION 9N
PARTS 62&65, COUPLING, SEE IOM SECTION 9F
PARTS 43&44, LUBE UNIT, SEE IOM SECTION 9D
PART 8, MOTOR, SEE IOM SECTION 9A

ROTOR ASSEMBLY DETAILS SEE DRAWING NFF000191000594_5

Nr	Qty	Code	Rev	Description	Material	Designation, dimensions	Weight/pc
66	1	XX000191005120_3	-	RTD 214C, ROSEMOUNT		214CRT	1.0
65	1	XX000191005120_2	-	RTD 214C, ROSEMOUNT		214CRT	1.0
64	1	XX000191005120_1	-	RTD 214C, ROSEMOUNT		214CRT	1.0
63	1	XX000191001923_195S	-	COUPLING, FLENDER NEN 203-6	-	D1=89 D2=85, DSBE-180	31.9
62	1	XX000191005440	-	GASKET TAPE	ePTFE	14x5 L=1.0 meters	0.9
61	2	XX000191004638	-	VELOMITOR, METRIX ST6917		METRIX, TYPE: ST6917, 1/4-28 UNF	0.2
60	1	XX000191004473	-	COUPLING, FLENDER NEN 268-6		D1=73 D2=127, DSBE-180	69.6
59	2	XX000191004364	-	V-BELT	HMCo, SEE LUBE BOM		0.7
58	1	XX000191004363	-	BELT PULLEY	HMCo, SEE LUBE BOM		12.1
57	1	XX000191004362	-	MECHNICAL PUMP	GC 030I, BY HMCL		40.6
56	1	XX000191000662	-	JUNCTION BOX		SEE WRING DIAGRAM NFF00019005008	47.4
55	1	SM004951_EN	A	WARNING SIGN - HATCH	SS	HATCH WARNING SIGN - ENG	0.2
54	1	SM005319	-	INSPECTION STICKER			0.0
53	10	SM004990	-	ADJUSTING BLOCK			0.8
52	2	SM004978	-	CENTERING WASHER ASSEMBLY			0.2
51	1	SM004954	A	SHM PACKAGE - STABILIZER			0.1
50	1	SM004953	A	WARNING STICKERS			0.0
49	1	OS005269_DN_65	-	FLEXITALLIC SPIRAL WOUND GASKET	AI5I316L/PTFE	DN65 PN10-PN40	0.2
48	2	OS004994_65X3_0_FPM	-	O-RING	FPM	OR 65X3 FPM	0.0
47	2	OS003332_N12N1852	-	REDUCER, FEMALE TO MALE	EN 1.4307	SS-8-RA-2 NPT 1/2" TO NPT 1/8"	0.1
46	2	OS003332_N12G1254	-	THREAD ADAPTER, Swagelok # SS-8-A-BRS	EN 1.4404	FEMALE NPT 1/2"-14 TO MALE BSSP G1/2"	0.1
45	2	OS000238_18GA0452	-	NOZZLE, NPT 1/8 GA-3.9	EN 1.4307	FULLJET NPT 1/8 GA-3.9	0.1
44	2	OS004301	-	BEARING RTD, AXIAL		ROSEMOUNT, TYPE: MW-GOK 3	0.1
43	1	NFF00019_NITROGEN	-	NITROGEN BUFFER SYSTEM		HRO DRG RX19105-SEAL	227
42	1	NFF0001910_13031	-	LUBE UNIT, GEAR		HMCo DRG: 13031	718.4
41	1	NFF0001910_13030	-	LUBE UNIT, FAN BEARINGS		HMCo DRG: 13030	727.3
40	1	NFF000191005630	-	GEAR OIL RETURN			38.7
39	1	NFF000191005590	-	COVER			8.7
38	1	NFF000191005589	-	COVER			9.4
37	1	NFF000191005563	-	BRACKET FOR SPEED SENSOR			1.8
36	3	NFF000191005561	-	GASKET, ANSI 10"	SILICONE		0.1
35	1	NFF000191005507	-	GASKET	SILICONE		0.8
34	1	NFF000191005464	-	COUPLING COVER, GEAR/MOTOR			35.3
33	1	NFF000191005372	-	MOTOR OIL OUTLET PIPING			62.5
32	2	NFF000191005354	-	SHAFT COVER	S235JR		7.3
31	1	NFF000191005009	-	P&ID DRAWING			0.0
30	1	NFF000191005008	-	JUNCTION BOX WRING DIAGRAM			0.0
29	1	NFF000191004959	-	BACK BEARING OIL RETURN			14.4
28	1	NFF000191004958	-	FRONT BEARING OIL RETURN			11.0
27	1	NFF000191004914	-	MACHINE SIGN			0.2
26	1	NFF000191004680	-	ADJUSTING BLOCK			0.8
25	1	NFF000191004671	-	MECHANICAL PUMP BRACKET	S235JR		13.0
24	1	NFF000191004655	-	GASKET	SILICONE		0.4
23	1	NFF000191004654	-	GASKET, ANSI 10"	SILICONE		0.5
22	2	NFF000191004125	-	INLET NOZZLE PIPE	EN 1.4410		1.8
21	1	NFF000191004081	-	SHAFT COVER	S235JR		2.4
20	1	NFF000191004078	-	THERMO BLANKET SUPPORT, BY MADER	S235JR	MADER DRG: MD-8086-4	5.0
19	1	NFF000191004071	-	BELT COVER	S235JR		10.3
18	1	NFF000191003788	-	COVER			9.4
17	1	NFF000191003205	-	CASING DRAIN ANSI 2-1/2 300 lbs	EN 1.4410		11.5
16	1	NFF000191002938	-	BRACKET FOR SPEED SENSOR			1.5
15	2	NFF000191002933	-	SUPPORT BEAM			4.3
14	1	NFF000191002923	-	LUBE SKID			1282.7
13	1	NFF000191002873	-	SHAFT SEAL ASSEMBLY	EN 1.4410		43.9
12	1	NFF000191002869	-	BEARING STIFFENER			21.9
11	1	NFF000191002868	A	CASING MACHINING	EN 1.4410		710.9
10	1	NFF000191002701	-	DIFFUSOR	EN 1.4410		81.6
9	1	NFF000191002495	B	INLET MACHINING	EN 1.4410		290.5
8	1	NFF000191002443	-	MOTOR	-	BY CUSTOMER	0.5
7	1	NFF000191002255	-	LOW PEDESTAL	S235JR		1464.0
6	1	NFF000191002241	-	MECHANICAL PUMP GUIDE PLATE	S235JR		8.1
5	1	NFF000191001127	-	SLIDE BEARING ASSEMBLY			261.3
4	1	NFF000191000900	A	IMPELLER			64.0
3	1	NFF000191000460	-	INLET GUIDE VANE, BY MADER	EN 1.4410	MADER DRG: MD-8086	356.1
2	1	NFF000191000226	-	COUPLING COVER	S235JR		30.3
1	2	NFF000191000122	-	STABILIZER	S235JR		49.8

Date	Department	General tolerances	Replacing	Replaced with	Total weight
11/11/2019	IF 405	ISO 2768-mK EN ISO 13920 BF			7533 kg
Drawn by	Checked by	Approved by	Related to		
SX					
MAIN ASSEMBLY			Drawing nr		
NFF00019			Sheet		
HBXRk-20-LGO			Rev.		
In Work			NFF000191000594		
Scale			3(6)		
9:250					



Rev.	Modification	Date	Sign

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Drawing: NFF000191000594
 Desc: NFF000191000594

Drawing: NFF000191000594
Model: NFF000191000594

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NITROGEN SYSTEM
TERMINAL BOX

FAN TERMINAL BOX

GEAR TERMINAL BOXES

MOTOR TERMINAL BOX

MOTOR BY OTHERS

HRO Project No.: RX19105 (NFF00019)
Project Name: Red Rock Biomass to Jet Fuel
Customer: TCG Energy (Worley Parsons)
Customer PO No.: RRB120-0036
Customer Project No.: 408084-14122
Site Identification: Lakeview, OR U.S.A.
Equipment Tag: 200-KB-103
Fan Model: HBXrG-20/675
Rotation: CCW (view from motor to fan)
Control Method: VFD & IGV

FAN LUBE UNIT
TERMINAL BOX

GEAR LUBE UNIT
TERMINAL BOX
(WILL BE MOVED TO THE OTHER SIDE)

FOR GENERAL ASSEMBLY, SEE DRG. NFF000191000594 SHEET 1
FOR FOUNDATION AND CoG's, SEE DRG. NFF000191000594 SHEET 2
FOR MAIN ASSEMBLY BOM, SEE DRG. NFF000191000594 SHEET 3
FOR PLAN VIEW, SEE DRG. NFF000191000594 SHEET 4
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WORLEY DOCUMENT NO. 408084-14122-03-(200-KB-103A)-A01-0001-001

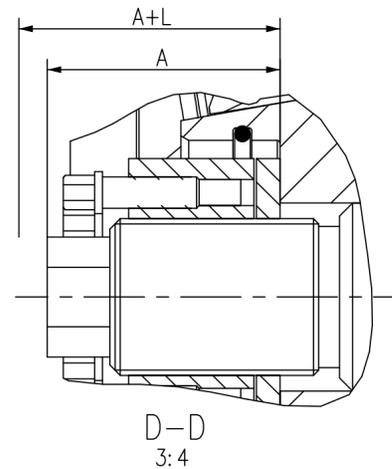
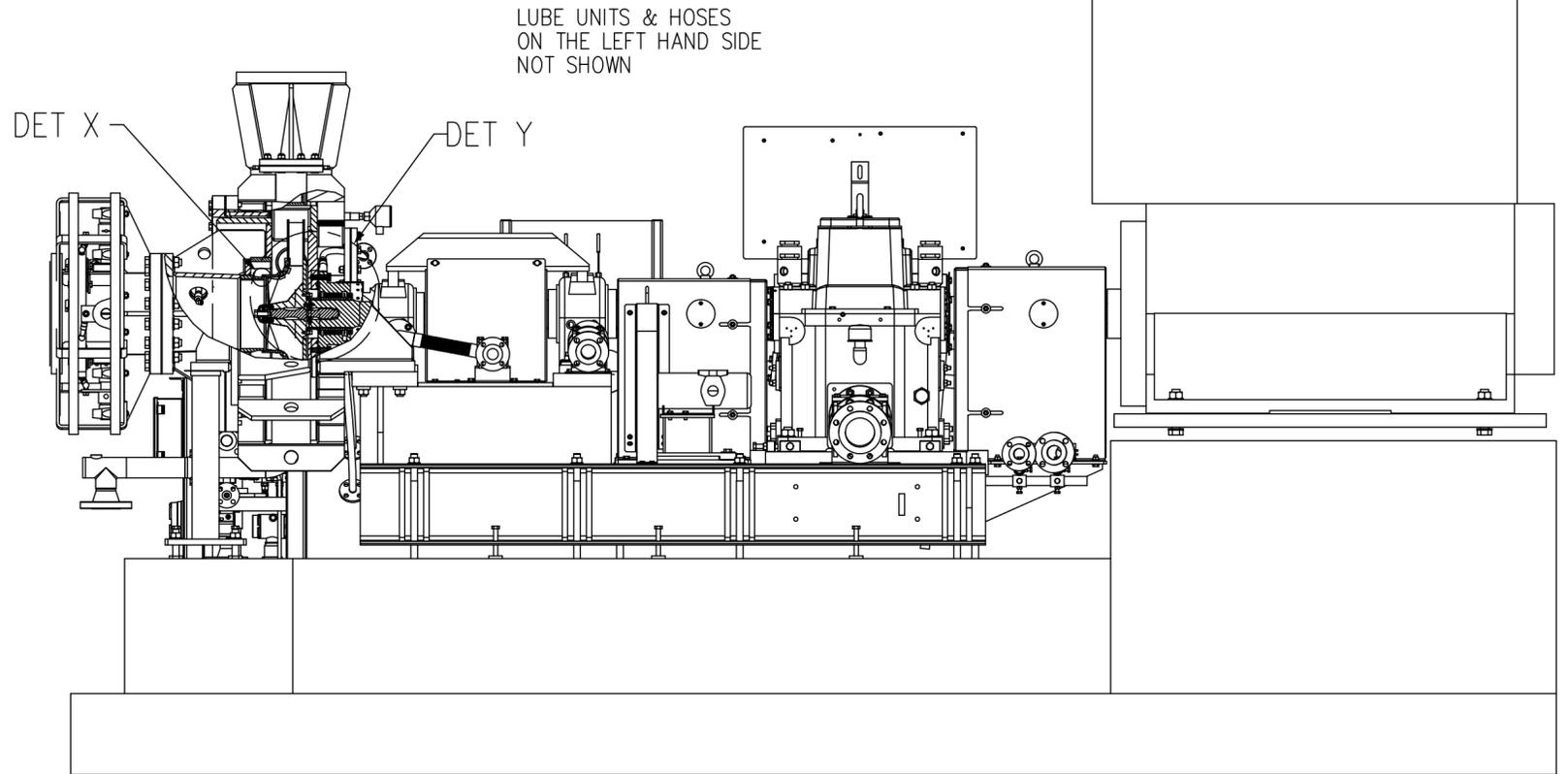
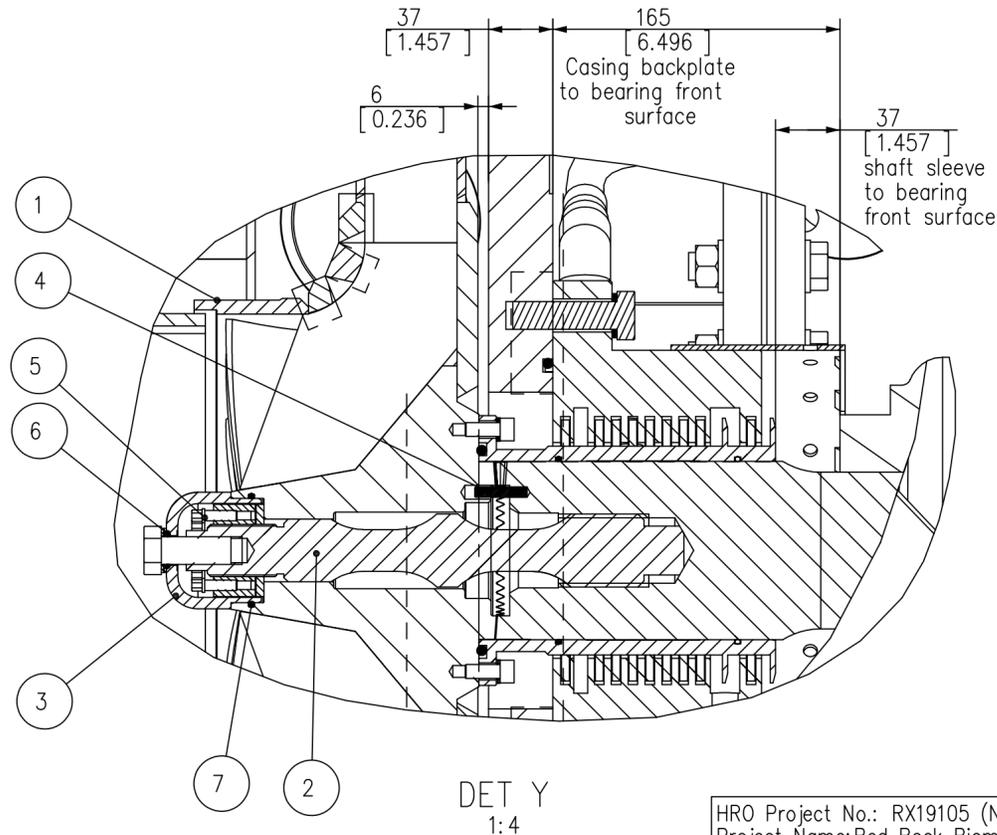
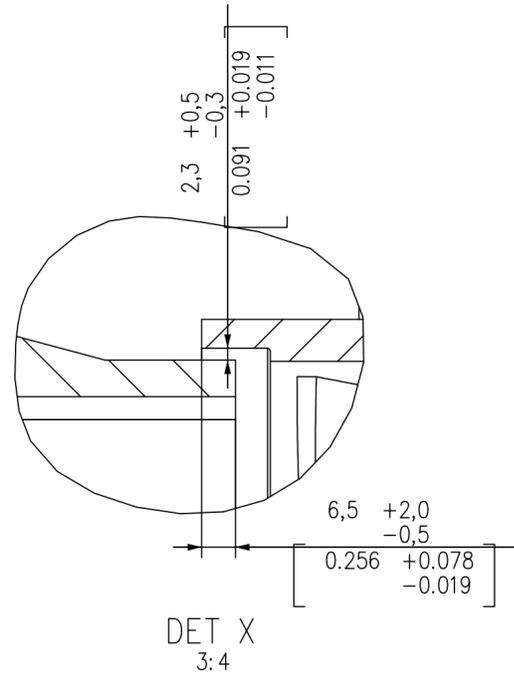
Qty	Nr	Code	Description	Material	Designation, dimensions	Weight/pc
						7533.0
Date	Department		General tolerances ISO 2768-mK EN ISO 13920. BF	Replacing	Replaced with	Total weight
11/11/2019	IF 405			Related to		7533 kg
Drawn by	Checked by	Approved by				
SX						
			MAIN ASSEMBLY			
Scale			NFF00019			Drawing nr
1:25			HBXrK-20-LG0			Sheet
						Rev.
						NFF000191000594
						4(6)
						-

Rev.	Modification	Date	Sign

In Work

Drawing: NFF000191000594
Model: NFF000191000594

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A-A

SOCKET WRENCH	50% TORQUE	100% TORQUE	EXTENSION L (mm)	TOLERANCE (mm)	A (mm)
SW 20	125 Nm	250 Nm	0.43	+0.10 mm	46

A: DIMENSIONING WITH FORCING SCREWS MANUALLY TIGHTENED

L: EXTENSION OF THE TENSION BOLT AT 100% TORQUE.

FOR GENERAL ASSEMBLY, SEE DRG. NFF000191000594 SHEET 1
FOR FOUNDATION AND CoG's, SEE DRG. NFF000191000594 SHEET 2
FOR MAIN ASSEMBLY BOM, SEE DRG. NFF000191000594 SHEET 3
FOR PLAN VIEW, SEE DRG. NFF000191000594 SHEET 4
FOR ROTOR ASSY & CLEARANCE, SEE DRG. NFF000191000594 SHEET 5
FOR HARDWARE AND HOSES, SEE DRG. NFF000191000594 SHEET 6

NOTE:
IMPELLER INSTALLED IN HORIZONTAL POSITION FOR BALANCING.
PIN ITEM 4 MUST POINT VERTICALLY UPWARDS.

WORLEY DOCUMENT NO.
408084-14122-03-(200-KB-103A)-A01-0001-001

HRO Project No.: RX19105 (NFF00019)
Project Name: Red Rock Biomass to Jet Fuel
Customer: TCG Energy (Worley Parsons)
Customer PO No.: RRB120-0036
Customer Project No.: 408084-14122
Site Identification: Lakeview, OR U.S.A.
Equipment Tag: 200-KB-103
Fan Model: HBXrG-20/675
Rotation: CCW (view from motor to fan)
Control Method: VFD & IGV

Nr	Qty	Code	Rev	Description	Material	Designation, dimensions	Weight/pc
7	1	XX000191004994_59_5_3	-	O-RING	FPM	OR 75X3 FPM	0.0
6	1	XX000191004994_16_3	-	O-RING	NBR 70	OR 12X1 NBR 70	0.0
5	1	XX000191005463	-	SUPERBOLT, MT-M30		MT-M30X2/W	0.4
4	1	XX000191004976	-	DOWEL PIN	ST	DIN 7 6x30	0.0
3	1	NFF000191005461	-	HUB END COVER			0.5
2	1	NFF000191005459	-	CENTER BOLT	EN 1.4462		1.7
1	1	NFF000191000900	A	IMPELLER			64.0

Date	Department	General tolerances	Replacing	Replaced with	Total weight
11/11/2019	IF 405	ISO 2768-mK EN ISO 13920 BF			7533 kg

Date	Department	General tolerances	Replacing	Replaced with	Total weight
11/11/2019	IF 405	ISO 2768-mK EN ISO 13920 BF			7533 kg

Scale	Main Assembly, Impeller Installation	Drawing nr	Sheet	Rev.
1:25	NFF00019 HBXrK-20-LGO	NFF000191000594	5(6)	-



Rev.	Modification	Date	Sign

In Work

