GENERAL NOTES

1.0 SYMBOLS AND ABBREVIATIONS:

"	INCHES	KPAD	KILOPASCAL DIFFERENTIAL
'	FEET	KPAG	KILOPASCAL GAGE
AC	ALTERNATING CURRENT	KW	KILOWATT
ACFM	ACTUAL CUBIC FEET PER MINUTE	L	LITER
AH	AMPERE HOURS	LBF	POUND-FORCE
BAR	BAR	LBS	POUNDS
BARG	BAR GAGE	LPM	LITERS PER MINUTE
BARD	BAR DIFFERENTIAL	M	METER
BTU	BRITISH THERMAL UNIT	M^3	CUBIC METER
°C	DEGREE CELSIUS	M/S	METERS PER SECOND
CFM	CUBIC FEET PER MINUTE	MM	MILLIMETER
CS	CENTISTOKES (MM SQUARED PER SECOND)	MPH	MILES PER HOUR
DC	DIRECT CURRENT	MIN	MINUTE
DIFF	DIFFERENTIAL	N	NEWTONS
°F	DEGREE FAHRENHEIT	M^3	NORMAL CUBIC METER
FT	FEET	NM	NORMAL CUBIC METER
GAL	GALLONS	PSI	POUNDS PER SQUARE INCH
GPM	GALLONS PER MINUTE	PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
HR	HOUR	PSIG	POUNDS PER SQUARE INCH GAGE
KG	KILOGRAM	SCF	STANDARD CUBIC FOOT
KJ	KILOJOULE	SCFM	STANDARD CUBIC FEET PER MINUTE
KN	KILONEWTON	SSU	SAYBOLTS SECONDS UNIVERSAL
KPA	KILOPASCAL	VAC	VOLTS ALTERNATING CURRENT
		VDC	VOLTS DIRECT CURRENT

NOTE: FLOW, PRESSURE AND TEMPERATURE VALUES SHOWN ON THIS DRAWING ARE INTENDED FOR USE IN THE DESIGN OF EXTERNAL SYSTEMS AND EQUIPMENT ONLY AND CANNOT BE USED IN ANY TURBINE PERFORMANCE CALCULATIONS.

1.1 SPECIFICATIONS: THE FOLLOWING SOLAR DOCUMENTS APPLY TO THIS DRAWING.

ES 9-54	FASTENER INSTALLATION AND TORQUE VALUES
ES 9-62	INGESTIVE CLEANING SOLAR GAS TURBINE ENGINES
ES 9-98	FUEL, AIR, AND WATER (OR STEAM) FOR SOLAR GAS TURBINE ENGINES
ES 9-224	LUBRICATING OIL FOR SOLAR GAS TURBINES
ES 9-414	ELEVATING AND LEVELING PACKAGE BASES
ES 2184	CLEANING AND FLUSHING OF HYDRAULIC SYSTEMS/COMPONENTS
ES 2201	AUXILIARY SERVICE AIR

INSTALLATION INSTRUCTIONS FOR:

ES 1748	LUBE OIL TANK VENT WITH SEPARATOR AND FLAME ARRESTOR

1.2 SYSTEM DRAWINGS:

75681-149543	AIR ASSIST/ENGINE DRAIN
75681-149544	LUBE OIL SYSTEM SCHEMATIC
75681-149545	FUEL SYSTEM SCHEMATIC
75681-149546	DIRECT AC START SYSTEM
75681-149223	TURBOMACHINERY MECHANICAL INSTALLATION
75681-149222	AUXILIARY EQUIPMENT MECHANICAL INSTALLATION
75681-149310	ELECTRICAL SCHEMATIC
75681-149311	WIRING DIAGRAM
75681-149312	INTERFACE/INTERCONNECT DIAGRAM

PACKAGE INSTALLATION

2.0 ESTIMATED COMPONENT WEIGHTS:

PACKAGE FRAME WITH ACCESSORIES	28,000 LBS (12701 KG)
BASIC ENGINE (TAURUS 60)	4,120 LBS (1869 KG)
EXHAUST DIFFUSER	300 LBS (136 KG)
AIR INLET	280 LBS (127 KG)
REDUCTION GEAR UNIT	3,600 LBS (1633 KG)
GENERATOR	25,500 LBS (11567 KG)
AC START MOTOR ASSEMBLY	850 LBS (386 KG)
TOTAL INSTALLED DRY PACKAGE WEIGHT	62,650 LBS (28419 KG)
OIL TO FILL SYSTEM	3,072 LBS (1393 KG)
TOTAL INSTALLED WET PACKAGE WEIGHT	65,722 LBS (29812 KG)

2.1 NOTE NOT USED.

2.2 WHEN A CONVENTIONAL REINFORCED CONCRETE SLAB IS USED, IT IS EXPECTED THAT THE CONCRETE WILL BE FLAT AND LEVEL. THE CUSTOMER BASED ON LOCAL SOIL CONDITIONS WILL DETERMINE THE THICKNESS. AN EMBEDDED PLATE AT EACH MOUNTING PAD IS REQUIRED TO SUPPORT JACKING SCREW. THE TURBINE ENGINE FRAME IS DESIGNED SUCH THAT IT WILL UNDERGO THERMAL GROWTH WITH OPERATION OF THE PACKAGE. THEREFORE, STRUCTURAL GROUT MUST NOT BE USED DIRECTLY ADJACENT TO THE MOUNTING PADS ON THE FRAME OR UNDER THE PERIMETER OF THE FRAME RAIL. FLEXIBLE SEALANT MAY BE USED AROUND THE PERIMETER OF THE FRAME BUT SHALL NOT RESTRAIN THE UNIT FROM THERMAL GROWTH. THE FRAME'S PAINT IS COMPATIBLE WITH MOST SEALANT. THEREFORE, DO NOT REMOVE PAINT.

THE SLAB OR DECK SHOULD PROVIDE ADEQUATE AND CLEAN WALKWAYS THAT PERMIT ACCESS FOR MAINTENANCE AND ALLOW PROPER CLEARANCE FOR HINGED ENCLOSURE DOORS AND FOR THE REMOVAL OF DUCTING. FOR PACKAGE MAINTENANCE ACCESSIBILITY, REVIEW CLEARANCE ZONES ON THE INSTALLATION DRAWING.

MAINTENANCE STRUCTURES (IF USED) SHOULD ALLOW ACCESS FOR MAINTENANCE OF COMPONENTS LOCATED EXTERNAL TO THE PACKAGE (VALVES, STRAINERS, ETC.). THESE STRUCTURES ARE NOT SUPPLIED BY SOLAR.

ASSUME ENTIRE SHORT CIRCUIT TORQUE IS TRANSMITTED DOWN THE DRIVE TRAIN AND THE TORQUE IS REACTED BY TIE-DOWN BOLTS NEAREST TO THE COMPONENT PRODUCING THE TORQUE.

2.3 NOTE NOT USED.

2.4 THE PACKAGE ASSEMBLY (DRIVER/DRIVEN OR SINGLE FRAME) IS PROVIDED WITH FOUR (4)-LIFTING POINTS. ALL FOUR POINTS MUST BE USED WITH SPREADER BARS TO PREVENT DAMAGE TO THE PACKAGE.

WHEN THE DRIVER AND DRIVEN FRAME ASSEMBLIES ARE SHIPPED SEPARATELY, THEY MUST NOT BE LIFTED AS A SINGLE ASSEMBLY IN THE FIELD.

THE PLANE OF THE CENTER OF GRAVITY FOR THE TOTAL PACKAGE ASSEMBLY IS STENCILED ON EACH SIDE OF THE PACKAGE FRAME.

2.5 NOTE NOT USED.

2.6 PACKAGE ELEVATION, BASE LEVELING, PRELIMINARY AND FINAL ALIGNMENT:

PACKAGE ELEVATION -OBTAIN THE CORRECT EQUIPMENT TRAIN ELEVATION AND LEVEL BY USING A SURVEYOR'S TRANSIT AND CUSTOMER SELECTED SITE REFERENCE POINT TO ADJUST THE BASE LEVELING DATUM POINTS INDICATED ON THE MECHANICAL INSTALLATION DRAWING.

A WATER GAGE OR OTHER SIMILAR DEVICE CAN BE USED TO LEVEL THE BASE DATUM POINTS WHEN EQUIPMENT TRAIN ELEVATION IS NOT CRITICAL TO THE INSTALLATION.

JACKING BOLTS HAVE BEEN PROVIDED AT THE BASE TIE-DOWN POINTS FOR ADJUSTMENT. VERIFY THE BASE IS LEVEL AFTER SETTING WITH A TRANSIT BY USING A MACHINIST LEVEL TO CHECK THE ROTATING EQUIPMENT PAD SURFACES. EACH PAD MUST BE LEVEL WITHIN ± .005 IN (.127 MM).

STRUCTURAL GROUT ENSURE THE SPACE FOR STRUCTURAL GROUT UNDER THE MOUNTS (IF USED) IS APPROXIMATELY AS SHOWN ON THE CUSTOMER'S INSTALLATION DRAWING AND THE GROUT VENDOR'S RECOMMENDATIONS. THE USE OF FILL-IN OR SEAL GROUT ON THE UNDERSIDE OF SOLAR EQUIPMENT IS NOT RECOMMENDED.

DO NOT INSTALL PACKAGE SITE CONNECTIONS UNTIL FINAL ALIGNMENT HAS BEEN COMPLETED.

PRELIMINARY ALIGNMENT PERFORM PRELIMINARY ALIGNMENT OF ROTATING MACHINERY.

THIS STEP IS NOT NECESSARY FOR A SINGLE BASE WITHOUT A BOLTED INTERFACE. DO NOT POUR STRUCTURAL GROUT UNTIL THE PRELIMINARY EQUIPMENT DRIVE TRAIN ALIGNMENT HAS BEEN COMPLETED.

MECHANICAL INSTALLATION DRAWING/STUDY THE INSTALLATION CAREFULLY. ALL SHAFTS MUST BE AGAINST THEIR ACTIVE THRUST BEARINGS. THE CORRECT COUPLING END FLOAT MUST BE ESTABLISHED FOR ALL GEAR TYPE COUPLINGS OR THE CORRECT DISTANCE BETWEEN FLANGES MUST BE SET FOR ALL DIAPHRAGM TYPE COUPLINGS. SEE ALIGNMENT SECTION FOR DETAILS.

NOTE: PRELIMINARY ALIGNMENT IS OBTAINED BY ADJUSTING THE PACKAGE BASE JACKING BOLTS. DO NOT USE THE EQUIPMENT SHIMS PROVIDED BETWEEN ROTATING EQUIPMENT AND BASES FOR PRELIMINARY ALIGNMENT. THIS SHIMMING IS INTENDED TO BE USED FOR FINAL ALIGNMENT ONLY.

CAUTION: CURE TIME FOR GROUT IS DEPENDANT ON THE AMBIENT TEMPERATURE. REFER TO THE GROUT VENDOR'S INSTRUCTIONS FOR NORMAL CURE TIMES AT VARIOUS AMBIENT TEMPERATURES.

FINAL ALIGNMENT -THE ROTATING EQUIPMENT IS NOW READY FOR FINAL ALIGNMENT. USE SHIMS PROVIDED IN THE LOOSE SHIP KIT AND ADJUST ROTATING EQUIPMENT AS NECESSARY. SEE ALIGNMENT DRAWING FOR PROCEDURES. REFERENCE SOLAR ES 9-414.

THE BOTTOM SURFACE OF THE PACKAGE FRAME, INCLUDING THE PACKAGE TIE DOWN LOCATIONS, IS PAINTED WITH THE SAME PROCESS AS THE OTHER SURFACES OF THE FRAME. THIS PAINT PROCESS IS COMPLETELY COMPATIBLE WITH GROUT PROCESSES AND DOES NOT REQUIRE REMOVAL OF THE PAINT WHEN GROUT IS UTILIZED. THE GROUT CAN BE APPLIED DIRECTLY TO THE PAINTED SURFACE.

2.7 FLOW, PRESSURE AND TEMPERATURE VALUES SHOWN ON THIS DRAWING ARE INTENDED FOR USE IN THE DESIGN OF EXTERNAL SYSTEMS AND EQUIPMENT ONLY, AND CANNOT BE USED IN ANY TURBINE PERFORMANCE CALCULATIONS.

2.8 A. ENGLISH UNITS ARE PRIMARY AND METRIC CONVERSIONS SHOWN IN BRACKETS ARE DERIVED FROM THE ENGLISH UNITS. OVERALL DIMENSIONS SHOWN ON THIS DRAWING ARE NOMINAL AND SMALL VARIATIONS CAN BE EXPECTED. TOLERANCES ARE +/-1/8 IN (+/- 3.2 MM) ON HOLD DOWN FOUNDATION POINTS. FOR ALL OTHER CUSTOMER CONNECTIONS, THE TOLERANCES ARE +/-1/2 IN (+/-12.7 MM). IT IS RECOMMENDED THAT SUFFICIENT ALLOWANCE BE LEFT ON MATING PIPES AND FLANGES FOR FINAL FIELD ALIGNMENT. DO NOT SCALE THIS DRAWING, WORK TO DIMENSIONS GIVEN. DIMENSIONS IN PARENTHESIS ARE FOR REFERENCE ONLY.

B. CUSTOMER CONNECTION PIPE FLANGES CONFORM TO AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI) B.16.5. ALL FLANGE HOLES STRADDLE THE VERTICAL CENTERLINE SYMMETRICALLY.

C. ALL EXTERNAL PIPES, DUCTS AND VENTS CONNECTED TO THE PACKAGE MUST BE FULLY SELF-SUPPORTING. EXTERNAL INTERCONNECT PIPING MUST BE CLEANED OF DIRT, LOOSE DEBRIS, MILL SCALE AND RUST BY CONTRACTOR PRIOR TO INSTALLATION. MINIMUM PIPE SIZES ALLOWABLE ARE DETERMINED BY PACKAGE CONNECTION POINT. NO REDUCTIONS ARE ALLOWED UNLESS OTHERWISE SPECIFIED.

△3 D. LUBE OIL PIPING, FUEL OIL PIPING AND THE LUBE OIL VENT LINE FROM THE TANK TO THE DEMISTER CAN BE 316L STAINLESS STEEL (RECOMMENDED) OR CARBON STEEL. EXTERNAL LINES ARE TO BE CLEANED BY CONTRACTOR PRIOR TO CONNECTION TO THE TURBINE SKID OR EXTERNALLY MOUNTED OIL COOLERS. LUBE OIL CARBON STEEL PIPING MUST BE PICKLED AND PASSIVATED PRIOR TO FLUSHING. UNDER NO CIRCUMSTANCES ARE THE EXTERNAL PIPES TO BE CLEANED WHILE THEY ARE CONNECTED TO THE TURBINE OR EXTERNALLY MOUNTED OIL COOLERS.

△3 E. ALL SOLAR SUPPLIED PIPING INTERFACE CONNECTIONS 4 IN (102 MM) OR LESS IN DIAMETER ARE 316L STAINLESS STEEL UNLESS OTHERWISE SPECIFIED. SOLAR SUPPLIED PIPING INTERFACE CONNECTIONS GREATER THAN 4 IN (102 MM) IN DIAMETER ARE CARBON STEEL UNLESS OTHERWISE SPECIFIED.

F. SOLAR RECOMMENDS THAT LUBE OIL PIPING BE FLUSHED WITH A MINIMUM REYNOLDS NUMBER OF 4000 UNTIL THE FLUSHING FLUID MEETS AN ISO CLEANLINESS CODE (4406) OF 14/12, AND THERE ARE NO PARTICLES COLLECTED ON A 100 MESH SCREEN AT THE LINE OUTLET AFTER FLUSHING FOR AT LEAST ONE HOUR. REFERENCE SOLAR ES 2184.

THE REYNOLDS NUMBER CAN BE CALCULATED BY:

NR = (3160 X GPM)/(CS X D)
GPM = (NR (CS X D))/3160

WHERE:
GPM = FLUSHING FLUID FLOW RATE GALLONS PER MINUTE
CS = FLUSHING FLUID VISCOSITY – CENTISTOKES
D = PIPE/TUBE INSIDE DIAMETER INCHES
EXAMPLE OF FLOW RATE FOR REYNOLDS NUMBER (NR) = 400

PIPE/TUBE SIZE	GPM REQUIRED FOR N_r = 4000 W/C32 OIL		
	80°F OIL 46 CS	120°F OIL 21 CS	150°F OIL 12.5 CS
.375 X .049 TUBE (.277 I.D.)	16.8	7.4	4.4
.50 X .049 TUBE (.402 I.D.)	24.4	10.7	6.4
.75 X .049 TUBE (.652 I.D.)	39.8	17.3	10.3
1.0 X .049 TUBE (.902 I.D.)	54.8	24.0	14.3
1.25 X .049 TUBE (1.152 I.D.)	70.0	30.6	18.2
.75 X SCH 80 PIPE (.742 I.D.)	45.1	19.7	11.7
1.0 X SCH 80 PIPE (.957 I.D.)	58.1	25.4	15.1
1.5 X SCH 80 PIPE (1.500 I.D.)	91.1	39.9	23.7
2.0 X SCH 80 PIPE (1.939 I.D.)	117.8	51.5	30.7
3.0 X SCH 40 PIPE (3.068 I.D.)	184.4	81.6	48.5
4.0 X SCH 40 PIPE (4.026 I.D.)	244.6	107.0	63.7

EXAMPLE OF FLOW RATE FOR REYNOLD'S NUMBER (Nr) = 4000 W/C32 OIL

2.9 NOTE NOT USED.

2.10 UNDER NO CIRCUMSTANCES SHOULD EXTERNALLY IMPOSED LOADING BE APPLIED IN ANY DIRECTION ON THE AIR INLET OR EXHAUST DUCTING CONNECTIONS WHICH EXCEEDS 200 LBS (890 N). THE TURBINE EXHAUST SPOOL PIECE (LOOSE SHIPPED) MUST BE INSTALLED TO THE TURBINE EXHAUST BELLOWS AT THE MARMON FLANGE. PRIOR TO ATTACHING EXHAUST DUCTING TO THE TURBINE EXHAUST SPOOL PIECE, INSPECT THE INNER SHROUD OF THE TURBINE EXHAUST BELLOWS AND THE INSIDE DIAMETER OF THE BELLOWS TO SEE THAT THERE IS EQUAL CLEARANCE BETWEEN THE INNER SHROUD AND THE BELLOWS. POSITION THE ATTACHING EXHAUST DUCTING SO THAT WHEN THE CONNECTION IS MADE, THE INNER SHROUD OF THE TURBINE EXHAUST BELLOWS AND THE INSIDE DIAMETER OF THE TURBINE EXHAUST BELLOWS CONTINUE TO MAINTAIN A CIRCUMFERENTIAL CLEARANCE. MAXIMUM LATERAL DEFLECTION ON EXHAUST DUCT CANNOT EXCEED 3/8" (10 MM). THE MATING EXHAUST DUCT FLANGE MUST BE LOCATED 4'-7" (1397 MM) FROM THE –A– PLANE. AFTER PROPER LOCATION OF THE FLANGE GASKET AND TURBINE EXHAUST SPOOL PIECE, THE TURBINE EXHAUST DIFFUSER BELLOWS MUST BE EXPANDED TO FIT. THIS IS APPROX 1" (25 MM). (USE THE LONG BOLTS PROVIDED IN THE LOOSE SHIP HARDWARE KIT FOR INSTALLATION).

2.11 TURBINE AIRFLOW VALUES ARE FOR DUCT SIZING CALCULATION PURPOSES ONLY AND DO NOT CORRESPOND TO ANY GIVEN TURBINE CONDITIONS. INLET AND EXHAUST SYSTEMS SHOULD BE DESIGNED SUCH THAT PRESSURE LOSSES DO NOT EXCEED 4" (102 MM) H_2O FOR THE INLET, 6" (152 MM) H $_2$O FOR THE EXHAUST AND 10" (254 MM) H_2O FOR EXHAUST SYSTEM WITH HEAT RECOVERY.

TAURUS 60 INLET AMBIENT TEMPERATURE FROM –20°F (–28.9°C) TO 120°F (48.9°C).

EXHAUST TEMPERATURE: 920 TO 1005°F (493 TO 541°C)

EXHAUST FLOW: 90,500 TO 113,000 ACFM (2563 TO 3200 AM^3/MIN)

INLET FLOW: 35,000 TO 35,500 SCFM (991 TO 1005 NM ^{3}/MIN)

IF NORMAL OPERATING TEMPERATURE OF TURBINE IS OUTSIDE OR EXCEEDS THE AMBIENT TEMPERATURE RANGE CONSULT SOLAR ENGINEERING.

REV	REV	REV	REV B 75046-K 12-20-04	REV A 75046-F 10-26-04	REV NC 75046-B 8-24-04

THIS PRINT IS PROVIDED ON A RESTRICTED BASIS AND IS NOT TO BE USED IN ANY WAY DETRIMENTAL TO SOLAR TURBINES INCORPORATED.

REVISIONS

ZONE	LTR	DESCRIPTION	DATE	APPROVED
	NC	INITIAL SUBMITTAL TO ISSUE GENERAL ARRANGEMENT INSTALLATION PRD 75046	07-23 2004	D.A.C.
	A	REVISED TO REFLECT CUSTOMER COMMENTS PER PRD 75046	10-18 2004	D.A.C.
	B	REVISED TO REFLECT AS-SHIPPED CONFIGURATION PER PRD 75046	12-17 2004	D.A.C.

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-001

CUSTOMER
SANTEE COOPER
RICHLAND COUNTY LANDFILL
GAS-TO-ENERGY FACILITY

☒ SUBMITTED FOR REVIEW DATE 07-23-04
☐ CERTIFIED AS NOTED WITH DATE
☒ CERTIFIED FOR CONSTRUCTION DATE 12-17-04

SYMBOLS
② DENOTES EXTERNAL CONNECTION POINT
△3 DENOTES REVISION
③ DENOTES COMPONENT OR INSTRUMENTATION
/12 DENOTES DRAWING ZONE LOCATION

FSCM NO. 66195

APPROVED	DATE
PROJECT MGR. J.BOGUSLAW	07-23-04
ANCILLARY ENGR. J.MUYCO	07-23-04
ENCLOSURE ENGR. NA	07-23-04
PACKAGE ENGR. D.COOLEY	07-23-04
HVAC-MECH ENGR. S.MACATEE	07-23-04
C.A. DESIGNER D.COOLEY	07-23-04

DRAWING TITLE
TAURUS 60
POWER GENERATION
TURBOMACHINERY
MECHANICAL INSTALLATION

Solar Turbines
A Caterpillar Company

SOLAR PROJECT ITEM NO. 2-75681
CUSTOMER IDENT. NO. SEE ABOVE
DRAWING NO. 75681-149223
REV B
SHEET 1 OF 20

2.12 NOTE NOT USED.

2.13 NOTE NOT USED.

2.14 TOTAL GENERATOR HEAT REJECTION IS APPROXIMATELY 600,533 BTU/HR (633,596 KJ/HR). TOTAL GAS TURBINE HEAT REJECTION IS APPROXIMATELY 201,000 BTU/HR (212,000 KJ/HR). THIS ESTIMATE IS EXCLUSIVE OF LUBE OIL COOLER AND DRIVEN EQUIPMENT AT ISO CONDITIONS.

2.15 DIRECTION REFERENCES TO THE PACKAGE – LEFT SIDE, RIGHT SIDE, FORWARD, AND AFT ARE ESTABLISHED BY VIEWING THE PACKAGE FROM THE EXHAUST END (AFT), AND LOOKING FORWARD TO THE TURBINE AIR INLET (FWD).

2.16 NOTE NOT USED.

2.17 NOTE NOT USED.

2.18 NOTE NOT USED.

2.19 THE QUALITY OF AIR, FUEL AND WATER TO BE USED IN THIS GAS TURBINE IS OUTLINED IN ES 9–98. PROVIDING AIR, FUEL OR WATER THAT DOES NOT MEET THE MINIMUM REQUIREMENTS OF ES 9–98 WILL RESULT IN INCREASED MAINTENANCE, PERFORMANCE LOSS, AND REDUCED LIFE EXPECTANCIES.

2.20 THE AIR ENTERING THE ENCLOSURE/GENERATOR COMPARTMENT MUST BE FREE OF DUST, OIL MIST AND MOISTURE. GENERATORS OPERATING IN CHEMICALLY LADEN AIR MAY REQUIRE ADDITIONAL PROTECTION. INCREASED MAINTENANCE, PERFORMANCE LOSS, AND REDUCED LIFE EXPECTANCIES WILL RESULT IF SUITABLE AIR IS NOT USED FOR ENCLOSURE/GENERATOR COOLING.

START SYSTEM

3.0 PRIOR TO STARTING THE ENGINE, ENSURE THAT THE TURBINE AIR INLET DRAIN CHECK VALVE IS NOT RESTRICTED AND THAT THE AIR INLET DUCT IS FREE OF ACCUMULATED WATER. THE AIR INLET DUCT SHALL BE FREE OF COMBUSTIBLE AND CORROSIVE ELEMENTS.

3.1 NOTE NOT USED.

3.2 NOTE NOT USED.

3.3 NOTE NOT USED.

3.4 UPON INSTALLATION OF THE START MOTOR VARIABLE FREQUENCY DRIVE, ALLOW 4 IN (102 MM) CLEARANCE ON TOP AND BOTTOM, AND 0.8 IN (20 MM) CLEARANCE ON THE SIDES OF THE UNIT. NO BOTTOM CLEARANCE IS REQUIRED FOR FLOOR MOUNTED UNITS. IF MULTIPLE UNITS ARE PLACED SIDE BY SIDE, ALLOW 1.6 IN (40 MM) CLEARANCE ON SIDES. VFD MUST BE INSTALLED SUCH THAT VISUAL AND PHYSICAL ACCESS TO THE VFD CONTROL PANEL IS MAINTAINED DURING NORMAL OPERATION. THE VFD MUST BE LOCATED IN AN AREA WITH A TEMPERATURE RANGE OF 32°F TO 104°F (0°C TO 40°C).

FUEL SYSTEM

4.0 GAS FUEL TO BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 9–98. NO LIQUIDS ARE ALLOWED IN THE FUEL GAS. SOLAR RECOMMENDS THE FUEL TEMPERATURE TO BE AT LEAST 50°F (28°C) ABOVE THE DEW–POINT TEMPERATURE OF BOTH THE NATURAL GAS LIQUIDS AND WATER AT SKID EDGE. IF THE FUEL GAS TEMPERATURE EXCEEDS THE SYSTEM COMPONENT CAPABILITIES, CONSULT SOLAR ENGINEERING. MAXIMUM FLOW DEMAND RATE IS 2,334 SCFM (62.5 NM ^{3}/MIN). MINIMUM FUEL PRESSURE REQUIRED AT PACKAGE CONNECTION IS 314 PSIG (2166 KPAG) AT AN AMBIENT TEMPERATURE OF 59°F (15°C). MAXIMUM FUEL SYSTEM PRESSURE RATING IS 500 PSIG (3448 KPAG). THE ACTUAL MINIMUM FUEL ACCEPTABLE PRESSURE IS A FUNCTION OF AMIBIENT TEMPERATURE. IF AMBIENT CONDITIONS ARE WARMER, A LOWER FUEL PRESSURE CAN BE USED. PLEASE CONSULT SOLAR ENGINEERING FOR ASSISTANCE. IT IS RECOMMENDED THAT A QUICK CLOSING AND EASILY ACCESSIBLE HAND OPERATED VALVE BE INSTALLED IN THE EXTERNAL SUPPLY LINE TO PROVIDE IMMEDIATE SHUTOFF CAPABILITY. GAS FUEL OPERATION TEMPERATURE IS BETWEEN –40°F (–40°C) AND 200°F (93°C). OPERATION ABOVE 200°F (93°C) WILL SHORTEN THE LIFE OF FUEL SYSTEM COMPONENTS.

4.1 NOTE NOT USED.

4.2 NOTE NOT USED.

4.3 NOTE NOT USED.

4.4 NOTE NOT USED.

4.5 NOTE NOT USED.

4.6 NOTE NOT USED.

4.7 NOTE NOT USED.

4.8 GAS VENT TERMINATION SHALL AFFORD PROTECTION FROM RAIN AND SNOW BY MEANS OF A SHIELD OR BY PIPE GEOMETRY AND BE SCREENED TO PREVENT ENTRY OF LARGE FOREIGN OBJECTS. **SEE WARNING NOTE 10.2 AND TABLE 3.**

LUBE SYSTEM

5.0 LUBE OIL USED IN THIS PACKAGE MUST BE IN ACCORDANCE WITH SOLAR SPECIFICATION ES 9–224. INITIAL FILL OF THE PACKAGE OIL TANK SHALL FULLY COMPLY WITH OIL CLEANLINESS LEVEL ISO 14/12. THE FOLLOWING EQUIPMENT AND PROCEDURES ARE RECOMMENDED TO OBTAIN THE REQUIRED CLEANLINESS LEVEL:

–– A HIGH EFFICIENCY (3 MICRON) OIL FILTER INSTALLED AT THE FILL HOSE DISCHARGE END.
–– ALL HOSES, CONNECTORS, ETC., SHOULD BE PRE–FLUSHED (USING AN OIL COMPATIBLE FLUID AT REYNOLDS NUMBER 4000) TO AN ISO 14/12 CLEANLINESS LEVEL AND NO PARTICLES COLLECTED ON A 100 MESH SCREEN AFTER A ONE HOUR FLUSHING PERIOD.
–– THE DISPENSING OIL STORAGE TANK AND ITS BULK FILL SHOULD BE PRE–FILTERED TO ISO 14/12 PRIOR TO THE PACKAGE OIL TANK FILL OPERATION.

THE CAPACITY OF THE OIL TANK AT THE NORMAL OPERATING LEVEL INDICATED AT THE LEVEL GAGE IS 430 GALLONS (1627 LITERS). AN ADDITIONAL 10 GALLONS (37.8 LITERS) IS REQUIRED FOR THIS PACKAGE FILTER AND PIPING. ADDITIONAL OIL WILL BE REQUIRED TO FILL OFF–SKID OIL PIPING AND VESSELS IF REQUIRED. THE MAXIMUM DRAIN BACK CAPACITY ABOVE THE NORMAL OPERATING LEVEL IS 170 GALLONS (643 LITERS). PIPING BETWEEN LUBE OIL COOLER AND PACKAGE SUPPLIED BY OTHERS WHEN COOLER IS NOT MOUNTED ON ANCILLARY SKID. IT IS RECOMMENDED THAT A MANUAL HAND VALVE BE INSTALLED IN THE LUBE OIL TANK DRAIN CONNECTION #26 PRIOR TO FILLING THE TANK. **SEE WARNING NOTE 10.2 AND TABLE 3.**

5.1 THE LUBE OIL SHALL HAVE A POUR POINT WHICH IS AT LEAST 11°F (6°C) BELOW THE MINIMUM AMBIENT TEMPERATURE TO INSURE FLOW IN EXPOSED LINES AND VESSELS.

5.2 THE PACKAGE OIL COOLER IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY. THE FOLLOWING INSTALLATION REQUIREMENTS APPLY (THESE REQUIREMENTS ARE MET WITH ANCILLARY SKID MOUNTED UNITS):

THE TOP OF THE COOLER SHALL NOT BE MORE THAN 50' (15240 MM) ABOVE THE BOTTOM OF THE PACKAGE FRAME. REFERENCE PLANE –C–.

COOLER OIL VOLUME (PER COOLER):	8 GALLONS (30.3 L)
DESIGN HEAT LOAD (PER COOLER):	572,228 BTU/HR (167.6 KW)
DESIGN OIL FLOW RATE (PER COOLER):	108.6 GPM (411 LPM)
AIR FLOW RATE:	18,225 ACFM (516 AM ^{3}/MIN)
MAX AMBIENT TEMPERATURES:	110°F (43.3°C)

MAX DESIGN LUBE OIL COOLER OUTLET TEMPERATURE C32 OILS: 150°F (65.5°C)

MAXIMUM OIL COOLER DESIGN PRESSURE DROP: 20 PSID (138 KPAD)
MINIMUM OIL COOLER DESIGN PRESSURE: 200 PSIG (1379 KPAG)

THE MAXIMUM TOTAL DESIGN PRESSURE DROP OF THE OFF SKID OIL COOLER LOOP INCLUDING SUPPLY AND RETURN LINES SHALL NOT EXCEED 30 PSID (207 KPAD) AT THE DESIGN FLOW RATE AND AN OIL VISCOSITY OF 60 SSU (10.5 CENTISTOKES). NO CHECK VALVES ARE ALLOWED IN THE OIL COOLER LOOP. FOR UNITS IN COLD CLIMATES, OIL COOLER SUPPLY, RETURN AND OPTIONAL VENT LINES MUST SLOPE FROM THE OIL COOLER TO THE TURBINE PACKAGE TO FACILITATE DRAINING WHEN THE UNIT IS NOT OPERATING. **SEE WARNING NOTE 10.2 AND TABLE 3.**

PREVAILING WINDS MUST BE CONSIDERED TO PREVENT THE LUBE OIL COOLER FROM EXHAUSTING INTO THE ENGINE AIR INLET SYSTEM OR TO TAKE AIR IN FROM THE ENGINE EXHAUST SYSTEM. NO AIRFLOW BACKPRESSURE IS ALLOWED AT THE LUBE OIL COOLER FACE.

5.3 NOTE NOT USED.

5.4 THE EXTERNAL OIL TANK VENT PIPING MUST BE SELF–SUPPORTING AND HAVE A MINIMUM UPWARD SLOPE OF 0.25" PER FOOT (21 MM/M) WITH NO TRAPS OR RESTRICTIONS. THE VENT LINE MUST BE ROUTED SUCH THAT OIL TANK VAPORS WILL NOT MIX WITH THE TURBINE INLET AIR. IN THE ABSENCE OF A FLAME ARRESTOR, THE VENT LINE MUST BE ROUTED AWAY FROM THE TURBINE EXHAUST AND OTHER SOURCES OF IGNITION. VENT PIPE TERMINATION SHALL AFFORD PROTECTION FROM RAIN AND SNOW BY MEANS OF A SHIELD OR BY PIPE GEOMETRY AND BE SCREENED TO PREVENT ENTRY OF LARGE FOREIGN OBJECTS. **SEE WARNING NOTE 10.2 AND TABLE 3.**

THE OIL TANK VENT AIR/OIL SEPARATOR IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY (REFERENCE NOTE 1.1 FOR SOLAR SPECIFICATION). THE FOLLOWING INSTALLATION REQUIREMENTS APPLY:

FILL THE SEPARATOR SUMP THROUGH FILL PORT TO OVERFLOWING BEFORE OPERATING. SUFFICIENT VERTICAL CLEARANCE FOR REMOVAL OF COVER MUST BE PROVIDED FOR PROPER MAINTENANCE OF THE SEPARATOR.

5.5 THE FLAME ARRESTOR IS REQUIRED TO PREVENT FIRE FLASHBACK INTO THE OIL TANK. THE FLAME ARRESTOR IS NOT INTEGRAL WITH THE PACKAGE AND MUST BE LOCATED AND INSTALLED SEPARATELY, NO MORE THAN 15 FT (4572 MM) FROM THE VENT TERMINATION (REFERENCE ES 1746 SOLAR SPECIFICATION).

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-002

Solar Turbines
A Caterpillar Company

DRAWING NO.	REV	B
75681–149223	SHEET	2

ELECTRICAL SYSTEMS

6.0 PACKAGE ELECTRICAL INSTALLATION REQUIREMENTS ARE AS SHOWN ON ELECTRICAL SCHEMATIC AND INTERCONNECTION WIRING DIAGRAM.

6.1 NOTE NOT USED.

6.2 GROUNDING LUGS ARE PROVIDED FOR SEPARATELY GROUNDING THE PACKAGE FRAME. LUG SURFACES TO BE FREE OF DIRT, GRIT, PAINT AND OIL TO ALLOW FOR CLEAN METAL–TO–METAL CONTACT. IF THE PACKAGE IS A SPLIT TYPE THE SUITABLE LUGS ARE PROVIDED FOR INSTALLATION OF MAIN BONDING JUMPER BETWEEN THE SKIDS WHICH SHOULD BE SIZED IN ACCORDANCE WITH THE APPLICABLE ELECTRICAL CODES. EACH TURBINE GENERATOR PACKAGE SHOULD BE GROUNDED PER LOCAL AND/OR NEC CODES. THE PANEL INSTRUMENT AND PHYSICAL GROUNDS SHOULD HAVE THE INDIVIDUAL GROUND CABLES TO CUSTOMER GROUND AND ARE NOT PERMITTED TO BE LOOPED OR DAISY CHAINED. ON MULTIPLE UNITS INSTALLATION LOOPING OR DAISY CHAIN OF GROUNDS BETWEEN PACKAGES IS NOT PERMITTED.

6.3 THE TURBOTRONIC CONTROL IS PROVIDED IN TWO ON–SKID, NEMA 4, PAINTED STEEL BOXES DESIGNED TO LIMIT THE EFFECTS OF ELECTROMAGNETIC INTERFERENCE. THE CONTROL BOX IS DESIGNED WITH INTERNAL FANS TO PROVIDE AIR CIRCULATION WITHIN THE BOX TO THE HEAT GENERATING COMPONENTS.

THE CONTROL SYSTEM IS DESIGNATED TO OPERATE IN A NON–HAZARDOUS AREA. ENVIRONMENTAL CONDITIONS WITHIN 32°F (0°C) TO 140°F (60°C) WITH 5–95% NON–CONDENSING HUMIDITY ARE REQUIRED.

6.4 AC AND DC CIRCUITS MUST BE RUN SEPARATELY FROM EACH OTHER TO AVOID ELECTRICAL CONTROL INTERFERENCE PROBLEMS. INTRINSICALLY SAFE CIRCUITS MUST BE SEPARATE FROM NON–INTRINSICALLY SAFE CIRCUITS.

6.5 BATTERIES AND BATTERY CHARGER ARE DEDICATED TO THE SOLAR ELECTRICAL SYSTEM AND MUST NOT BE SHARED WITH OTHER SITE/CUSTOMER SYSTEMS WITHOUT WRITTEN APPROVAL FROM SOLAR ENGINEERING.

6.6 NOTE NOT USED.

A

6.7 FOR THE PURPOSE OF ELECTRICAL INTERCONNECTION, THE BLANK PLATES LOCATED IN STRATEGIC LOCATIONS ARE PROVIDED WITH THE PACKAGE. IT IS THE CUSTOMER SCOPE TO PENETRATE THE PLATES AND CONTINUE ROUTING THE CABLES OR CONDUITS TO THE FINAL EQUIPMENT AND/OR TERMINAL BOXES WITHIN THE SKID. THIS CUSTOMER SCOPE OF SUPPLY ALSO INCLUDES ALL ASSOCIATED CABLE AND/OR CONDUIT MATERIAL.

6.8 CUSTOMER TO DRILL PER LOCAL ELECTRICAL CODE.

6.9 REFER TO LOCAL PREVAILING ELECTRICAL CODE TO DETERMINE THE REQUIREMENTS FOR CONDUIT SEALS. WHERE ELECTRICAL CONDUIT AT THE SKID EDGE PASSES FROM CLASS 1, GROUP D, DIVISION 2, TO AN UNCLASSIFIED LOCATION; SEALING REQUIREMENTS MUST BE FOLLOWED.

7.0 NOTE NOT USED.

8.0 NOTE NOT USED.

ENGINE CLEANING

A 9.0 USE CONNECTION 122 FOR ON–CRANK CLEANING ONLY, AND 121 FOR ON–LINE CLEANING ONLY. FOR ON–CRANK AND ON–LINE CLEANING THE WATER/SOLVENT SOLUTIONS SUPPLY IS TO BE REGULATED BETWEEN 85 PSIG AND 100 PSIG (586.1 KPAG AND 689.5 KPAG) AT THE PACKAGE SKID CONNECTION. THE FLUID TEMPERATURE SHOULD BE AT AMBIENT CONDITIONS EXCEPT IN EXTREME COLD AMBIENCE. PLEASE REFER TO ES 9–62 OR THE OPERATIONS AND MAINTENANCE MANUAL FOR ADDITIONAL TURBINE CLEANING REQUIREMENTS AND PROCEDURES. WASH FLOW RATES AND TREATMENT QUANTITIES PER WASH CYCLE ARE SHOWN IN THE TABLE BELOW.

ON–CRANK FLOW	ON–LINE FLOW	TREATMENT QUANTITY	RINSE QUANTITY
2.4 – 3.4 GPM	0.6 – 1.2 GPM	12 – 17 GAL	17 – 34 GAL
9.1 – 12.9 LPM	2.3 – 4.5 LPM	45.4 – 64.4 L	64.4 – 128.7 L

9.1 WHEN AMBIENT TEMPERATURES FALL BELOW 50°F (10°C), CONSULT SOLAR SPECIFICATION ES 9–62 AND THE OPERATION AND MAINTENANCE MANUAL FOR PROPER COLD WEATHER OPERATING PROCEDURES.

9.2 SOLAR CLEANING SOLUTIONS SHOULD NEVER BE USED FOR ON–LINE CLEANING CONNECTION 121 UNLESS A PROPERLY DESIGNED INJECTION SYSTEM IS INSTALLED.

9.3 THE TURBINE AIR INLET DUCT MUST BE FREE OF ALL ACCUMULATED WATER AND SOLVENTS PRIOR TO STARTING THE TURBINE. INSURE THAT THE TURBINE AIR INLET DUCT AND DRAINS ARE COMPLETELY DRAINED AFTER CLEANING AND NOT TERMINATED IN A COMBUSTIBLE ENVIRONMENT. SEE NOTE 10.2 AND TABLE 3.

9.4 THE SOLAR SUPPLIED WASH CART REQUIRES A CLEAN DRY SUPPLY OF SHOP AIR AT 85 PSIG TO 100 PSIG (586.1 KPAG TO 689.5 KPAG) WITH A FLOW RATE OF:

ON–CRANK AIR FLOW	ON–LINE AIR FLOW
2.99 SCFM	0.98 SCFM
0.09 NM^3/MIN	0.03 NM^3/MIN

A COMPANION FLANGE INCORPORATING AN INTEGRAL QUICK DISCONNECT COUPLING IS PROVIDED WITH THE WASH CART FOR INSTALLATION AT SKID CONNECTIONS 121 AND 122.

SAFETY AND MISCELLANEOUS NOTES

10.0 CAUTION:
ENGINE BLEED AIR TEMPERATURE RANGES FROM 660°F (349°C) TO 860°F (460°C). APPLICATION OF THERMAL LAGGING TO EXTERNAL PIPES, TUBES, AND FITTINGS IS RECOMMENDED FOR PERSONNEL PROTECTION.

10.1 LOOSE SHIPPED WITH ATTACHING HARDWARE FOR FIELD INSTALLATION.

10.2 WARNING:
FAILURE TO LIMIT BACKPRESSURE TO SPECIFIED VALUE CAN RESULT IN SYSTEM OR COMPONENT MALFUNCTION AND CAN CAUSE PERSONAL INJURY AND/OR PROPERTY DAMAGE. THE USE OF BLOCK VALVES IN THE VENTS IS NOT RECOMMENDED.

WARNING:
IF THE EQUIPMENT WILL BE USING COMBUSTIBLE GAS AND/OR LIQUID FUEL FOR SERVICE, CARE MUST BE TAKEN TO PROPERLY VENT THE EXHAUST TO A SAFE LOCATION. REFER TO TABLE 1(TABLE 3 FOR CENTAUR/T60) FOR EMISSION QUANTITY AND DURATION.

10.3 NOTE NOT USED.

10.4 NOTE NOT USED.

10.5 SOLAR–SUPPLIED EQUIPMENT FOR EXTERNAL MOUNTING.

A 10.6 NOTE NOT USED.

11.0 NOTE NOT USED.

12.0 NOTE NOT USED.

TURBINE EXHAUST SYSTEM

REFER TO THE AUXILLIARY EQUIPMENT GENERAL ARRANGEMENT INSTALLATION.

TURBINE AIR INLET SYSTEM

REFER TO THE AUXILLIARY EQUIPMENT GENERAL ARRANGEMENT INSTALLATION.

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-003

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681–149223 | REV B | SHEET 3

VENTS AND DRAINS

13.0 GENERAL INFORMATION:

SOLAR PACKAGES USE ATMOSPHERIC VENTS AND DRAINS TO ALLOW FOR MOMENTARY OR CONTROLLED ESCAPE OF GAS AND PNEUMATIC PRESSURE OR LIQUIDS FROM A SYSTEM. THIS ALLOWS ACTUATION OF SOLENOID AND SHUTOFF VALVES, PROVIDES, VENTING FOR PNEUMATICALLY POWER DEVICES, AND PURGING OR DRAINING OF UNWANTED LIQUIDS. CORRECT OPERATION OF VALVES AND THE MECHANICAL INTEGRITY OF CERTAIN PARTS DEPEND ON MAINTAINING BACK PRESSURE IN THESE VENTS BELOW THE WORKING PRESSURE FOR WHICH THESE COMPONENTS ARE DESIGNED.
IDEALLY, ALL PACKAGE VENT AND DRAIN CONNECTIONS ARE SEPARATE DRAINS AND ATMOSPHERIC VENTS WHICH LEAD DIRECTLY TO THE ATMOSPHERE. VENTS AND DRAINS HAVE TO BE LARGE ENOUGH TO HANDLE ANY FLOW GIVEN IN THIS DRAWING WITHOUT EXCEEDING THE MAXIMUM ALLOWABLE BACK PRESSURE. THE GIVEN SIZE OF EACH SKID CONNECTION IS THE MINIMUM SIZE AND CANNOT BE REDUCED UNDER ANY CIRCUMSTANCES. FOR LONGER PIPE RUNS, LINE SIZES HAVE TO BE APROPRIATELY INCREASED.

IT IS MANDATORY TO INTERLOCK THE PACKAGE IF A BLOCK VALVE IS INSTALLED IN ANY VENT CONNECTION EXCEPT WHERE NOTED BELOW. THE INSTALLATION OF ANY INTERLOCK, MECHANICAL OR ELECTRICAL, IS THE CUSTOMER'S RESPONSIBILITY.

COMMON VENT LINES EXPERIENCE PERODIC INCREASES IN BACK PRESSURE DURING BLOW DOWN OF OTHER EQUIPMENT. THE BACK PRESSURE MUST NOT EXCEED THE PRESSURES LISTED INTABLE 3EVEN FOR SHORT PERIODS, REGARDLESS IF THE PACKAGE IS RUNNING OR NOT. THE ADDITION OF A CHECK VALVE IS NOT PERMITTED.

DETAILED INFORMATION:

13.1 LUBE OIL TANK VENT –THE EXTERNAL OIL TANK VENT PIPE IS A CONTINUATION OF THE OIL TANK. THE PIPE MUST BE CLEAN, SELF–SUPPORTIONG AND HAVE A MINIMUM UPWARD SLOPE OF 0.25 IN PER FOOT WITH NO LIQUID TRAPS OR RESTRICTIONS EXCEPT THE DEMISTER AND, WHEN USED, A FLAME ARRESTOR. THE VENT PIPE TERMINATION SHALL AFFORD PROTECTION FROM RAIN AND SNOW BY MEANS OF A SHIELD OR BY PIPE GEOMETRY AND MAY REQUIRE SCREENING TO PREVENT THE ENTRY OF LARGE FOREIGN OBJECTS. THE FLAME ARRESTOR, WHEN USED, MUST BE MOUNTED WITHIN 15 FEET OF THE VENT EXIT. TANK VENTS SHOULD NOT BE TIED TOGETHER ON MULTIPLE UNIT INSTALLATIONS.

THIS VENT IS NOT DESIGNED FOR HIGH BACK PRESSURE OPERATION AND THE PACKAGE WILL SHUT DOWN IF OVER PRESSURE IS DETECTED. HIGH TANK PRESSURE CAN ALSO MAKE IT DIFFICULT TO DRAIN OIL BACK FROM THE GENRATOR BEARINGS. THIS MAY RESULT IN THE LUBE OIL TANK TRYING TO VENT ITSELF THROUGH THE GENERATOR BEARINGS AND CAUSE OIL TO BE CARRIED OUT OF THESE VENTS. IT WILL ALSO CAUSE OIL TO LEAK AROUND THE GENERATOR SHAFT SEALS.

13.2 GAS VENT – THE VENT MUST BE ROUTED TO A SAFE PLACE WITH NO LIQUID TRAPS OR RESTRICTIONS. THE VENT LINE MUST NOT BE REDUCED IN SIZE AND MUST NOT BE SUBJECTED TO MORE THAN 5 PSIG (34.47 KPAG) OF BACK PRESSURE. THE VENTS SHOULD NOT BE TIED TOGETHER ON MULTIPLE UNIT INSTALLATIONS.

13.3 COMBUSTOR AND EXHAUST COLLECTOR DRAINTHESE DRAINS ARE CONNECTED TOGETHER WITHIN THE PACKAGE TO FORM A SINGLE DRAIN CONNECTION AND WILL COLLECT ANY WATER IN THE EXHAUST STACK FROM RAIN, SNOW, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS. THE COLLECTED LIQUIDS IN THIS DRAIN SHOULD BE PIPED TO A DRAIN SYSTEMS CAPABLE OF HANDLING HYDROCARBON LIQUIDS.

WARNING: ANY BACK PRESSURE AT THIS CONNECTION OR CLOGGING OF THE DRAIN MAY RESULT IN AN ACCUMULATION OF COMBUSTIBLE LIQUIDS IN THE ENGINE OR EXHAUST DUCTING AND COULD RESULT IN A FIRE.

13.4 ENGINE EXHAUST DUCTING AND SILENCER THIS DRAIN, WHEN USED, IS EXTERNAL TO THE PACKAGE AND MUST BE CLEAR OF WATER OR OTHER LIQUIDS BEFORE STARTING THE ENGINE. THE COLLECTED LIQUIDS IN THIS DRAIN ARE MOST LIKELY WATER, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS. THIS DRAIN SHOULD BE PIPED TO A DRAIN SYSTEM CAPABLE OF HANDLING HYDROCARBON LIQUIDS.

13.5 ENGINE AIR INLET DUCT DRAIN –THIS DRAIN MUST BE CLEAR OF WATER OR OTHER LIQUIDS BEFORE STARTING THE ENGINE. THE COLLECTED LIQUIDS IN THIS DRAIN ARE MOST LIKELY WATER, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS, AND MUST BE PROPERLY DISPOSED. THIS DRAIN MUST NOT BE COMBINED WITH UNPOLLUTED WATER DRAINS. A MANUAL SHUTOFF VALVE INSTALLED EXTERNAL TO THE PACKAGE IS RECOMMENDED FOR DRAIN LINE ISOLATION DURING PACKAGE OPERATION.

13.6 NOTE NOT USED.

13.7 OIL TANK DRAIN –THE TANK DRAIN MUST BE FITTED WITH A MANUAL VALVE BEFORE THE TANK IS FILLED. IT IS RECOMMENDED THAT THE VALVE BE OF THE LOCKING TYPE AND HAVE A PLUG INSTALLED IN THE OPEN END TO AVOID ACCIDENTAL SPILLS. THIS DRAIN IS USED TO EMPTY THE TANK WHEN NEEDED, AND NORMALLY IS NOT CONNECTED TO A DRAIN SYSTEM.

A

13.8 DRIP PAN DRAIN –THESE DRAINS MUST BE FITTED WITH MANUAL VALVES, WHICH HAVE TO BE CLOSED DRUING PACKAGE OPERATION. THIS IS TO PREVENT THE ESCAPE OF CO_2 DURING A FIRE SYSTEM DISCHARGE. THE COLLECTED LIQUIDS IN THESE DRAINS ARE MOST LIKELY WATER, LIQUID FUEL (IF USED), LUBE OIL AND ENGINE CLEANING SOLUTIONS. THE AMOUNT OF LIQUID CAN VARY FROM A FEW DROPS TO SEVERAL HUNDRED GALLONS (LITERS) DEPENDING ON THE SOURCE AND CAUSE OF THE LEAK. AVOID CONNECTING TO A CLOSED DRAIN SYSTEM BECAUSE ANY BACK PRESSURE AT THESE DRAINS WILL VENT BACK INTO THE ENCLOSURE CREATING HAZARDOUS ENVIORNMENT.

13.9 OIL COOLER VENT –THE AIR/OIL COOLER VENT PORT IS EQUIPPED WITH AN ORIFICE, WHICH SHOULD BE TUBED BACK TO THE OIL TANK. THIS ORIFICE ALLOWS TO VENT THE INITIAL AIR TRAPPED IN THE SYSTEM AT THE STARTUP AND DRAIN THE OIL FROM THE EXTERNAL COOLER LINES BACK TO TANK AFTER SHUTDOWN.

13.10 LUBE OIL FILTER DRAIN – THE HOUSING MUST BE DRAINED PRIOR TO REMOVING THE FILTERS. THIS DRAIN MAY ALSO ACT AS A LOW POINT DRAIN FOR SYSTEM OPERATIONS.

A

TABLE 3 – PACKAGE VENT AND DRAIN EMISSION INFORMATION

A

EXTERNAL CONNECTIONS							
ITEM	DESCRIPTION	PORT SIZE SEE SHEET	EMISSION SUBSTANCE	EMISSION QUANTITY	EMISSION DURATION	*MAXIMUM BACK PRESSURE	VELOCITY (FT/SEC)
3	LUBE OIL TANK VENT	4" PIPE STUB CS (WITH FLEXMASTER COUPLING)	AIR/OIL	N/A	N/A	6" H_2O	N/A
7	LUBE OIL COOLER VENT	1" TUBE O–RING BOSS	AIR/OIL	N/A	N/A	N/A	N/A
19	ENGINE EXHAUST COLLECTOR AND COMBUSTOR DRAIN	3/4" NPT FEMALE 316L	AIR/OIL FUEL/H_2O	NOTE 13.3	START–UP/ SHUTDOWN	NO BACK PRESSURE ALLOWED	N/A
22	ENGINE AIR INLET DUCT DRAIN	3/4" NPT FEMALE 316L	AIR/H_2O	NOTE 13.5	START–UP/ SHUTDOWN	NO BACK PRESSURE ALLOWED	N/A
26	LUBE OIL TANK DRAIN	3/4" NPT FEMALE 316L	OIL	430 GALLONS	MAINTENANCE	NO BACK PRESSURE ALLOWED	N/A
54	LUBE OIL FILTER DRAIN (UNFILTERED)	3/4" NPT FEMALE 316L	OIL	1.5 GALLONS	MAINTENANCE	NO BACK PRESSURE ALLOWED	N/A
126	PACKAGE DRIP PAN DRAIN	2" NPT FEMALE CS	OIL/WATER	NOTE 13.8	MAINTENANCE	NO BACK PRESSURE ALLOWED	N/A
127	OIL DRAIN FROM DRIP PAN GENERATOR	2" NPT FEMALE CS	OIL/WATER	NOTE 13.8	MAINTENANCE	NO BACK PRESSURE ALLOWED	N/A
203	FLAME ARRESTOR, LUBE OIL TANK VENT	6" 125 LB ANSI FF FLANGE CS	AIR/OIL	150 SCFM AIR 0.3 GAL PER MONTH OF OIL	CONTINUOUS	NO BACK PRESSURE ALLOWED	13
289	LUBE OIL MIST SEPARATOR OUTLET	6" 150 LB ANSI FF FLANGE CS	AIR/OIL	150 SCFM AIR 0.3 GAL PER MONTH OF OIL	CONTINUOUS	2" H_2O	13

* SEE NOTE 10.2

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-004

Solar Turbines
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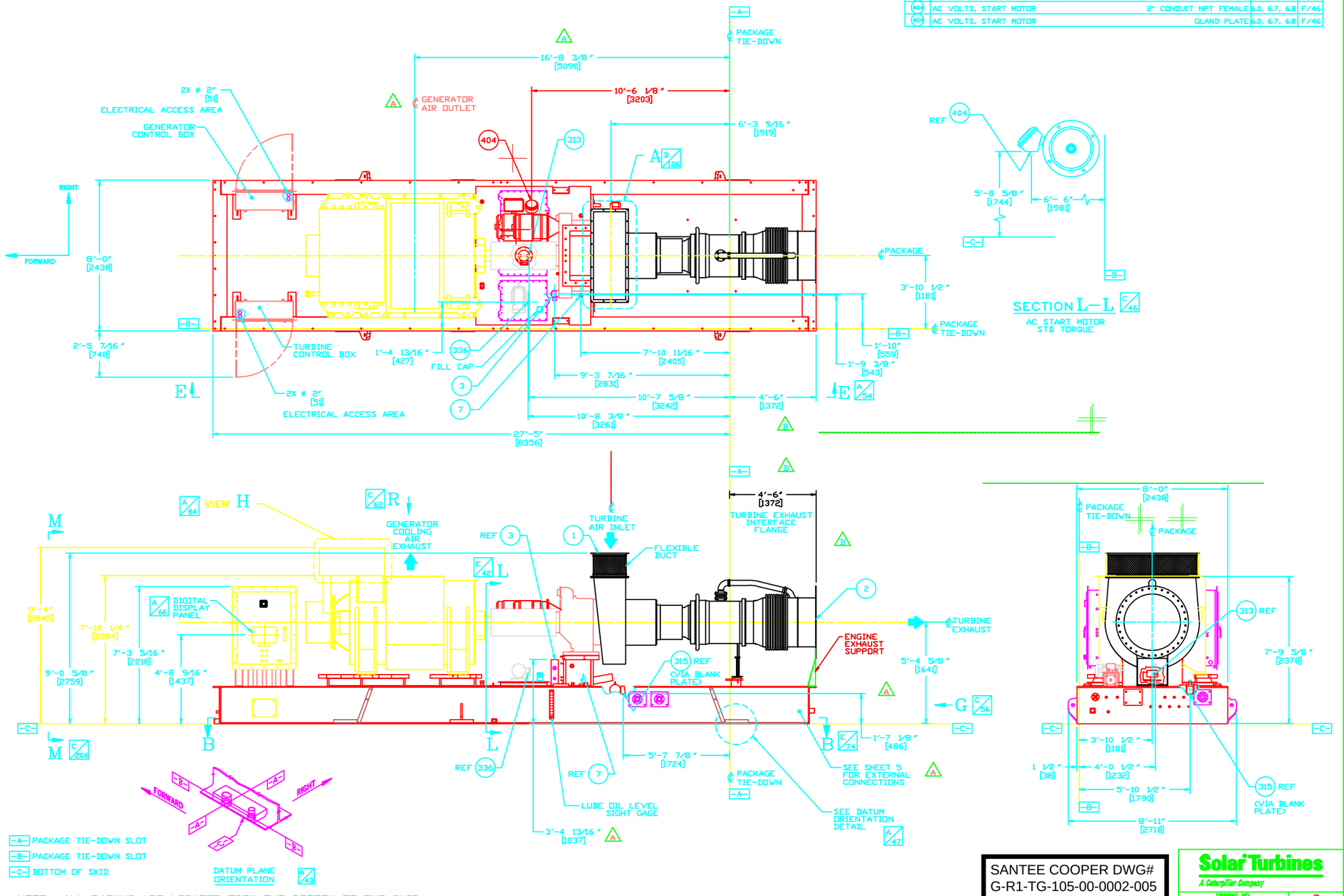
DRAWING NO. 75681–149223 | REV B | SHEET 3A

TABLE 1 – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION		REFERENCE NOTE	ZONE
1	TURBINE AIR INLET FLANGE		2.11	C/45
2	TURBINE EXHAUST FLANGE		2.11, 2.19	C/43
3	LUBE OIL TANK VENT	4" PIPE (WITH COUPLING)	5.4, 10.2	E/46
7	LUBE OIL COOLER VENT	3/8" TUBE PER SAE J514	5.2	D/46
313	AC VOLTS, LUBE OIL TANK HEATER	1 1/2" CONDUIT NPT FEMALE	6.0	F/45
336	DC VOLTS, BACKUP LUBE OIL PUMP MOTOR	3/4" CONDUIT NPT FEMALE	6.0	E/46
404	AC VOLTS, START MOTOR	2" CONDUIT NPT FEMALE	6.0, 6.7, 6.8	F/46
404	AC VOLTS, START MOTOR	GLAND PLATE	6.0, 6.7, 6.8	F/46



SANTEE COOPER DWG#
G-R1-TG-105-00-0002-005

Solar Turbines
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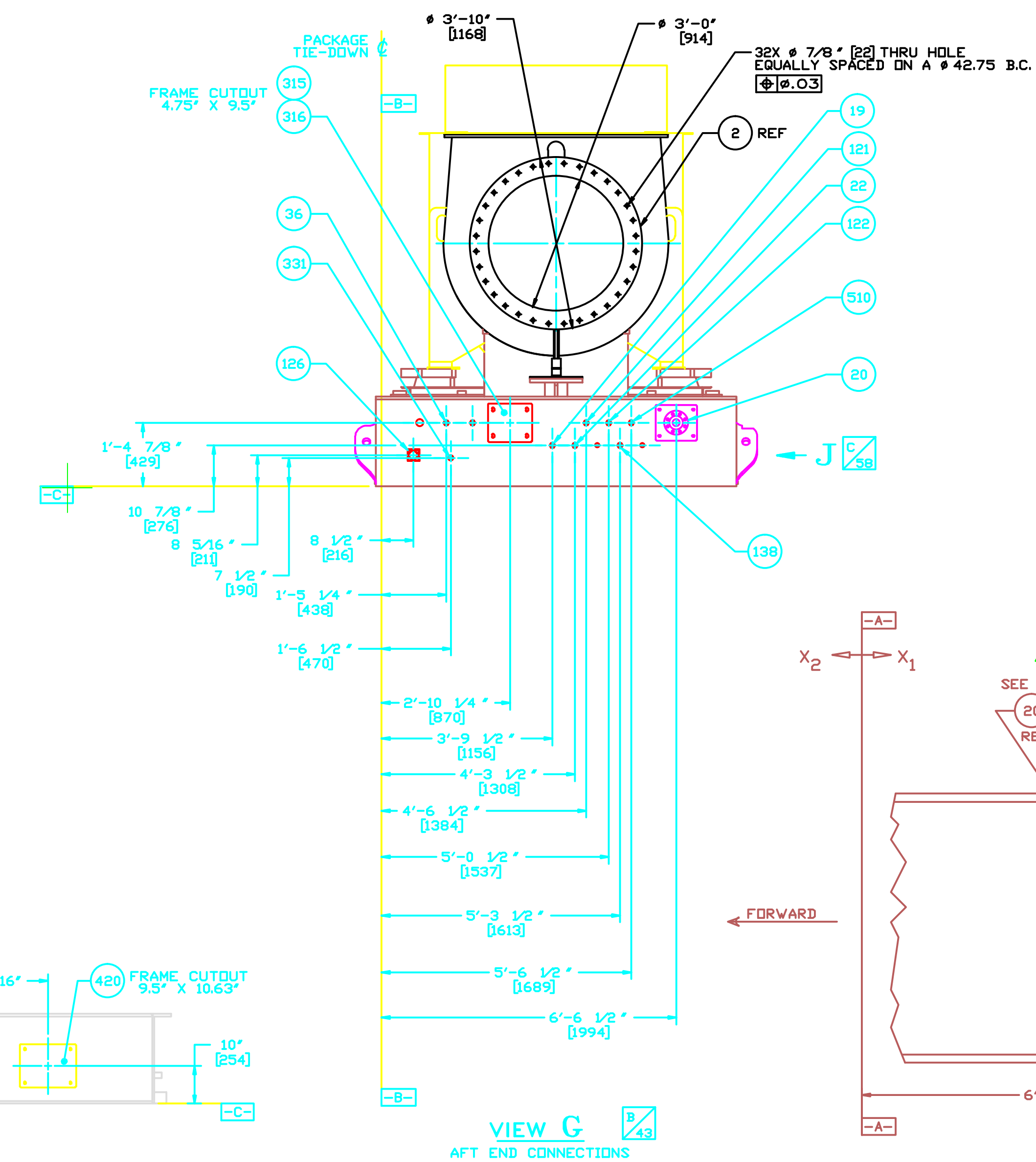
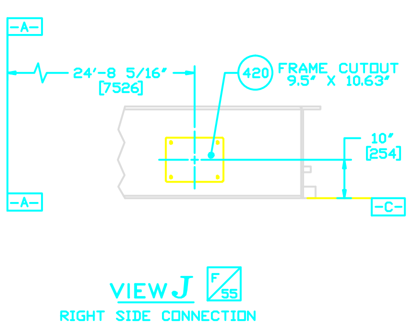
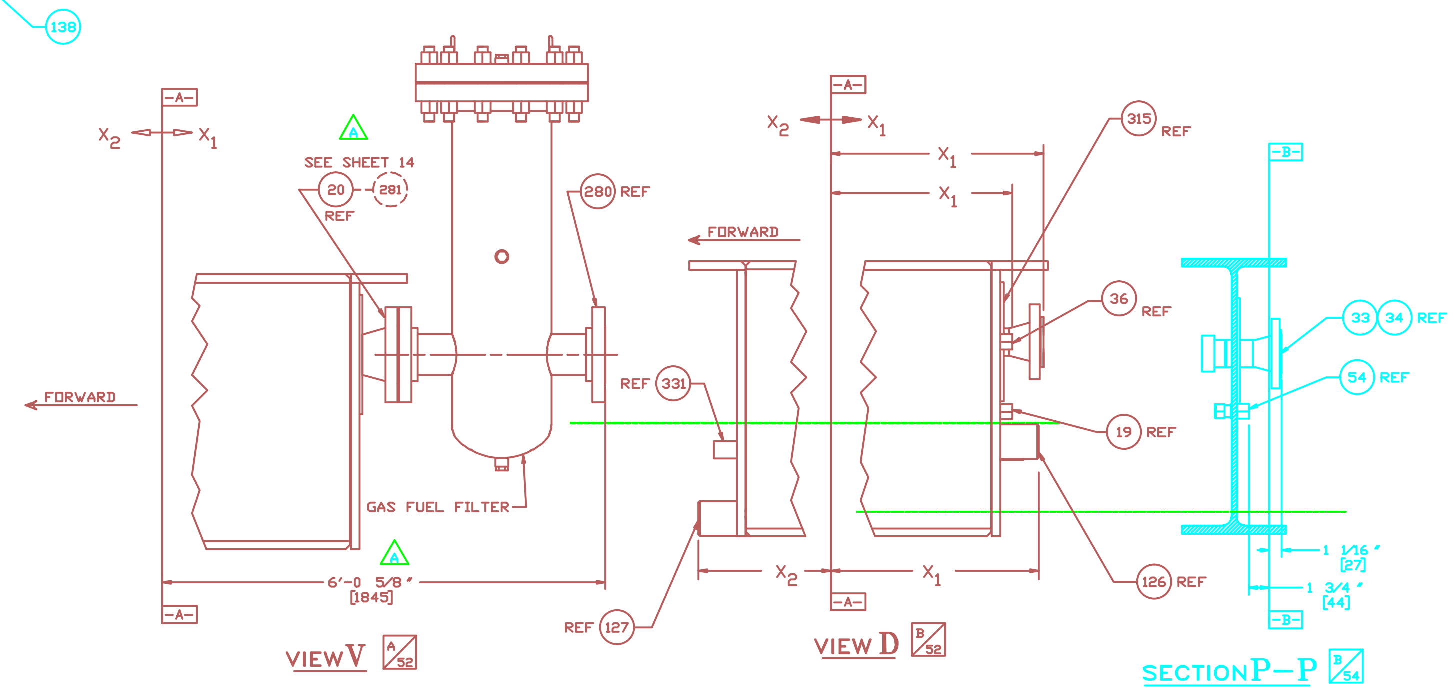
DRAWING NO. 75681-149223
REV B
SHEET 4

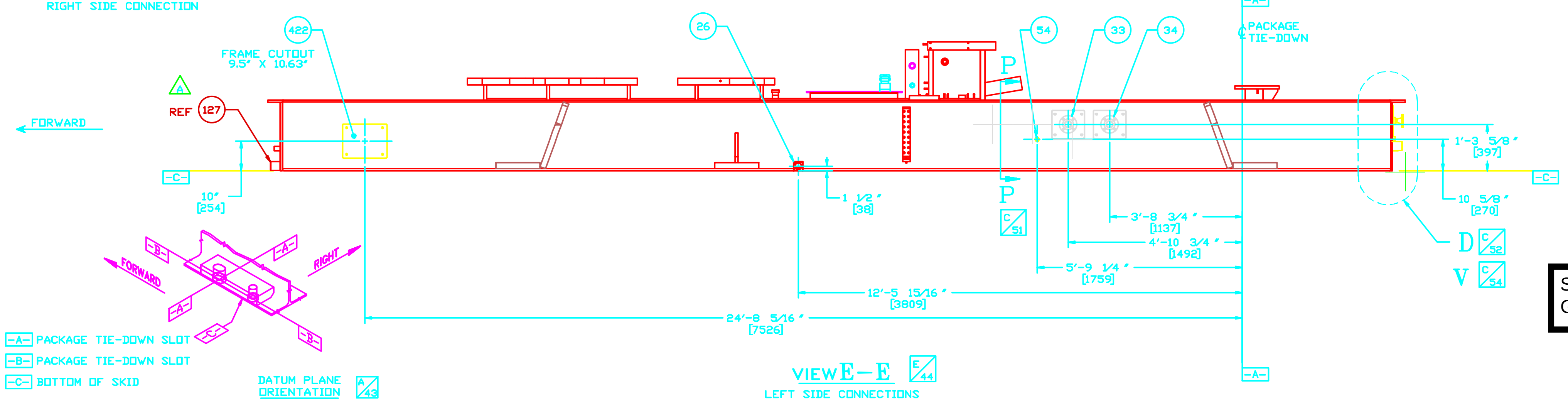
TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION		REFERENCE NOTE	VIEW D X1	VIEW D X2	ZONE
19	ENGINE EXHAUST COLLECTOR AND COMBUSTOR DRAIN	3/4" NPT FEMALE	13.3	4'– 3 5/8" [1311]		H/55
20	NATURAL GAS FUEL INLET	2" 300 LB ANSI RF FLANGE	4.0	4'– 6 5/8" [1387]		G/55
22	ENGINE AIR INLET DUCT DRAIN	3/4" NPT FEMALE	9.3, 13.5	4'– 3 5/8" [1311]		H/55
26	LUBE OIL TANK DRAIN	2" NPT FEMALE	5.0, 13.7			C/55
33	LUBE OIL TO COOLER	2" 150 LB ANSI RF FLANGE	5.2			C/54
34	LUBE OIL FROM COOLER	2" 150 LB ANSI RF FLANGE	5.2			C/53
36	PACKAGE AIR SUPPLY	3/4" NPT FEMALE	4.8	4'– 3 5/8" [1311]		G/57
54	LUBE OIL FILTER DRAIN (UNFILTERED)	3/4" NPT FEMALE	5.2, 13.10			C/54
121	ON LINE CLEANING FLUID INLET	3/4" NPT FEMALE	9.0, 9.2, 9.4	4'– 3 5/8" [1311]		H/55
122	ON CRANK CLEANING FLUID INLET	3/4" NPT FEMALE	9.0, 9.4	4'– 3 5/8" [1311]		G/55
126	OIL DRAIN FROM DRIP PAN	2" NPT FEMALE	13.8	4'– 6 3/16" [1376]		G/57
138	GAS VENT	3/4" NPT FEMALE	13.2	4'– 3 5/8" [1311]		F/55
315	AC VOLTS, PRE/POST LUBE OIL PUMP MOTOR	9.5" X 11" PLATE, BLANK	6.0, 6.8			H/57
316	AC VOLTS, LIQUID FUEL PRIMARY PUMP MOTOR	9.5" X 11" PLATE, BLANK	6.0, 6.8			H/57
331	GROUND, PACKAGE FRAME	1/2"-13 X 1 1/4" LG	6.0			G/57
420	GENERATOR CONTROL BOX	11.5" X 15" PLATE, BLANK	6.0, 6.8			D/57
422	TURBINE CONTROL BOX	11.5" X 15" PLATE, BLANK	6.0, 6.8			C/57
510	REMOTE PROPANE SUPPLY TO TORCH	3/4" NPT FEMALE	6.0	4'– 3 5/8" [1311]		G/55









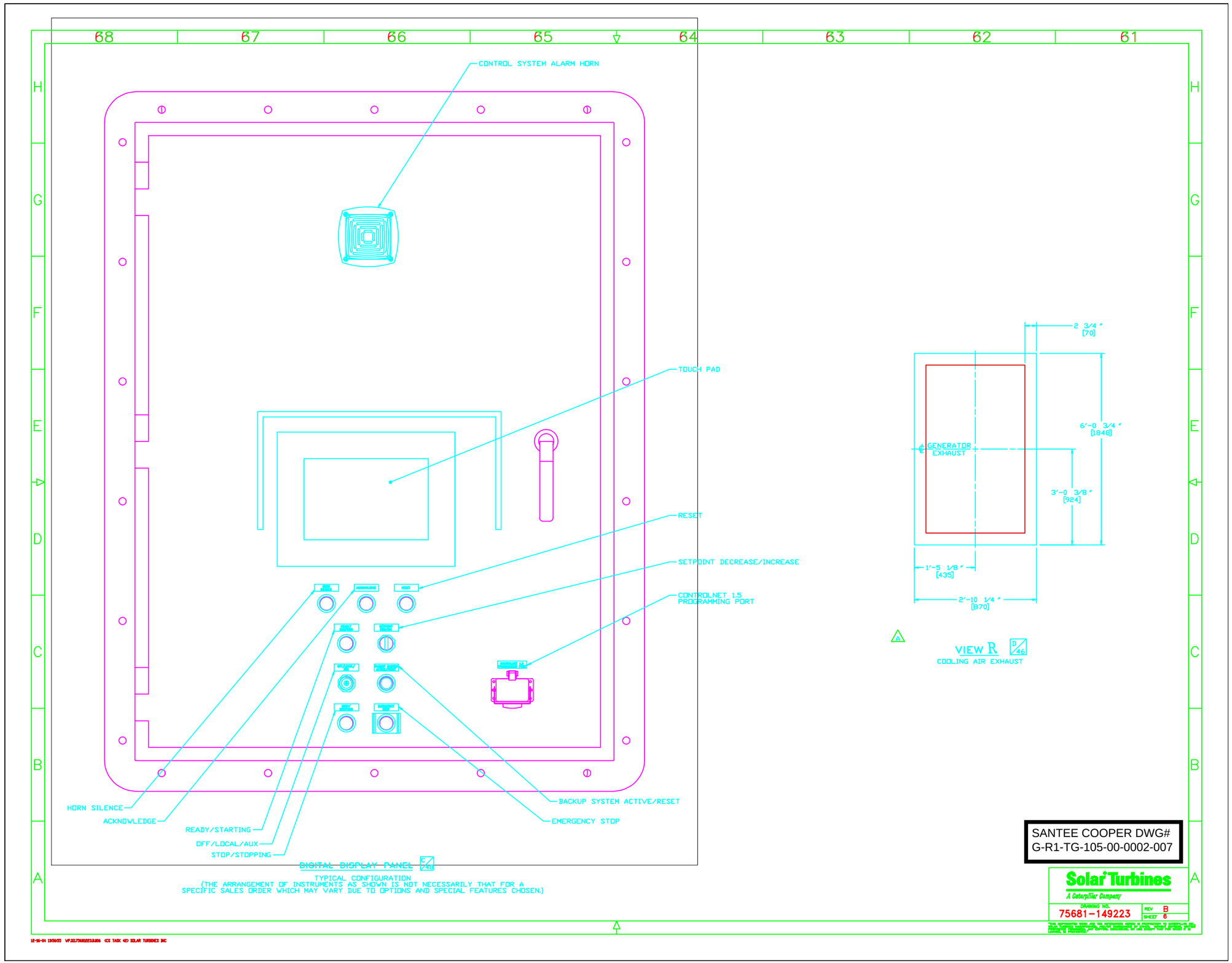
-A- PACKAGE TIE-DOWN SLOT
-B- PACKAGE TIE-DOWN SLOT
-C- BOTTOM OF SKID

NOTE : ALL DATUMS ARE LOCATED FROM THE BOTTOM OF THE SKID.

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-006

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681–149223 REV B SHEET 5



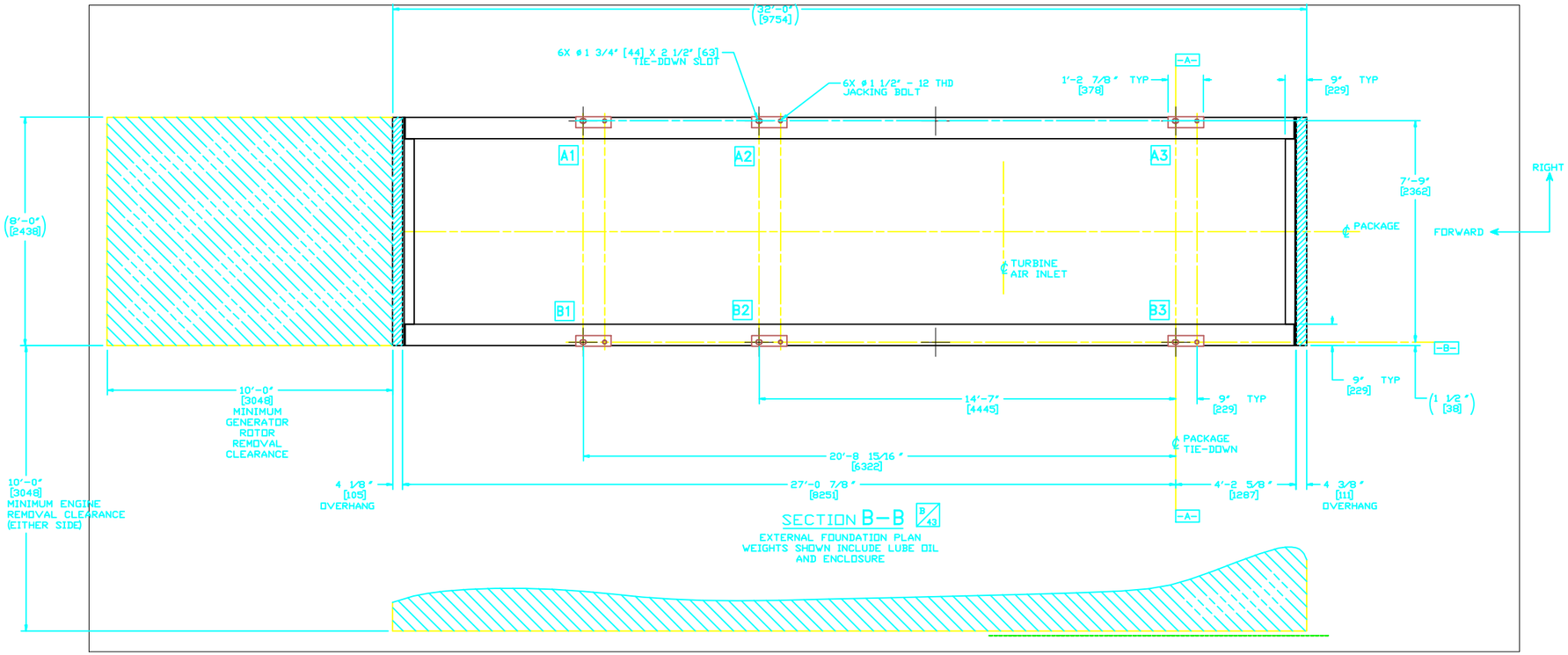
~~DIGITAL DISPLAY PANEL~~

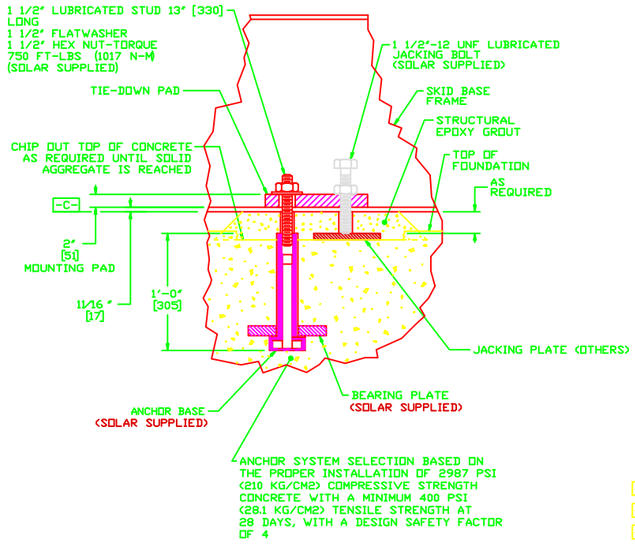
TYPICAL CONFIGURATION
(THE ARRANGEMENT OF INSTRUMENTS AS SHOWN IS NOT NECESSARILY THAT FOR A SPECIFIC SALES ORDER WHICH MAY VARY DUE TO OPTIONS AND SPECIAL FEATURES CHOSEN.)

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-007

Solar Turbines
A Caterpillar Company

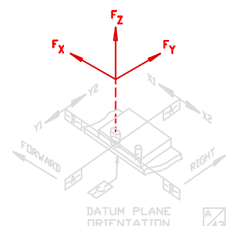
DRAWING NO. 75681-149223
REV B
SHEET 6





BOLT-DOWN FOR CONCRETE FOUNDATION 8 PLACES

-A- PACKAGE TIE-DOWN SLOT
-B- PACKAGE TIE-DOWN SLOT
-C- BOTTOM OF SKID



NOTE : DATUM -C- IS LOCATED ON THE BOTTOM OF THE SKID.

PACKAGE FOUNDATION

FOUNDATION LOAD TABLE

TIE-DOWN PAD	STATIC PAD LOAD LBF	STATIC PAD LOAD (KN)	GENERATOR LINE TO LINE SHORT CIRCUIT LOAD LBF	GENERATOR LINE TO LINE SHORT CIRCUIT LOAD (KN)
A1	7200	(32)	± 7600	±(34)
B1	7200	(32)	± 7600	±(34)
A2	18200	(81)	± 15000	±(67)
B2	18200	(81)	± 15000	±(67)
A3	7600	(34)	-	-
B3	7600	(34)	-	-

LOAD TABLE NOTES:

1. POSITIVE LOAD REPRESENT DOWNWARD FORCES AND NEGATIVE LOAD REPRESENT UPWARD FORCES.
2. LINE TO LINE (L-L) SHORT CIRCUIT TORQUE VALUES ARE USED TO CALCULATE THE SHORT CIRCUIT LOADS. DURING A SHORT CIRCUIT, THE TORQUE OSCILLATES BACK AND FORTH CREATING A POSITIVE THEN NEGATIVE LOAD. THE SHORT CIRCUIT LOAD VALUES ARE SHOWN AS BOTH PLUS AND MINUS TO REFLECT THIS CONDITION.
3. THE MAXIMUM DOWNWARD LOAD DURING A L-L SHORT CIRCUIT IS CALCULATED BY ADDING THE SHORT CIRCUIT POSITIVE LOAD (DOWN) TO THE STATIC LOAD (DOWN).
4. AN UPWARD LOAD DURING A L-L SHORT CIRCUIT MAY OCCUR IF THE MAGNITUDE OF THE NEGATIVE SHORT CIRCUIT LOAD (UP) EXCEEDS THE STATIC LOAD (DOWN). FOR THIS CONDITION, THE MAXIMUM UPWARD LOAD IS CALCULATED BY ADDING STATIC LOAD TO THE NEGATIVE SHORT CIRCUIT LOAD.

SANTEE COOPER DWG# G-R1-TG-105-00-0002-008

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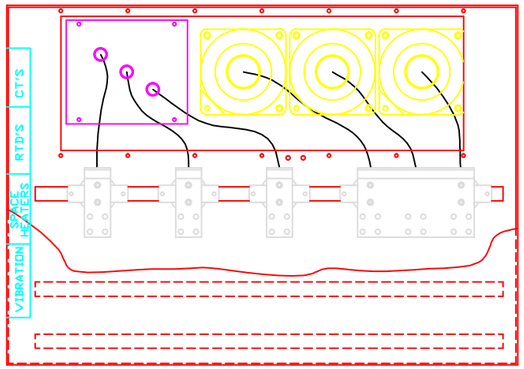
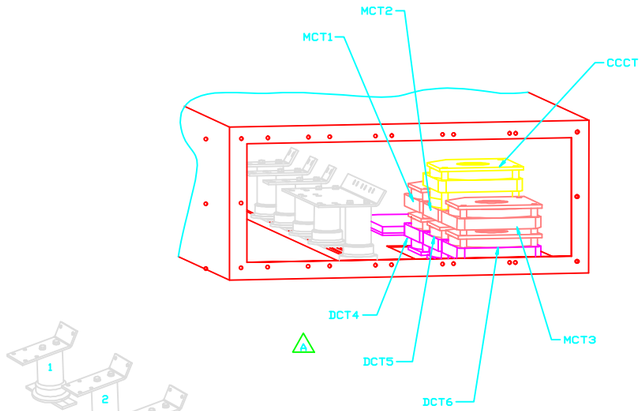
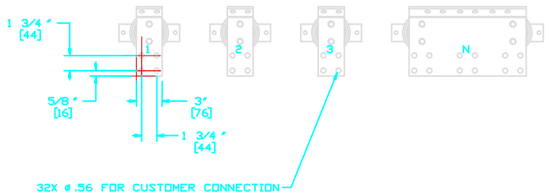
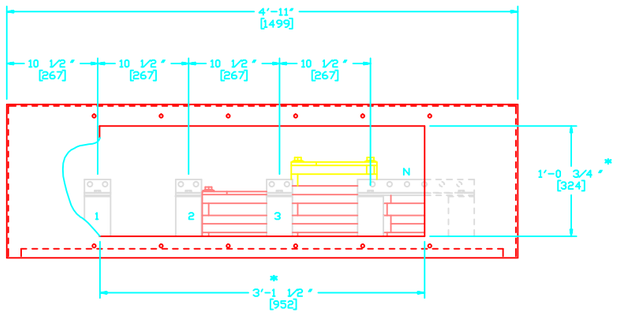
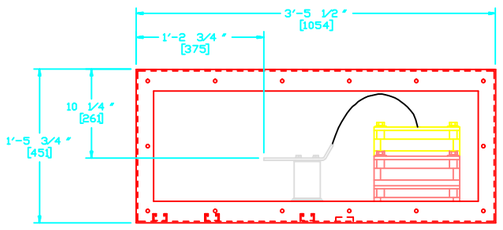










* OPENING IN THE BOX FOR ENTRY OF LOAD LEADS, GLAND PLATE OVER OPENING IS UNDRILLED #10GA. STAINLESS STEEL.

NOTE:

GENERATOR SPACE HEATER(S) AND SECONDARIES OF ALL CT'S (IF SUPPLIED) ARE WIRED TO GENERATOR CONTROL BOX FOR CUSTOMER INTERCONNECTION.

VIEW H
POWER LEAD CONNECTIONS
D/46

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-009

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223
REV B
SHEET 8

12-16-04 13:09:08 WP:SLT75681B23.3.000 CCS TASK 4D SOLAR TURBINES INC

EQUIPMENT ALIGNMENT

PRELIMINARY ALIGNMENT CONSIDERATIONS:

PRELIMINARY ALIGNMENT CHECKS ARE ESSENTIAL. THEY MUST BE COMPLETED BEFORE ALIGNMENT

THIS ALIGNMENT PROCEDURE ASSUMES THAT NO SOFT FOOT OR SHORT FOOT CONDITION EXISTS ON ANY OF THE MACHINES AND THE BASE HAS BEEN QUALIFIED IN ACCORDANCE WITH SOLAR QUALITY ASSURANCE PROCEDURES.

SHEAR COUPLING GUARD REMOVAL:

REMOVE THE SHEAR COUPLING GUARD SHROUDS.

PAD CLEANLINESS:

VERIFY THAT THE SHIMMABLE EQUIPMENT PADS ARE CLEAN AND FREE OF OIL, GREASE AND DEBRIS.

SHIPPING BRACES:

A. REMOVE RED GENERATOR SHIPPING BRACES BEFORE STARTING ALIGNMENT.

B. LOOSEN AND REMOVE THE RED TURNBUCKLE FROM THE REAR MOUNT ASSEMBLY. REMOVE THE BRACKETS FROM ASSEMBLY. SAVE THESE FOR FUTURE TRANSPORTATION.

RUNNING POSITION THRUSTS:

THE PURPOSE OF "RUNNING POSITION THRUSTS" IS TO PLACE THE ROTORS OF ALL THE MACHINES IN THEIR OPERATING THRUSTS POSITION TO SET THE PROPER DISTANCE.

GENERATOR MAGNETIC CENTER:

SET THE GENERATOR SHAFT AT THE MAGNETIC CENTER. NOT REQUIRED FOR GENERATORS WITH A THRUST BEARING.

DRIVEN GEARBOX THRUSTS:

FOR A GEARBOX WITH PLANETARY GEARS (EPICYCLIC), NO MOVEMENT IS REQUIRED.

COLD ALIGNMENT:

ALL MEMBERS NEED 12-24 HOURS TO COOL FROM OPERATING TEMPERATURE. THE GENERATOR SPACE HEATER AND OIL TANK HEATER MUST BE TURNED OFF DURING THE EQUIPMENT ALIGNMENT.

OIL TANK:

IT IS PREFERABLE TO HAVE OIL TANK FILLED TO ITS OPERATING LEVEL AT THIS TIME.

ALIGNING OUTDOORS:

WHEN ALIGNING OUTDOORS OR IN ENVIRONMENTS WITH VARYING TEMPERATURE CONDITIONS, BE AWARE OF THERMAL GROWTH EFFECTS ON THE PACKAGE AND ALIGNMENT TOOLING. WHEN PRACTICAL, ALIGNMENT SHOULD TAKE PLACE DURING THE MOST STABLE TEMPERATURE CONDITIONS.

IDENTIFICATION OF ALIGNMENT STATIONS:

ALIGNMENT STATIONS ARE IDENTIFIED IN FIGURE III.

SETTING AXIAL DISTANCE BETWEEN MACHINES:

ONCE THE MACHINERY IS IN ITS RUNNING THRUST POSITION, USE THE PACKAGE'S JACKING BOLTS TO MOVE THE MACHINE AXIALLY AS REQUIRED TO ACHIEVE THE PROPER DISTANCE BETWEEN HUBS. SEE FIGURE I.

VERIFY DISTANCE:

USE AN INSIDE MICROMETER TO VERIFY DISTANCE TOP, BOTTOM AND SIDES OF THE HUBS. AVERAGE THE READINGS. THIS AVERAGE MUST BE WITHIN THE CALCULATED DISTACE BETWEEN HUBS IN FIGURE I. HUBS SHOULD BE IN THEIR NEUTRAL POSITIONS.

TIEDOWN BOLTS:

VERIFY THAT ALL TIEDOWN BOLTS ARE LUBRICATED WITH ANTI-SEIZE LUBRICANT.

TOOLING SAG VERIFICATION:

ALWAYS COMPENSATE ACTUAL READ INDICATOR DATA FOR BRACKET SAG BY SUBTRACTING SAG, WHICH IS ALWAYS (-) FROM LEFT AND RIGHT READINGS AND TWO TIMES SAG FROM BOTTOM READING.

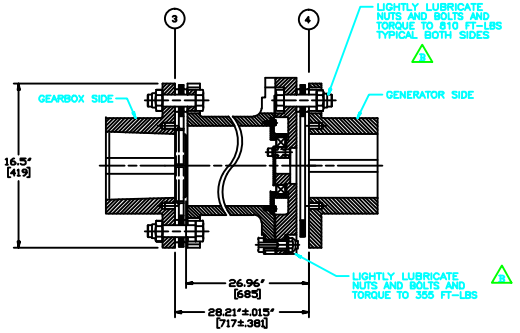
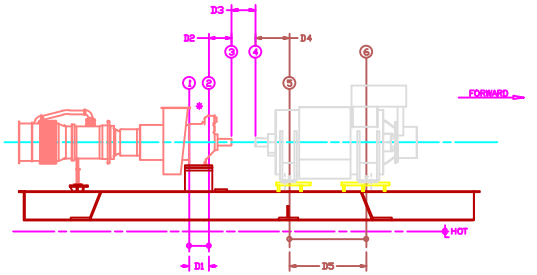


FIGURE I

COUPLING P/N 301315-702
APPROXIMATE WEIGHT: 603 LBS (274 KG)
LOOSE SHIPPED FOR FIELD INSTALLATION



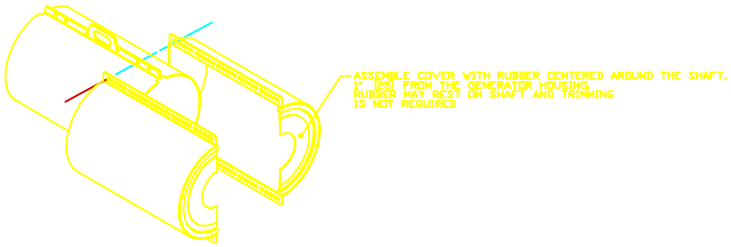
VERTICAL COLD SHAFT RELATIONSHIPS

FIGURE III

THIS FIGURE IS USED TO TRANSMIT RELATIVE POSITIONS DUE TO THERMAL GROWTH ONLY AND IS NOT INTENDED TO SHOW EXACT PACKAGE CONFIGURATION

DISTANCE	DISTANCE	INCHES/[mm]
D1	FEET DISTANCE OF GEARBOX	19.250 [488.95]
D2	NEAR FOOT TO COUPLING ADAPTER FACE ON GB SHAFT	14.21 [360.934]
D3	COUPLING ADAPTER FACE COUPLING SLEEVE (TOOL LENGTH	28.21 [716.534]
D4	DRIVEN FOOT TO COUPLING FLANGE FACE GENERATOR	24.375 [619.12]
D5	FEET DISTANCE OF GENERATOR	62.00 [1574.80]

STATION	VERTICAL THERMAL GROWTH	INCHES/[mm]
1	FAR FOOT OF GEARBOX	.032 [.813]
2	NEAR FOOT OF GEARBOX	.032 [.813]
5	NEAR FOOT GENERATOR	.012 [.305]
6	FAR FOOT GENERATOR	.012 [.305]



COUPLING COVER INSTALLATION

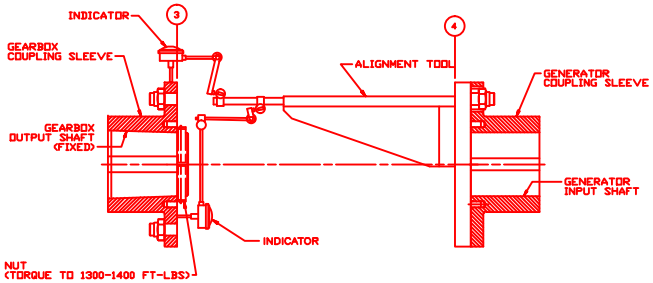


FIGURE II ALIGNMENT TOOL KIT FT67200 / FT67201
DIAL INDICATOR KIT FT67001

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Solar Turbines
A Caterpillar Company
DRAWING NO. 75681-149223
REV B
SHEET 9

EQUIPMENT ALIGNMENT

MOUNTING OF ALIGNMENT TOOL:
FOR THE STATION UNDERGOING ALIGNMENT, MOUNT THE APPROPRIATE TOOLING AS SHOWN IN FIGURE II.

ALIGNMENT CONVENTIONS:

DIAL INDICATOR SETUP:
DIAL INDICATOR BORE AND FACE READINGS ARE ILLUSTRATED IN FIGURE IV. BB=BORE BOTTOM, BL=BORE LEFT, BR=BORE RIGHT, BT=BORE TOP. FACE READING ARE THE SAME.

MEASUREMENTS:
ALL MEASUREMENTS ARE GIVEN IN INCHES AND MILLIMETERS.

DIAL INDICATOR READINGS:
DIAL INDICATOR READINGS ARE ALWAYS "TOTAL INDICATOR READINGS" (T.I.R.).

FIXED REFERENCE POINT:
BECOMES THE FIXED REFERENCE POINT AS DENOTED BY ✱ IN FIGURE III.

NEAR FOOT/FAR FOOT:
NEAR FOOT IS FOOT OR PAD CLOSEST TO THE MACHINES SHAFT END. FAR FOOT IS FOOT OR PAD FARTHEST AWAY FROM MACHINES SHAFT END.

SIGHT/FROM MACHINE:
MACHINE WITH ALIGNMENT TOOL ATTACHED.

TARGET/TO MACHINE:
MACHINE WITHOUT ALIGNMENT TOOL ATTACHED.

BEARING PRE-LUBRICATION:
IT IS RECOMMENDED TO PRELUBE THE MACHINERY PRIOR TO ROTATION TO PREVENT POSSIBLE BEARING DAMAGE.

MACHINE ROTATION:
ROTATE MACHINERY IN THE SAME DIRECTION OF NORMAL ROTATION.

SWEEP ALIGNMENT:
WITH THE ST AND FT READING 0.0 IN THE 12 O'CLOCK POSITION, SLOWLY ROTATE THE ALIGNMENT TOOL WHILE PULLING AFT, ONE COMPLETE ROTATION AND RECORD THE FOLLOWING DIAL INDICATOR READINGS: FL, FR, FB, BL, BR, AND BB.

DIAL INDICATOR REPEATIBILITY:
REPEAT THE ABOVE STEP AS NECESSARY TO VERIFY REPEATABILITY OF THE DIAL INDICATORS.

SHIM CARE:
USE CLEAN SHIMS. SHIMS WHICH ARE OILY, RUSTED, OR DEFORMED SHOULD NOT BE USED.

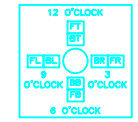
VERTICAL SHIM ADJUSTMENT:
WHEN THE LATERAL ADJUSTMENT IS SATISFIED, SWEEP THE SHAFT AND RECORD BB AND FB.

NEAR FOOT/FAR FOOT SHIM ADJUSTMENT:
FROM THE BB AND FB READINGS RECORDED IN STEP I ABOVE, ADD OR REMOVE SHIMS FROM THE NEAR FEET AND FAR FEET USING THE METHOD DESCRIBED BELOW.

SEE FIGURE III AND TABLE I FOR CORRECT DIMENSIONS

ONCE A SHIM CORRECTION IS MADE, RETORQUE TIEDOWN BOLTS TO 70% OF VALUE GIVEN IN TABLE II. RECHECK ALIGNMENT AND SHIM AS NECESSARY UNTIL READINGS ARE WITHIN THE ALLOWABLE LIMITS.

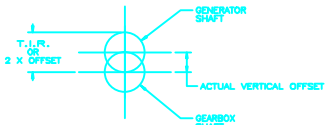
ALIGNMENT TOOL REMOVAL:
REMOVE THE ALIGNMENT TOOL(S).



VIEW LOOKING BOTH FORWARD AND AFT
IMPORTANT: ACCURATELY LOCATE THE 90° CLOCKING POSITIONS

FIGURE IV

DIAL INDICATOR READINGS:
DIAL INDICATOR READINGS ARE ALWAYS "TOTAL INDICATOR READINGS" (T.I.R.).



TYPICAL T.I.R. REFERENCE

TABLE IA – DIAL INDICATOR ALIGNMENT – BORE AND FACE OFFSETS

BORE OFFSET = T.I.R.	SIGHT "FROM"	TARGET "TO"	OFFSET (BORE OFFSET) BT	BL	BR	BB	ANGULARITY (FACE OFFSET) FT	FL	FR	FB	FACE DIAMETER	SHAFT RELATIONSHIPS
	④	③	00	+.020 [+.508] OUTSIDE TIR	+.020 ±.002" [+.508 ±.051] OUTSIDE TIR	+.040 ±.005" [+1.016 ±.127] OUTSIDE TIR	00	.000" [.000]	.000" ±.001" [.000 ±.025]	.000" ±.002" [.000 ±.051]	9.0" [229] GEARBOX COUPLING HUB	③ ④

CAUTION: DIAL INDICATOR READINGS ABOVE ARE TOTAL INDICATOR READINGS (T.I.R.).

THE FACE DIAMETER IS DEFINED AS THAT DIAMETER ON THE SPECIFIC HOUSING FACE FOR WHICH THE FACE OFFSET IS GIVEN (SHOULD NOT BE AN INTERRUPTED SURFACE).

BORE LEFT (BL) READINGS AND FACE LEFT (FL) READINGS ARE RECORDED FROM EQUIPMENT DURING A 360° SWEEP.

BORE RIGHT (BR) READING AND FACE RIGHT (FR) READING MUST BE WITHIN THE TOLERANCE NOTED ABOVE.

TABLE IB – LASER ALIGNMENT – BORE AND FACE OFFSETS

LASER STATIONARY	DETECTOR MOVEABLE	COLD TARGET AT	COLD TARGET OFFSET (BORE OFFSETS) VO (BB)	HO (BL-BR)	TOLERANCE	COLD TARGET ANGLES (FACE OFFSETS) VA (FB)	HA (FL-FR)	DIAMETER	TOLERANCE
GEARBOX	GENERATOR	COUPLING CENTER	+.020 [+.508]	.000" [.000]	±.005" [.127]	.000" [.000]	.000" [.000]	10"	±.002" [±.051]

(ALL COLD TARGETS ARE MOVEABLE MACHINE RELATIVE TO STATIONARY MACHINE

ROTALIGN TERMINOLOGY:
VO = VERTICAL OFFSET
HO = HORIZONTAL OFFSET
VA = VERTICAL ANGULARITY
HA = HORIZONTAL ANGULARITY

SOLAR TERMINOLOGY:
BORE BOTTOM
BORE LEFT OR BORE RIGHT
FACE BOTTOM
FACE LEFT OR FACE RIGHT

WHEN STATIONARY MACHINE IS ON YOUR LEFT AND MOVEABLE MACHINE IS ON YOUR RIGHT:

+VO = MOVEABLE MACHINE HIGHER THAN STATIONARY MACHINE
-VO = MOVEABLE MACHINE LOWER THAN STATIONARY MACHINE
+VA = COUPLING OPEN AT TOP
-VA = COUPLING OPEN AT BOTTOM

+HO = MOVEABLE MACHINE AWAY FROM YOU RELATIVE TO STATIONARY MACHINE
-HO = MOVEABLE MACHINE TOWARDS YOU RELATIVE TO STATIONARY MACHINE
+HA = COUPLING OPEN AWAY FROM YOU
-HA = COUPLING OPEN TOWARDS YOU

FINAL ALIGNMENT VERIFICATION:

WHEN ALL ALIGNMENT READINGS ARE WITHIN THE ALLOWABLE LIMITS, MONITOR THE ALIGNMENT READINGS AS THE FOLLOWING IS BEING COMPLETED.
ALL MANIFOLDS ARE TIGHTENED IN PLACE.
ALL TIE-DOWN BOLTS ARE TORQUED IN A "STAR" PATTERN TO THEIR SPECIFIED VALUE.
THE INLET AND EXHAUST DUCT ARE TIGHTENED IN PLACE.
ALL JACKING BOLTS ARE FULLY RETRACTED.
THE OIL TANK IS FILLED TO ITS OPERATING LEVEL.
AFTER THE ABOVE IS COMPLETED, RESWEEP ALIGNMENT AND VERIFY THAT THE INDICATOR READINGS ARE STILL WITHIN ALLOWABLE LIMITS.
MAKE ADJUSTMENTS IF NECESSARY. RESWEEP, RESHIM, RECHECK.

NOTE: IF MISALIGNMENT HAS BEEN CAUSED BY ATTACHMENT OF HEADER PIPES OR DUCTING, MAKE CORRECTIONS TO THE OFFENDING ITEM (S). DO NOT REPOSITION THE DRIVER OR DRIVEN MACHINES AS A METHOD OF CORRECTING THIS MISALIGNMENT CONDITION.

WHEN ALL ALIGNMENT IS ACCEPTABLE, DOWEL THE DRIVEN EQUIPMENT IN PLACE AND VERIFY ALIGNMENT.

TABLE II – TORQUE VALUES

THREAD SIZE	TIGHTENING TORQUE ENGLISH (FOOT-LBS)	TIGHTENING TORQUE METRIC (NEWTON-METERS)	GRADE
.75-10	211 (LUBRICATED)	286 (LUBRICATED)	B7
1.00-8	423 (LUBRICATED)	574 (LUBRICATED)	B7
1.25-7	806 (LUBRICATED)	1094 (LUBRICATED)	B7
1.50-6	1437 (LUBRICATED)	1950 (LUBRICATED)	B7
2.00-4 1/2	3408 (LUBRICATED)	4624 (LUBRICATED)	B7

FOR ADDITIONAL TORQUE VALUES REFERENCE SOLAR SPECIFICATION ES 9-54.

TABLE III SHIM REQUIREMENTS

THICKNESS	GENERATOR MOUNTS
.005" [.127]	142155-373
.010" [.254]	142155-374
.060" [1.524]	142155-375
.134" [3.4036]	142155-376
.250" [6.350]	142155-377
.005" [.127]	142155-378
.010" [.254]	142155-379
.060" [1.524]	142155-380
.134" [3.4036]	142155-381
.250" [6.350]	142155-382

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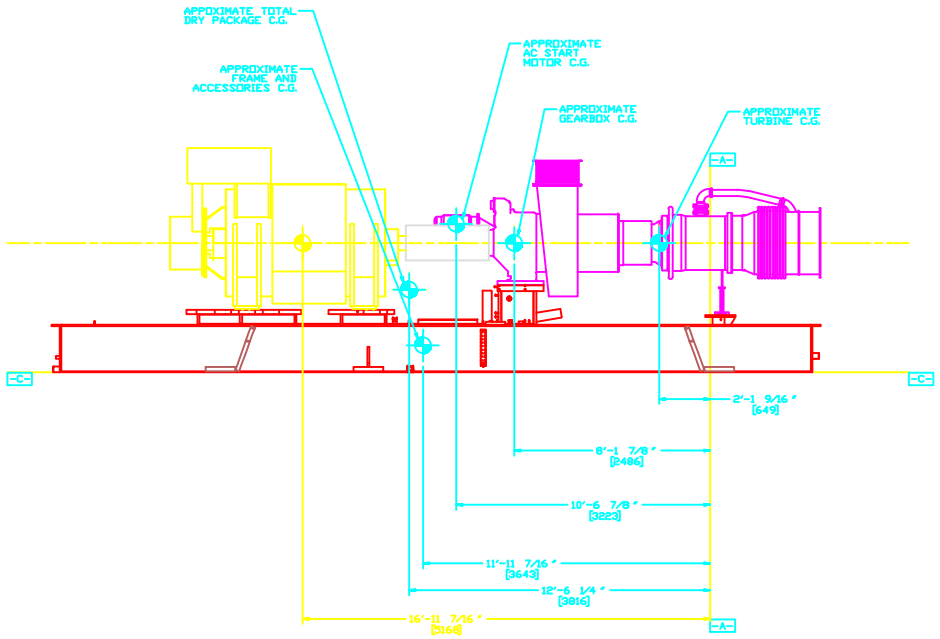
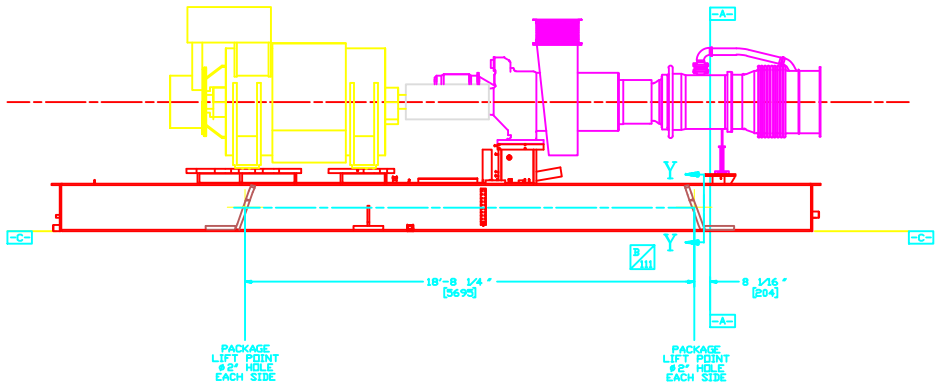
G-R1-TG-105-00-0002-011

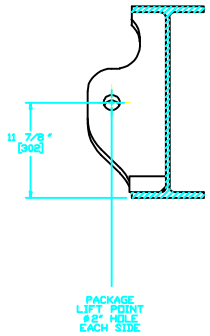
Solar Turbines
A Caterpillar Company
DRAWING NO. 75681-149223
REV B
SHEET 10



CENTER OF GRAVITY INFORMATION



LIFT POINT INFORMATION
(REFER TO TOTAL PACKAGE CENTER OF GRAVITY AS SHOWN ABOVE)



SECTION Y–Y B/115
LIFT POINT 4 PLACES

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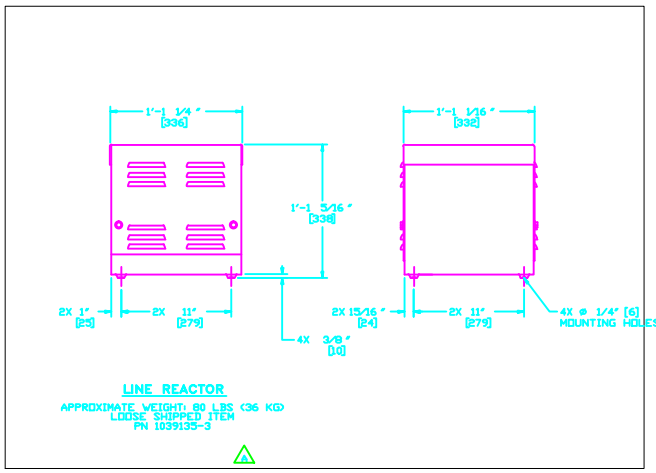
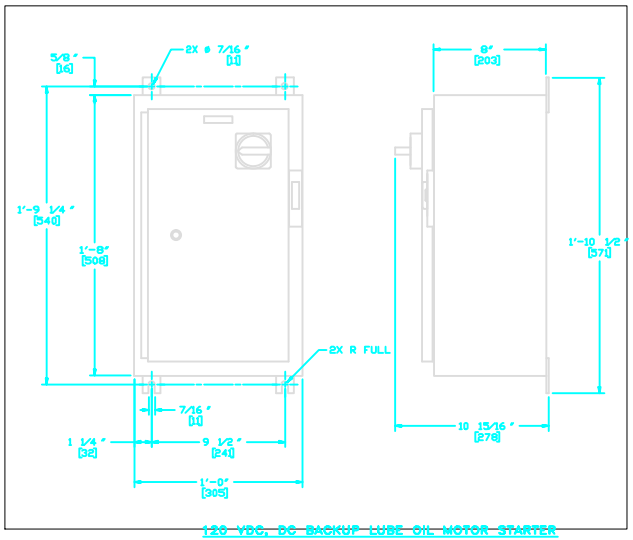
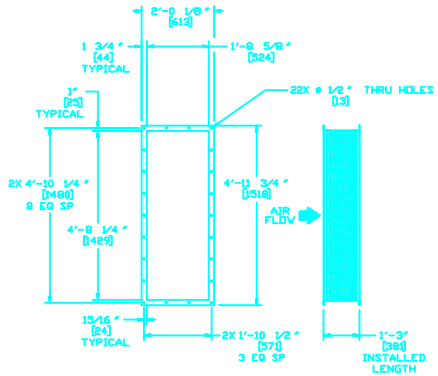
Solar Turbines
A Caterpillar Company
DRAWING NO. 75681–149223
REV B
SHEET 11







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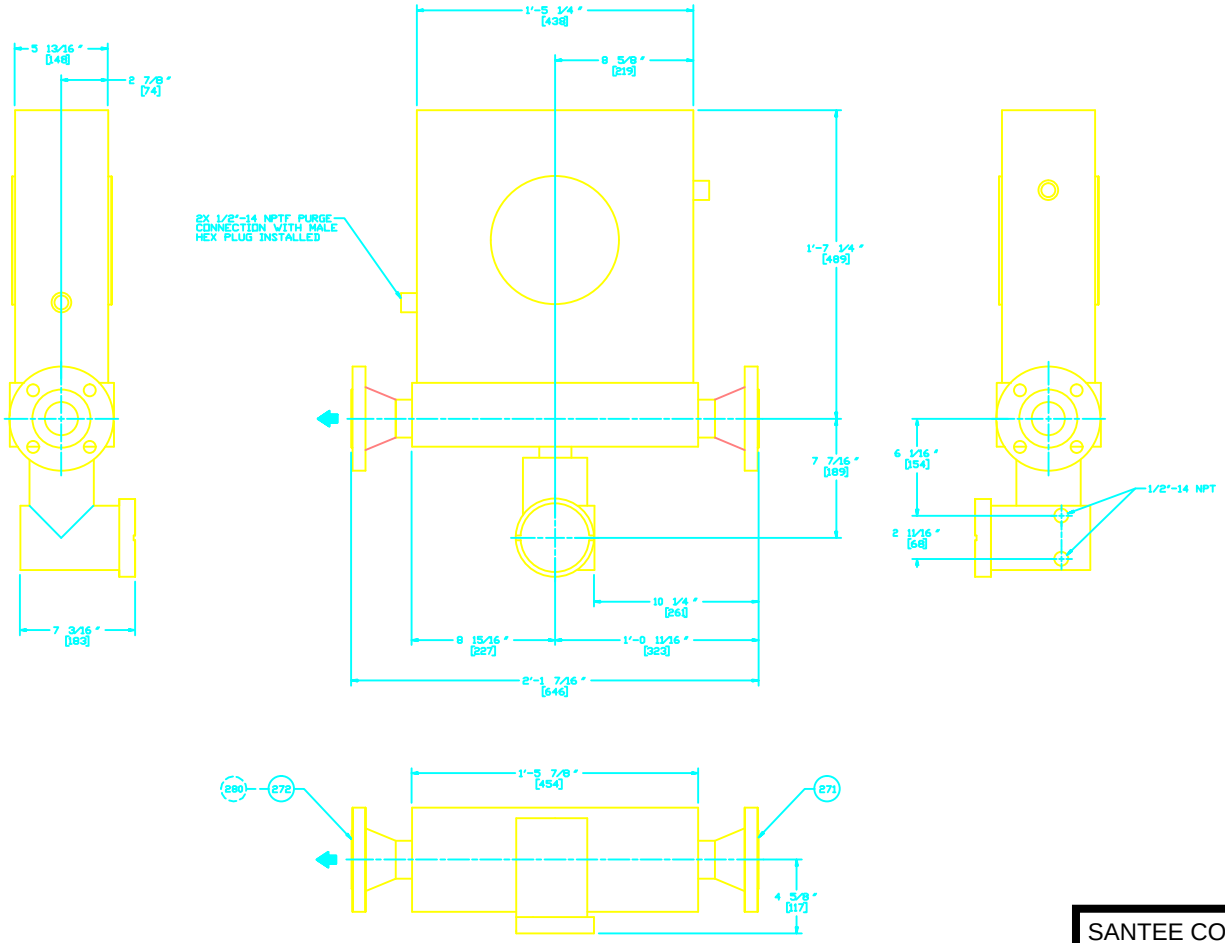
Solar Turbines
A Caterpillar Company
DRAWING NO. 75681-149223
REV B
SHEET 12

TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	REFERENCE NOTE	ZONE
271	FUEL FLOW METER RUN INLET 2" 300 LB ANSI RF FLANGE 316L	4.0	C/133
272	FUEL FLOW METER RUN OUTLET 2" 300 LB ANSI RF FLANGE 316L	4.0	C/136



MASS FLOW METER, GAS FUEL SYSTEM
APPROXIMATE WEIGHT: 64 LBS (29 KG)
LOOSE SHIPPED ITEM
P/N 1053791-100

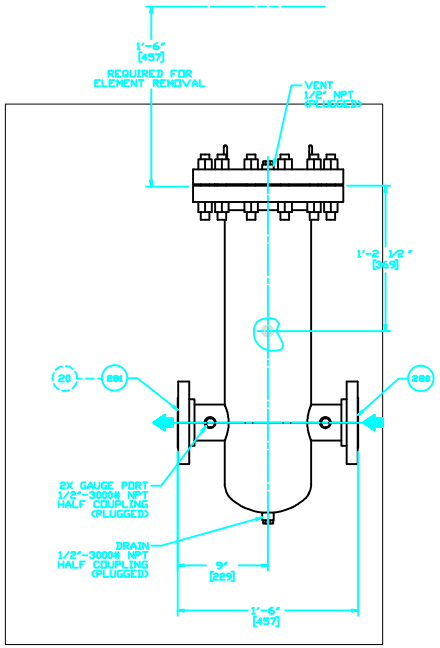
SANTEE COOPER DWG#
G-R1-TG-105-00-0002-014

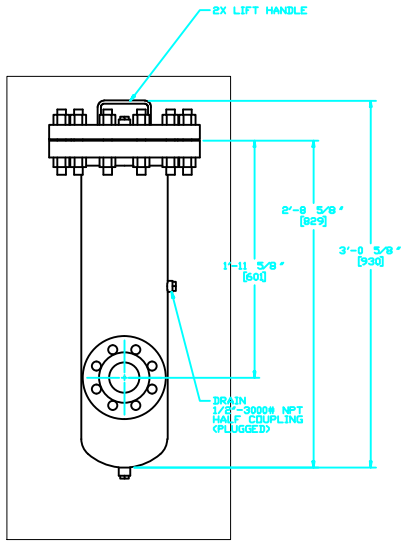
Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223
REV B
SHEET 13

TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	REFERENCE NOTE	ZONE
20	GAS FUEL FILTER INLET 2" 300 LB ANSI RF FLANGE CS	4.0	E/144
280	GAS FUEL FILTER OUTLET 2" 300 LB ANSI RF FLANGE CS	10.5	E/146





GAS FUEL FILTER, LOW BTU

APPROXIMATE WEIGHT: 250 LBS (113 KG)
LOOSE SHIPPED ITEM
P/N 1060817-100
GAS FUEL SYSTEM INLET
NOTE: FILTER IS INSTALLED
EXTERNAL TO PACKAGE

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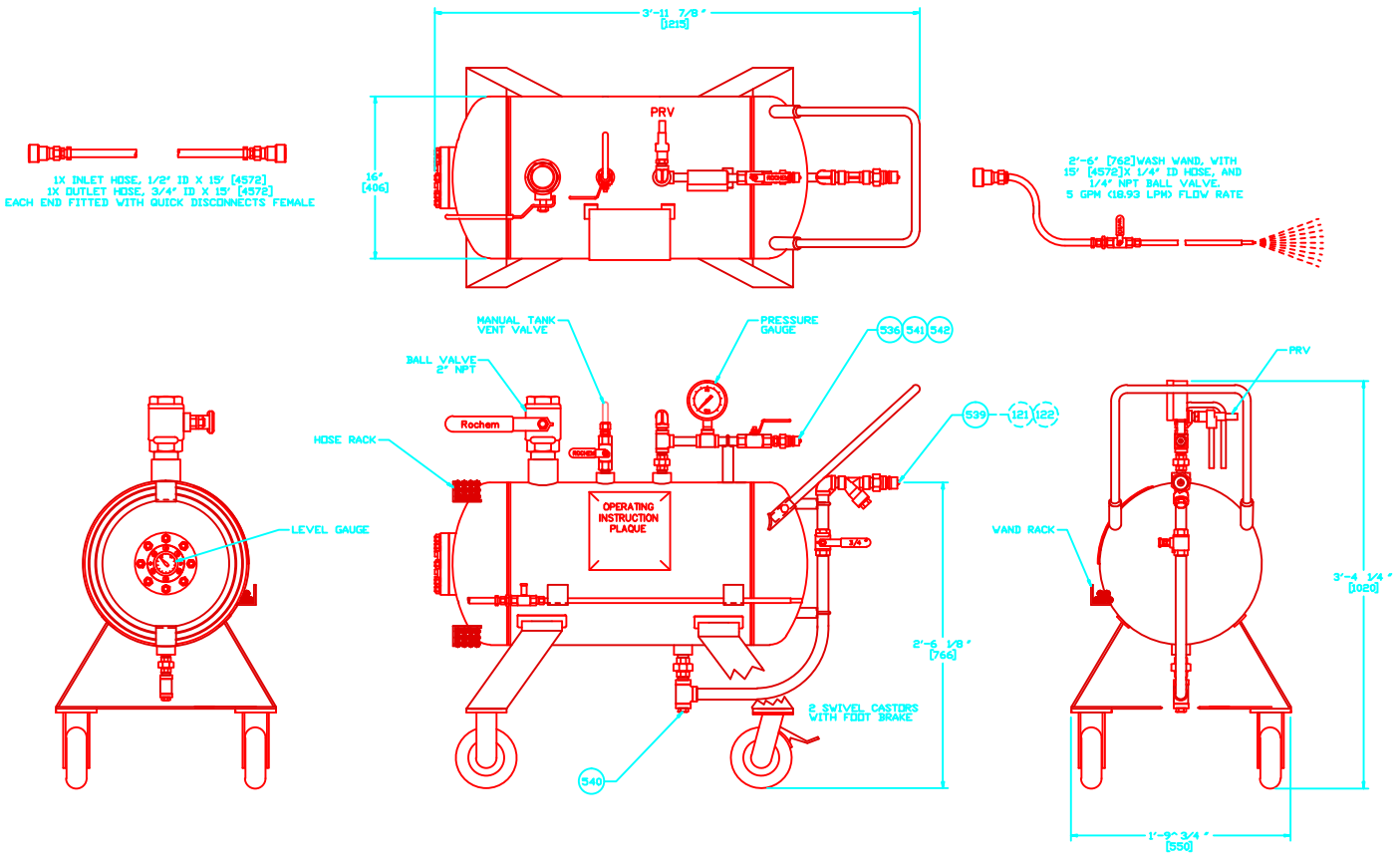
G-R1-TG-105-00-0002-015

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223
REV B
SHEET 14

TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION		REFERENCE NOTE	ZONE
538	ON-LINE/CRANK CLEANING TANK AIR SUPPLY	1/2" MALE COUPLING	9.4	E/153
539	ON-LINE/CRANK CLEANING TANK FLUID OUTLET	3/4" MALE COUPLING	9.4	E/153
540	ON-LINE/CRANK CLEANING TANK DRAIN	1/2" NPT	9.4	B/155
541	ON-LINE/CRANK CLEANING TANK WATER INLET	1/2" MALE COUPLING	9.4	E/153
542	ON-LINE/CRANK CLEANING TANK CHEMICAL INLET	1/2" MALE COUPLING	9.4	E/153



ENGINE CLEANING VESSEL

APPROXIMATE WEIGHT: 190 LBS (86 KG)
LOOSE SHIPPED ITEM
P/N 1054541-100

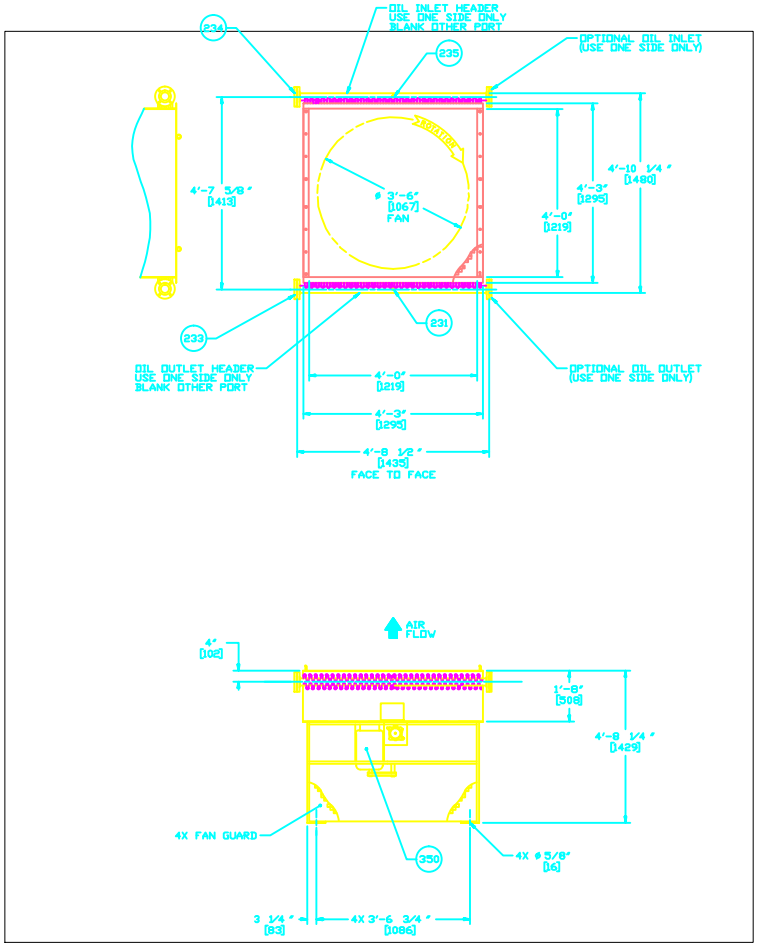
SANTEE COOPER DWG#
G-R1-TG-105-00-0002-016

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223 REV B SHEET 15

TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	REFERENCE NOTE	ZONE
234	DRAIN 3/4 NPT FEMALE	5.2	E/164
235	LUBE OIL COOLER OIL INLET 2" ANSI 150 RF FLANGE CS	5.2	E/165
231	LUBE OIL COOLER OIL OUTLET 2" ANSI 150 RF FLANGE CS	5.2	G/165
233	OIL COOLER VENT RETURN TO TANK 3/4 NPT FEMALE VENT WITH 1/8 ORFICE	5.2	G/164
350	AC VOLTS, LUBE OIL COOLER MOTOR 10HP		B/164



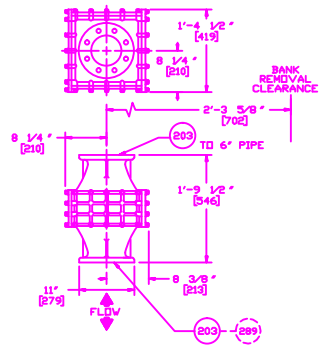
LUBE OIL COOLER
APPROXIMATE WEIGHT: 950 LBS (431 KG)
LOOSE SHIPPED ITEM
P/N 1063793-1

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-017

Solar Turbines
A Caterpillar Company
DRAWING NO. 75681-149223
REV B
SHEET 16

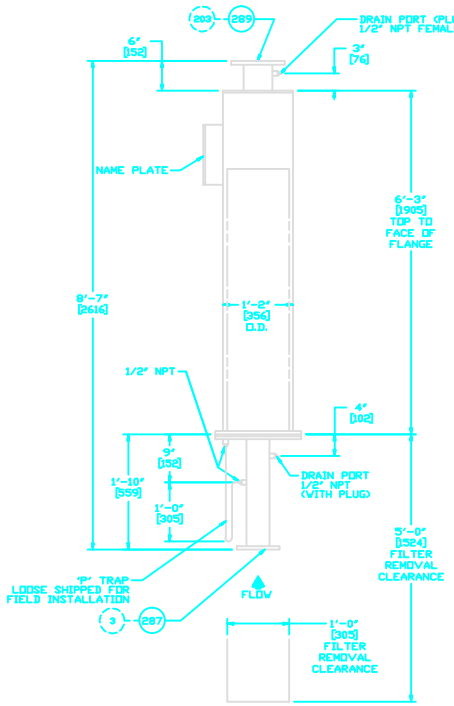
TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	REFERENCE NOTE	ZONE
203	FLAME ARRESTOR, LUBE OIL TANK VENT 6" 125 LB ANSI FF FLANGE ALUMINUM	5.5, 13.0	E/177,F/177
289	LUBE OIL MIST SEPARATOR INLET 4" 150 LB ANSI RF FLANGE CS	5.4	D/175
289	LUBE OIL MIST SEPARATOR OUTLET 6" 150 LB ANSI FF FLANGE CS	5.4, 13.0	G/175



FLAME ARRESTOR

OIL TANK VENT
LOOSE SHIPPED ITEM
APPROXIMATE WEIGHT: 105 LBS (47 KG)
P/N 120363-1
(VERTICALLY MOUNTED)



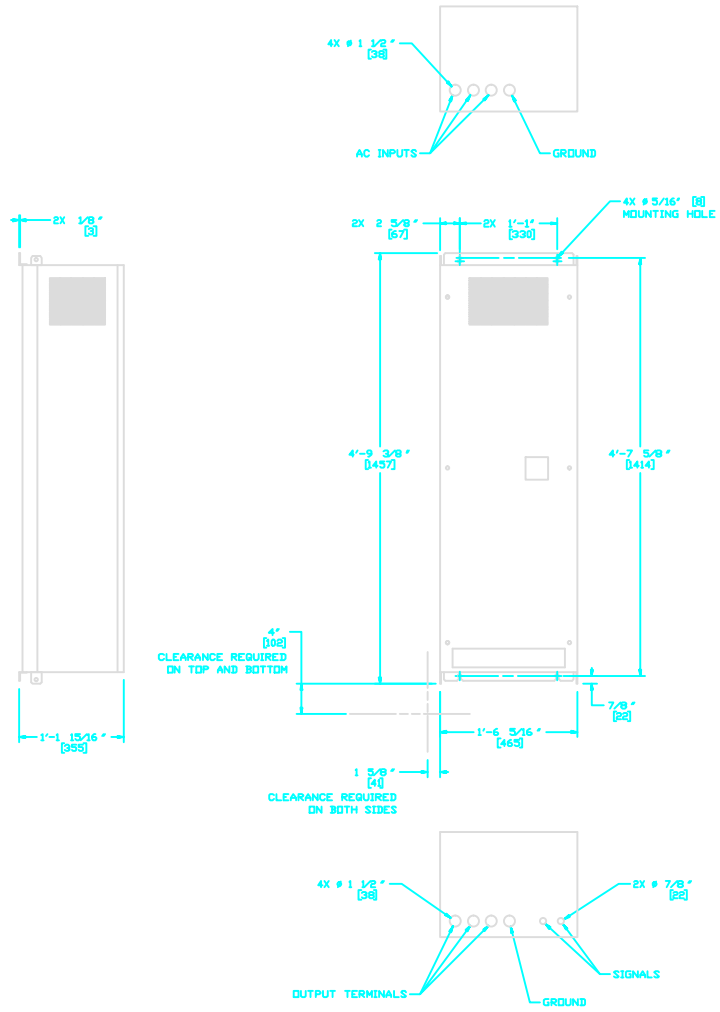
LUBE OIL MIST SEPARATOR

APPROXIMATE SHIPPING WEIGHT: 370 LBS (168 KG)
APPROXIMATE OPERATING WEIGHT: 430 LBS (195 KG)
LOOSE SHIPPED ITEM
P/N 1030923-102

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-018

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223
REV B
SHEET 17



DRIVE, VARIABLE FREQUENCY, START MOTOR

APPROXIMATE WEIGHT: 211 LBS (96 KG)
LOOSE SHIPPED ITEM
P/N 1052291-3

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-019

Solar Turbines
A Caterpillar Company

DRAWING NO. 75681-149223
REV B
SHEET 16

THIS SHEET IS BLANK

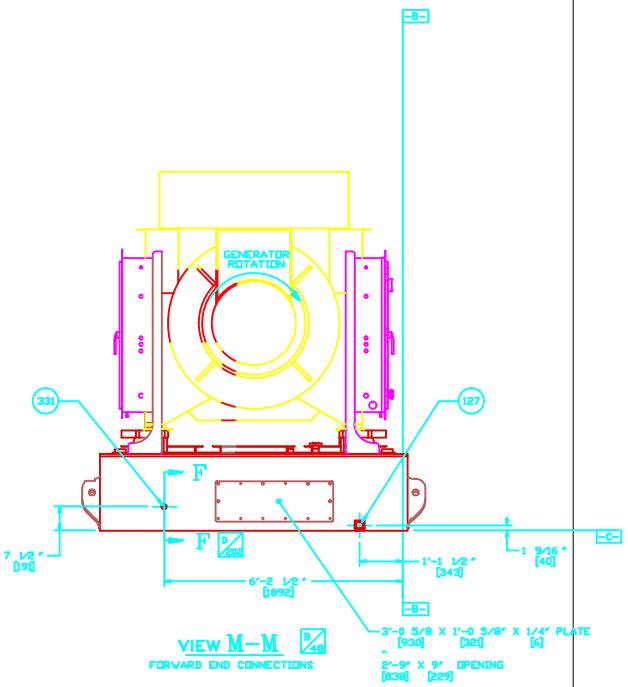
SANTEE COOPER DWG#
G-R1-TG-105-00-0002-020

Solar Turbines
A Caterpillar Company

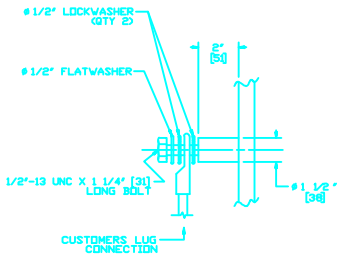
DRAWING NO. 75681-149223
REV B
SHEET 19

TABLE 1 (CONTINUED) – EXTERNAL CONNECTIONS

ITEM	DESCRIPTION	REFERENCE NOTE	VIEW D X_1	VIEW D X_2	ZONE
127	OIL DRAIN FROM DRIP PAN GENERATOR 2" NPT FEMALE	13.8		27'-4 1/8" [8335]	E/204
331	GROUND, PACKAGE FRAME 1/2"-13 X 1 1/4" LG	6.0		27'-3 7/8" [8305]	E/206

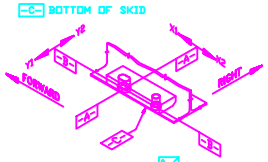


VIEW M–M
B 48
FORWARD END CONNECTIONS



SECTION F–F
D 206
PACKAGE GROUNDING BOSS
(2) PLACES
(ATTACHING HARDWARE SOLAR SUPPLIED)

-A- PACKAGE TIE-DOWN SLOT
-B- PACKAGE TIE-DOWN SLOT
-C- BOTTOM OF SKID



DATUM PLANE ORIENTATION
D 53

NOTE : ALL DATUMS ARE LOCATED FROM THE BOTTOM OF THE SKID.

SANTEE COOPER DWG#
G-R1-TG-105-00-0002-021

Solar Turbines
A Caterpillar Company
DRAWING NO. 75681-149223
REV B
SHEET 20