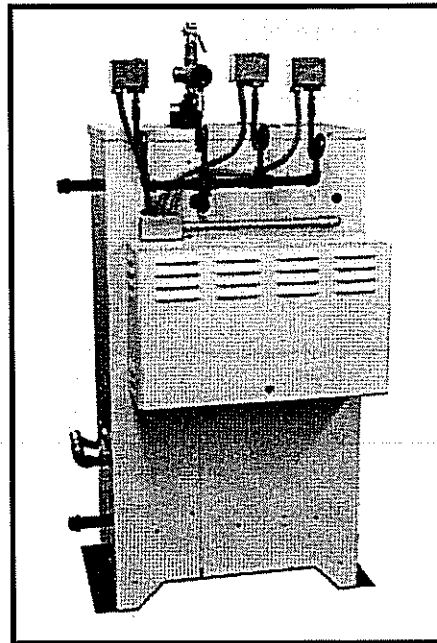


**APPLICATION**

Amsco Electric Steam Generators (CES Series) provide the high-quality (97%-vapor quality) steam needed to power equipment such as sterilizers, water stills, utensil sanitizers and water temperature boosters for washing equipment. They provide a steam source when in-house supply is not available, when an emergency standby is required, or when a remote location needs to be served.

When a deionized, distilled or reverse osmosis water supply (min. resistivity of 1 megohm/cm) is available, stainless steel generators can also be used to supply pure steam.



(Typical only - some details may vary.)

**CONSTRUCTION**

STERIS furnishes all components necessary to obtain a complete working unit, ready for (but not including) installation and connection to the building utility service lines and the equipment to be powered.

**Heating Section**

The pressure vessel is ASME Grade carbon steel rated for 100 psig. If selected, 316L stainless steel can be supplied for use with deionized, distilled or reverse osmosis water.

**STANDARDS**

Generator meets the applicable requirements of the following standards:

- **American Society of Mechanical Engineers Code**, Section I, Part PMB for power boilers and is so stamped
- **Underwriters Laboratories Incorporated**
- **Canadian Standards Association** listings

- **Seismic pre-approval**; meets Zone 4 when installed according to the installation instructions.

**FEATURES**

Openings are provided for water inlet, drain, steam outlet, gauges, instrumentation and immersion type heating elements.

The entire heating section is insulated with two inch thick glass fiber.

**The Selections Checked Below Apply To This Equipment**

**GENERATOR RATING (KW)**

- |                             |                              |   |
|-----------------------------|------------------------------|---|
| <input type="checkbox"/> 30 | <input type="checkbox"/> 75  | <input type="checkbox"/> 150            |
| <input type="checkbox"/> 40 | <input type="checkbox"/> 100 | <input checked="" type="checkbox"/> 180 |
| <input type="checkbox"/> 60 | <input type="checkbox"/> 120 |   |

**CONSTRUCTION**

- |  |
|--|
| <input type="checkbox"/> 316L Stainless Steel    |
| <input checked="" type="checkbox"/> Carbon Steel |

**ELECTRICITY\***

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> 208 V, 3 Phase | <input type="checkbox"/> 240 V, 3 Phase | <input checked="" type="checkbox"/> 480 V, 3 Phase |
| <input type="checkbox"/> 380 V, 3 Phase | <input type="checkbox"/> 415 V, 3 Phase | <input type="checkbox"/> 575 V, 3 Phase            |

\* Other voltages are available on special order.

Item ~~710511~~ 11691  
 Location(s) \_\_\_\_\_  
 \_\_\_\_\_

The flanged heaters include .427" diameter incolloy 800 tubular elements rated 105 W/in<sup>2</sup> brazed into heavy duty ASME flanges. Each element consists of 80% nickel, 20% chromium resistance wire surrounded by high density magnesium oxide insulation. The elements are repressed to ensure high density compression of all bends.

The heaters are individually fused for 208, 240, or 480 Volt, 50/60 Hz, 3-phase operation as selected.\*

**Automatic controls** operate on 120 Volt, 50/60 Hz electric service. Operation of the generator is automatic. Standard components include:

- **Flush system** - the generator's heating section can be manually flushed. Review local codes before flushing generator.
- **Water-level control** - energizes the water pump and supply valve to ensure proper water level in the drum. This system uses a bronze or stainless steel, positive displacement pump, with drive motor wired for operation on 120 Volt, 50/60 Hz electric service. Motor has automatic overload protection. In addition, it shuts off power to the heaters if water in the heating section should fall below a preset level. System supply valve withstands hydrostatic test of 300 psig (21.2 kg/cm<sup>2</sup>) and has a brass or stainless steel body; non-magnetic, stainless-steel trim and dual electromagnetic coil are included. A water-level sight gauge with upper and lower hand-valve shutoffs is provided. Sightglass valves are equipped with ASME rated automatic shutoff if the sight gauge glass should break.
- **Steam pressure controls** - generators are supplied with operating and high limit pressure controls. One (two for 100-180 kW units) is used for controlling the operating pressure of the generator (0-90 psi adjustable operating range) while the other is used as a high limit pressure control, and incorporates a manual reset.

\* Other voltages are available upon special order.

- **Electric door interlock** - interrupts the 120 V control circuit whenever the generator's main electrical door panel is opened.
- **Auxiliary low water cut-off** - a safety backup protection that turns off the power to the heating element(s) in the event of a low water level control failure.
- **Water sensing system** - if an equipment malfunction occurs and the outlet should fill with water, the water sensing system closes the steam outlet, preventing liquid from entering service lines to user devices. The system also activates a visual alarm, alerting operator of malfunction.

The boiler is fully insulated and equipped with a steel jacket having a baked enamel finish. Plumbing and control devices are copper alloy or stainless steel.

The boiler is equipped with an ON-OFF control switch and pilot light.

If **stainless steel construction** is selected, all components in contact with feedwater and steam are 316L stainless steel or equal.

## PERFORMANCE CAPABILITIES

Electric steam generators can provide the high pressure steam (90 psig max.) required for either single or multiple equipment arrangements. Available models are listed in Engineering Data, next page.

## NOTES

1. Pipe sizes shown indicate terminal outlets only. Building service lines, provided by others, must supply the specified pressures and flow rates.
2. STERIS recommends supplying hot water at 140°F (60°C) (maximum 150°F [60°C]) to the generator to minimize heat-up time and conserve electricity; cold water at 70°F (21°C) may be substituted, but only with sacrifice of heat-up time. For proper boiler operation and

reasonable element life, STERIS recommends the feed water quality be controlled within the following parameters:

### For Carbon Steel Generators

Condition	Nominal Conditions	Max. Conditions
Temperature	as supplied	140°F (60°C)
Total Hardness as CaCO <sub>3</sub> *	0-17 mg/L	130 mg/L
Total Dissolved Solids	50-150 mg/L	250 mg/L
Total Alkalinity as CaCO <sub>3</sub>	50-100 mg/L	180 mg/L
pH	6.8-7.5	6.5-8.5
Total Silica	0.1 - 1.0 mg/L	2.5 mg/L
Resistivity - ohms/cm**	2000-6000	26000

### For Stainless Steel Generators:

requires deionized, distilled or reverse osmosis water with minimum resistivity of 1 megohm/cm. Do not connect tap water to stainless steel generators. Use of water not meeting the required feedwater quality will invalidate the warranty and is a violation of ASME Boiler Codes.

3. Clearances shown are minimal for installing and servicing the equipment.
4. Disconnect switches (by others) should be installed in electric supply lines near the equipment. Water in and steam out lines should also be equipped with independent shut-off valves.
5. STERIS recommends that steam generating equipment be maintained and operated in an area where temperature does not exceed 100°F (38°C).
6. Other voltage specifications are available through special order.

\* 17.1 mg/L = 1 grain hardness  
 \*\* WARNING - BURN HAZARD: Sterilizer operator may be severely burned by scalding water if the water level control malfunctions. The steam generator level control may malfunction if the supply water exceeds 26,000 ohms/cm (38.5 micro-mhos conductivity min.). Do not connect to treated water (e.g., distilled, reverse osmosis, deionized) unless water resistivity is determined to be acceptable. If water exceeds 26,000 ohms/cm, contact STERIS Engineering Service for information concerning modifications required to the generator control system.

**ENGINEERING DATA**

Rating (kW)	30	40	60	75	100	120	150	180
Developed Boiler Horsepower	3.1	4.1	6.1	7.7	10.4	12.2	15.3	18.4
Generator Steam Output -- lbs/hr (kg/hr) 70°F (21°C) feedwater - 80 psig operating pressure	89.3 (40.6)	119 (54.1)	178.5 (81.1)	223 (101.4)	297.5 (135.2)	357 (162.3)	446.1 (202.8)	535.5 (243.4)
140°F (60°C) feedwater - 80 psig operating pressure	95.2 (43.3)	127 (57.7)	190.5 (86.6)	238.1 (108.2)	317.5 (144.3)	381.1 (173.2)	476.3 (216.5)	571.5 (259.8)
Gross BTU Output (BTU/hr)	102,360	136,480	204,720	255,900	348,024	409,440	511,800	614,160
Operating Weight lbs (kg)	388 (176)	393 (179)	458 (208)	468 (213)	842 (383)	1002 (456)	1002 (456)	1007 (458)
<b>Electrical Requirements:</b>								
<b>Heaters:</b>								
208 V - 3-Phase (amp/ph)	83	111	167	208	278	333	417	500
240 V - 3-Phase (amp/ph)	72	96	144	186	241	289	361	433
480 V - 3-Phase (amp/ph)	36	48	72	90	123	144	180	217
380 V - 3-Phase (amp/ph)	46	61	91	114	152	182	228	274
415 V - 3-Phase (amp/ph)	42	56	84	104	139	167	209	250
575 V - 3-Phase (amp/ph)	30	40	60	75	100	121	151	180
<b>Controls &amp; Pump Motor:</b>								
120 V - 1Phase	15	15	15	15	15	15	15	15
<b>Fuse Breaker Size:</b>								
208 V - 3-Phase (amp/ph)	110	150	225	300	400	450	600	700
240 V - 3-Phase (amp/ph)	100	125	200	250	350	400	500	600
480 V - 3-Phase (amp/ph)	50	60	90	125	150	200	250	300
380 V - 3-Phase (amp/ph)	60	80	125	150	200	250	300	350
415 V - 3-Phase (amp/ph)	60	80	110	150	175	225	300	350
575 V - 3-Phase (amp/ph)	40	50	80	100	125	175	200	250
<b>Input Wire Size**</b>								
208 V - 3-Phase	1	2/0	250 or 6-1/0	400 or 6-2/0	500 or 6-3/0	900 or 6-250	6-400	6-500
240 V - 3-Phase	2	1/0	4/0	300 or 6-1/0	500 or 6-3/0	700 or 6-4/0	3-300	6-400
480 V - 3-Phase	6	4	2	1/0	2/0	4/0	300 or 6-1/0	400 or 6-2/0
380 V - 3-Phase	6	4	1/0	2/0	3/0	300 or 6-1/0	400 or 6-2/0	500 or 6-3/0
415 V - 3-Phase	6	4	1	2/0	3/0	250 or 6-1/0	400 or 6-2/0	500 or 6-3/0
575 V - 3-Phase	8	6	4	2	1/0	3/0	4/0	300 or 6-1/0
Water Consumption -- gph (litres per hour) at 70 psig water inlet 140°F (60°C)	12 (46)	16 (60)	25 (95)	31 (118)	43 (163)	51 (194)	63 (239)	76 (289)
Heat Loss -- BTU/hr at 70°F (21°C); continuous operation	1750	1750	2600	3500	4400	4800	4800	4800

\*\* Minimum wire type - AWG (MCM) 90°C CU (copper) wire only.

## UTILITY REQUIREMENTS

### Waste (W)

For 30 to 180 kW generators:  
1" NPT.

### Hot Water (HW)

1/2" NPT; 20 to 50 psig (1.41 to 3.52 kg/cm<sup>2</sup>, dynamic); 140°F (60°C) minimum - see Note 2.

### Steam Outlet (S)

For 30 to 75 kW generators:  
3/4" NPT; for 100 to 180 kW  
Generators: 1" NPT.

### Electrical (E1)

30 to 40 kW generators: 208,  
240, or 480 Volt, 3-Phase, 50/60 Hz.

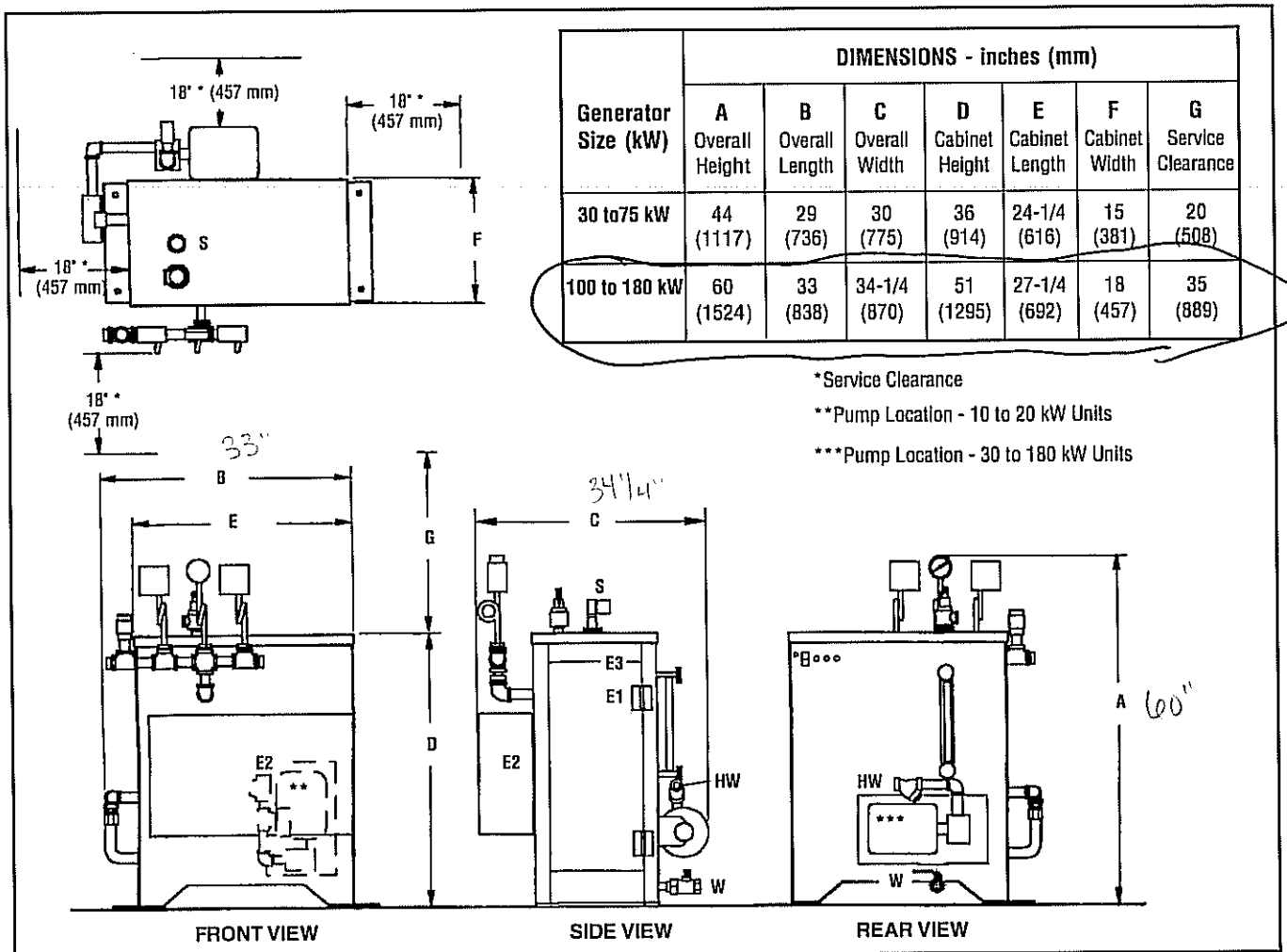
### Electrical (E2)

60 to 180 kW generators: 208, 240,  
or 480 Volt, 3-Phase, 50/60 Hz.

### Electrical (E3)

120 Volt, 15 Amp, 1-Phase 50/60 Hz  
service for control and pump motor.

...CHECK LOCAL CODES...



NOTE: Because of STERIS's continuing program of research and development, all specifications and descriptions are subject to change without notice. Some options may affect utility consumptions. Obtain approved drawings for design, and installation.

For further information, please contact:

# STERIS®



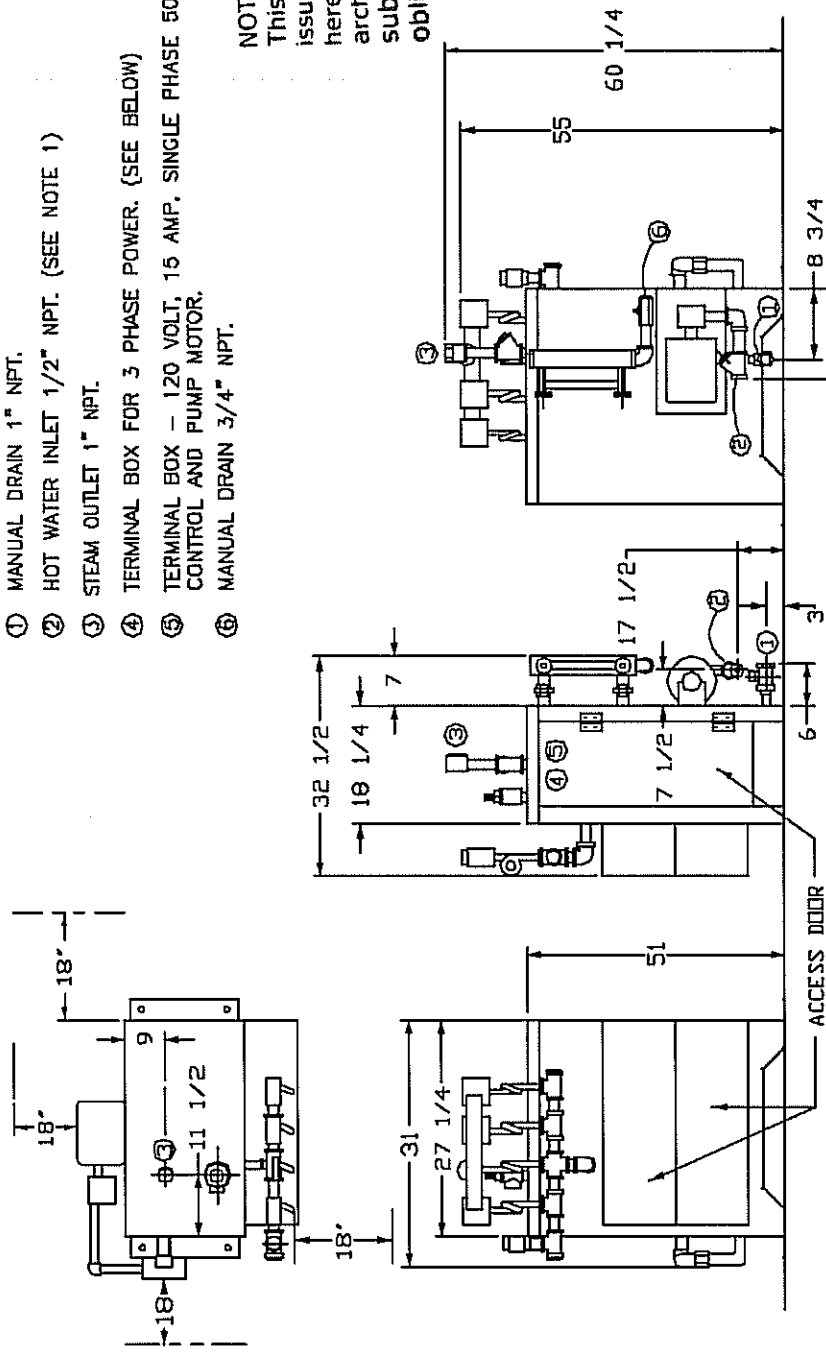
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Singapore	65 841 7677
Spain	34 91 658 5920
United Kingdom	44 1 608 811 822

- ① MANUAL DRAIN 1" NPT.
- ② HOT WATER INLET 1/2" NPT. (SEE NOTE 1)
- ③ STEAM OUTLET 1" NPT.
- ④ TERMINAL BOX FOR 3 PHASE POWER. (SEE BELOW)
- ⑤ TERMINAL BOX - 120 VOLT, 15 AMP, SINGLE PHASE 50/60 HZ SERVICE FOR CONTROL AND PUMP MOTOR.
- ⑥ MANUAL DRAIN 3/4" NPT.

**NOTICE**  
 This print accurate on the initial issue or revision date shown hereon is presented expressly for architectural planning purposes and is subject to change without notice or obligation on the part of STERIS.



ELECTRICAL REQUIREMENTS - HEATERS				
VOLTS	PHASE	AMPS/PHASE		
		100-KW	120-KW	150-KW 180-KW
208	3	278	334	417 500
240	3	241	289	361 434
480	3	121	144	180 217
380	3	152	183	228 274
415	3	140	167	209 251
575	3	100	121	151 181

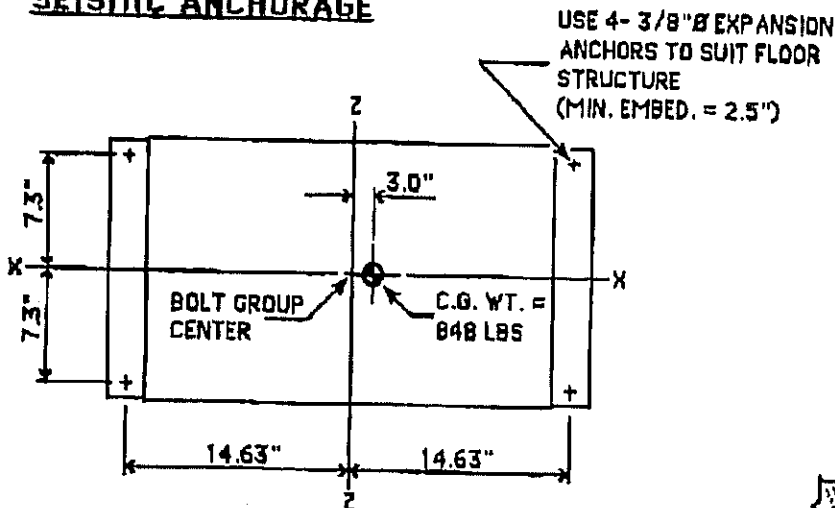
- NOTES:
1. OTHER CONTRACTORS TO PROVIDE HOT WATER 20 TO 50 PSIG (1.41 TO 3.52 KG/CM2, DYNAMIC) 140' (50') MINIMUM TO PUMP.
  2. CLEARANCES SHOWN ARE MINIMAL FOR INSTALLING AND SERVICING.
  3. OPERATING WEIGHT OF ALL UNITS - 1007 LBS. MAX.
  4. SEE TECH DATA SD56 FOR WATER QUALITY REQUIREMENTS.

SHT. 1 OF 1

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED DWG NO. 62941-091 STERIS STERIS Corporation Number, OH	100-120-150-180 KW CES STEAM BOILER.	EQUIPMENT DRAWING NO. <b>65435-731</b> JTBH _____ LOCATIONS _____
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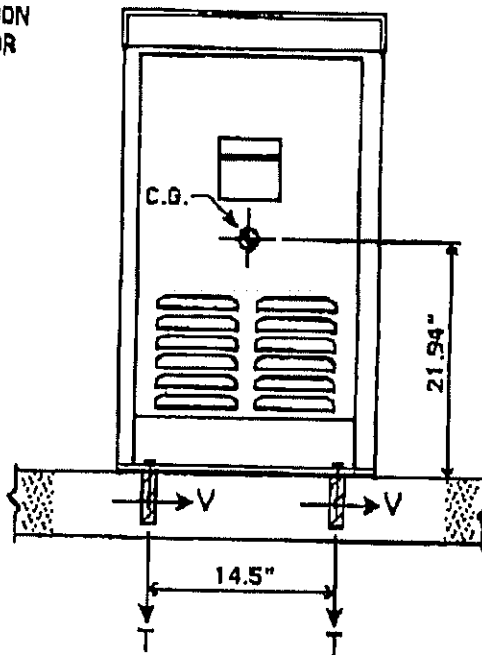
<b>EASE</b> EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING <b>WIEGLAND INDUSTRIAL DIVISION</b> <b>EQUIPMENT ANCHORAGE</b> <b>STEAM BOILER ASSEMBLY</b> <b>MODEL CES-C 100/180</b>	DES. R.B.L.	SHEET 1
	JOB 11-9824	
	DATE 9-3-98	OF 1 SHEET

**SEISMIC ANCHORAGE**



**PLAN AT BASE**

$T_{MAX} = 161 \text{ LBS/BOLT}$   
 $V_{MAX} = 113 \text{ LBS/BOLT}$



**FRONT ELEVATION**

**LOADS:** (PER CALIFORNIA BUILDING CODE SECTION 1630A AND TABLE 16A-0)  
 WEIGHT (W) = 848 LBS  
 HORIZONTAL ACCELERATION  $V_H = 0.45W = 382 \text{ LBS}$   
 VERTICAL ACCELERATION  $V_V = 0.15W = 127 \text{ LBS}$

**BOLT GROUP PROPERTIES:**

$I_{x-x} = 213 \text{ in}^4$   
 $I_{z-z} = 856 \text{ in}^4$   
 $I_{y-y} = 1069 \text{ in}^4$

**MOMENTS:**

$M_{xx} = 382 * (21.94) = 8,381 \text{ in}^*$   
 $M_{zz} = 382 * (21.94) + (848 * - 127) * 3.0 = 10,544 \text{ in}^*$   
 $M_{yy} = 382 * (3.0) = 1,146 \text{ in}^*$

**BOLT FORCES:**

**TENSION (T)**

$T_{X-AXIS} = \frac{8381 * (7.3)}{213} - \frac{848 * - 127}{4} = 107 \text{ LBS/BOLT}$

$T_{Z-AXIS} = \frac{10544 * (14.63)}{856} = 180 \text{ LBS/BOLT}$

$T = 107 + 180 * (0.3) = 161 \text{ LBS/BOLT (MAX)}$

**SHEAR (V)**

$V = \frac{382}{4} + \frac{1146 * \sqrt{7.3^2 + 14.63^2}}{1069} = 113 \text{ LBS/BOLT (MAX)}$

**NOTE:**  
 PROVIDE FLOOR STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.  
 (BY ENGINEER OF RECORD FOR THE BUILDING)

