

10.0 Installation & Specifications

10.1 General Mounting Instructions

Mark 5 series generators are specifically designed for underslung mounting on railcars. The unit is designed to be supported exclusively from the (2) endplates. These are the **only approved mounting surfaces; mounting of the unit from any other surface may result in catastrophic failure of the unit enclosure and will void manufacturers warranty and relieves Stadco of all responsibilities with regard to the units frame integrity and strength.**

It is the responsibility of the installer to provide mounting members and necessary hardware to mount the generator unit to the railcar. Be sure to provide members with ample strength to withstand and maintain structural integrity under the impact of coupling railcars and stresses of railroad travel.

Mounting load should be evenly distributed across the entire width of the unit endplate. Do not concentrate mounting load & stresses to a small area, as this may cause structural failure of the unit endplate. Support members are to be bolted to the generator unit endplates using only high quality grade 8 hardened bolts. A series of (12) holes for 1/2" Dia. bolts are provided on each endplate.

When mounting the generator unit, be certain to mount it in a level attitude both front to back and end to end.

CAUTION: Always disconnect the battery cables before attempting to weld on the unit, otherwise damage to the battery charging alternator or other electrical components may result. General Warranty notes apply. Refer to section 14.1.

10.2 Mounting Using Optional Service Track Kit #1508

Service track kit #1508 is designed to aid in periodic maintenance and service by allowing you to roll the unit out from under the railcar where it can easily be accessed from all sides. The following installation instructions will refer to **Drawings 12230-1, 12230-2, 12230-3 & 1508.**

A few items to consider before beginning installation:

- What clearances are needed for rolling genset unit in and out?

- Connection & disconnection of engine exhaust system.
- Extra length of load cables & control system cords to allow for roll out of genset unit or connection/disconnection plugs.
- Extra length of fuel hose or use of a quick disconnect coupling. Be sure to install either a shut-off valve or spill-proof couplings.

IMPORTANT: Depending upon available tools, you may need to drill the mounting holes in the main carrier rails before they are installed. See step D) for locating these holes.

- A) To mount the main carrier rails, **Item #5**, select the mounting dimension "**A**", according to GENSET MODEL. It is the installers responsibility to provide support members to attach the main carrier rails to the railcar frame structure. Support members should be attached to surfaces labeled "**Z**", of the main carrier rails. Other surfaces must remain clear to provide unobstructed roll-out of the genset unit. Be sure to provide members with ample strength to withstand and maintain structural integrity under the impact of coupling railcars and stresses of railroad travel.

IMPORTANT: Be sure to leave clearance at battery box to allow genset to roll in and out. Battery box protrudes past main carrier rail. Do not block the hot air discharge or the cool air intake openings. You can find these locations on the unit sales drawings.

Do not concentrate the mounting stresses of the support members to a small area of the main carrier rails **Item #5**, as this may cause structural failure. If the main carrier rails need to be shortened they may be cut to desired length. Position the main carrier rails **Item #5** with the roller guides facing each other. Make certain the rails are parallel with each other and level in all directions. This is important to prevent stressing of mounting members & the genset frame when bolting into position. This will also insure equal weight distribution onto rollers when rolling genset in & out.

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10.2 cont'd

- B) The next step is to install & assemble the roller mounting brackets **Items #8 & #9**. Start by attaching (1) **Item #8** mounting bracket to genset endplate at right front corner. Assemble using (6) each **Item #'s 19, 20 & 21**. Securely tighten. Repeat for remaining **Item #8** at left rear corner and (2) **Item #9** at right rear and left front corners.
- C) Next step is to install rollers as shown on drawing no. 1508. Place roller **Item #11** onto spindle **Item #10**. Place (1) 3/4" SAE flat washer **Item #12** onto 3/4"-10 x 3.5" lg. grade 8 bolt **Item #13**. Insert bolt w/ washer through spindle & roller assembly, through mounting bracket **Item #8** and through genset endplate. Place a second 3/4" SAE flat washer **Item #12** onto bolt **Item #13** and tighten securely with a 3/4"-10 conical locknut **Item #14**. **Repeat step C** for the remaining three rollers.
- D) Before placing genset onto main carrier rails **Item #5** you must first locate the mounting holes for mounting bolts **Item #15**. Determine the desired genset location, drill (4) 9/16" diameter holes through main carrier rails.

The genset unit is ready to be placed onto the main carrier rails when the following steps have been completed:

1. The main carrier rails have been securely mounted to the railcar.
2. The mounting holes have been drilled.
3. The roller mounting brackets have been assembled and fastened to the genset endplates.

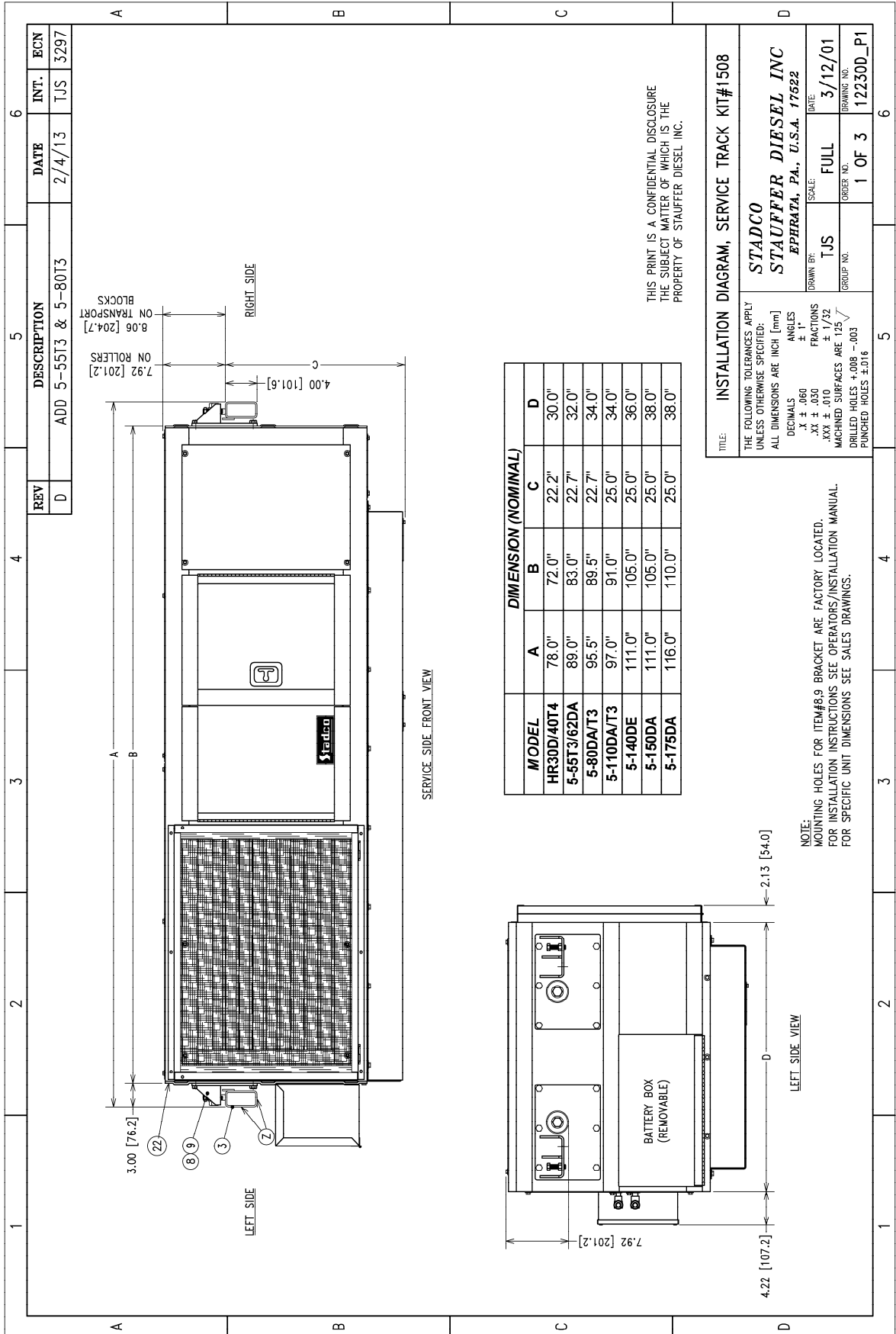
IMPORTANT: Be sure jacking screws **Item #18** are not protruding through support pads a greater distance than the thickness of the mounting spacers.

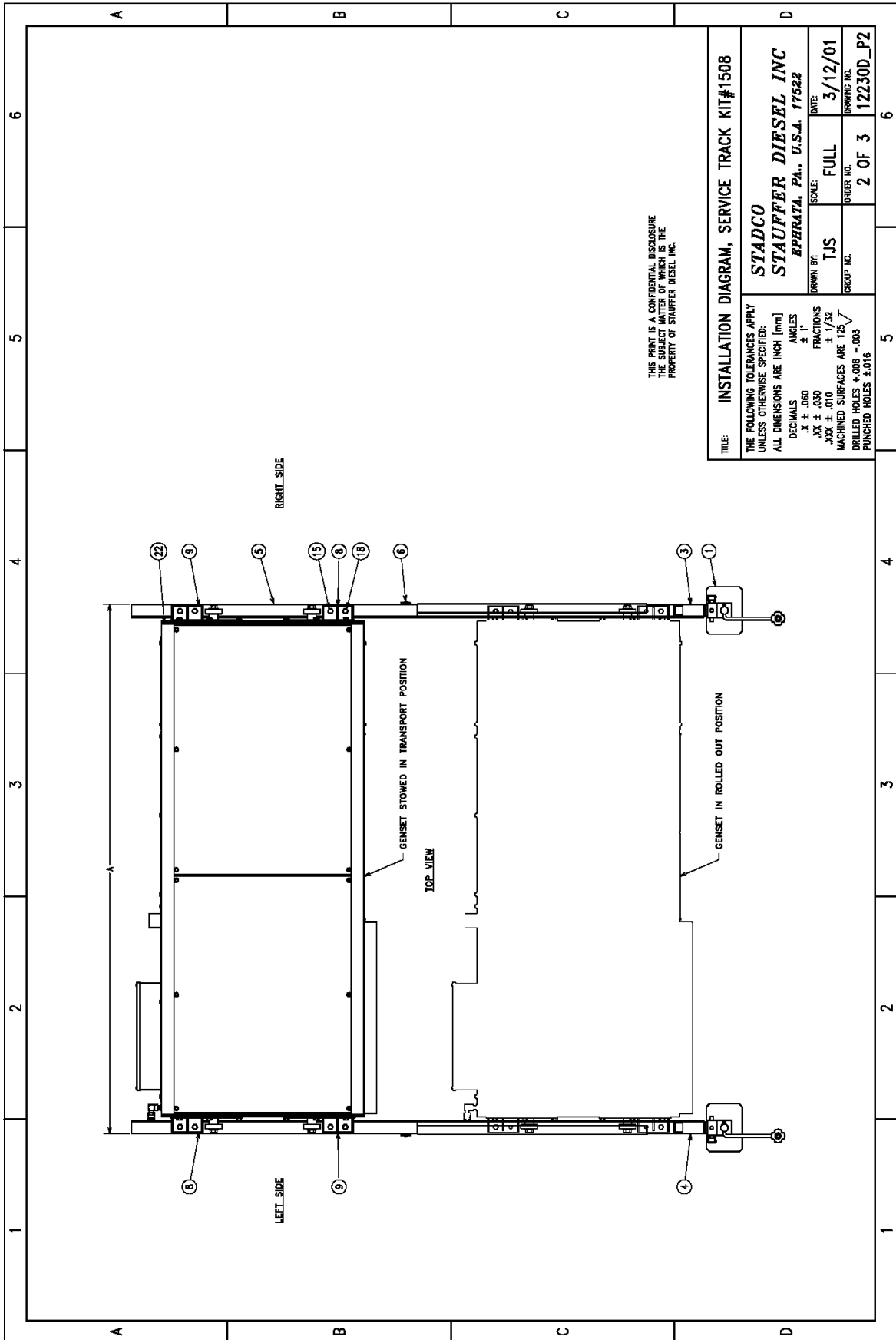
- E) Locate (4) mounting pad spacers **Item #16**. Spacers must be placed under mounting bracket support pads **Items #8, #9**, before fastening genset to main carrier rails. Secure the genset with (4) 1/2"x 6.00 lg. grade 8 hex head bolts **Item #15** & 1/2" grade 8 nylon locknuts **Item #17**. Roller wheels **Item #11** should not be making contact with main carrier rails when the genset is in transport (operating) position.

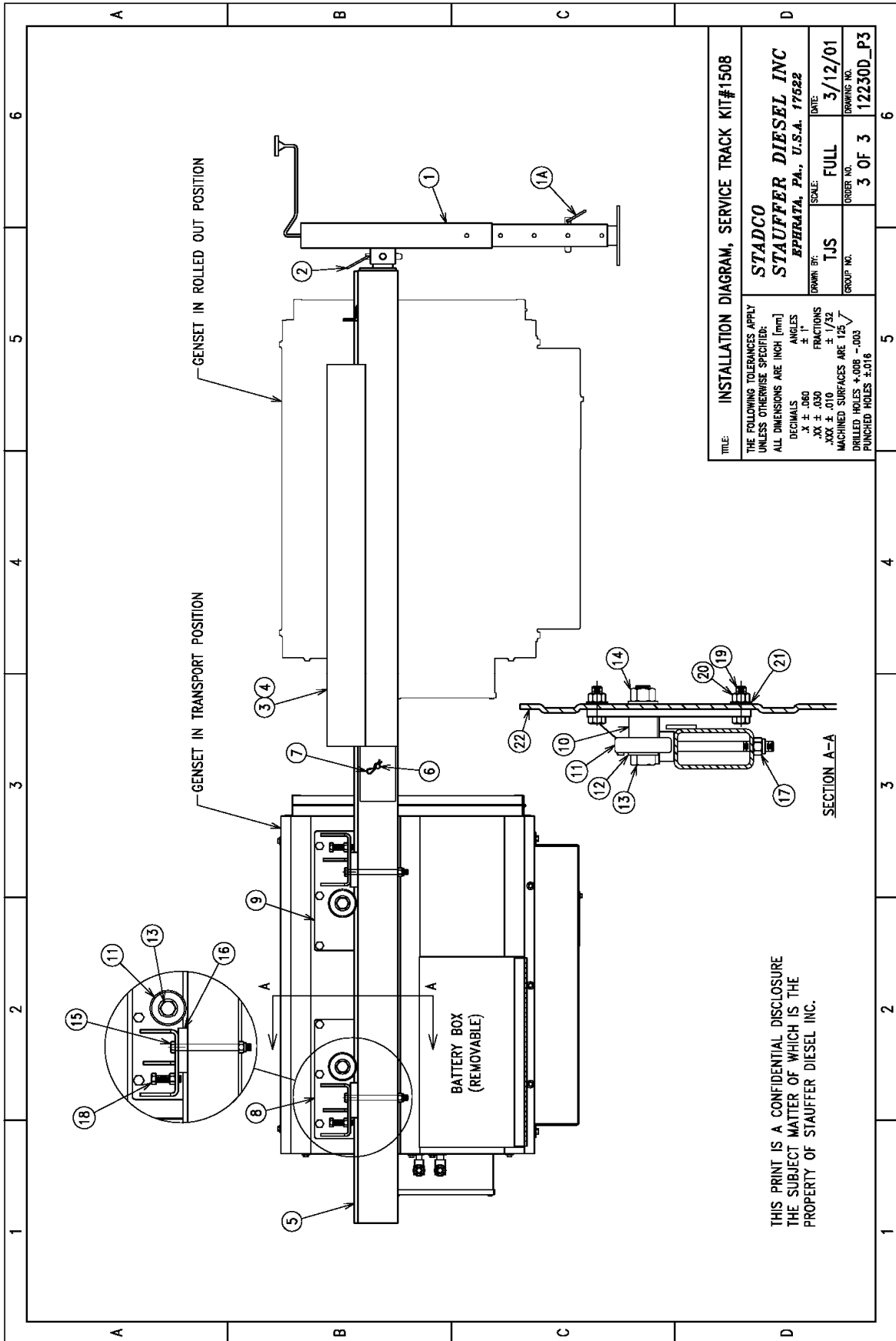
NOTE: Do not store extension rails, support legs, and their associated hardware inside the genset enclosure.

The following actions will automatically void all Stadco warranty coverage:

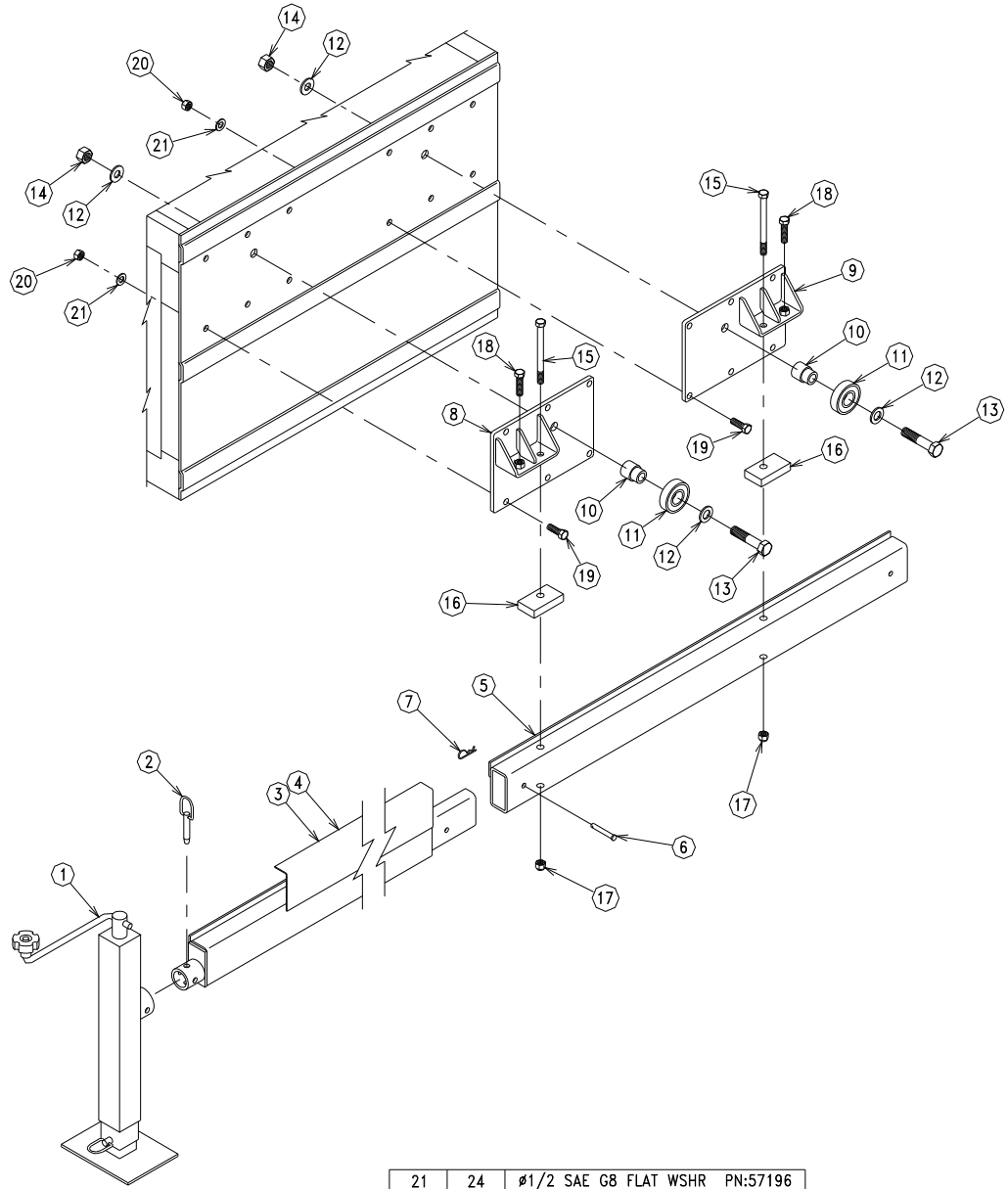
- a. Failure to use Stadco designated attachment points for mounting the genset unit.
- b. Storing service track extensions, support jacks or any other unapproved or loose equipment inside the genset enclosure.
- c. Installation of any equipment, not approved by Stadco in writing, that would destroy the integrity, performance or service life of critical internal systems of the generator unit.
- d. Unapproved modifications to the generator unit.







Drawing 1508



21	24	Ø1/2 SAE G8 FLAT WSHR PN:57196
20	24	Ø1/2-13 GC STOVER LOCKNUT PN:57192
19	24	Ø1/2-13 x 1.5 LG G8 HHCS PN:56899
18	4	Ø1/2-13 x 2.0 LG FULL THRD. HHCS PN:56902
17	4	Ø1/2-13 G8 NYLON LOCKNUT PN:57194
16	4	3/4 TH. 80A S.H. RUBBER BLOCK PN:21689
15	4	Ø1/2-13 x 6.0 LG G8 HHCS PN:56900
14	4	Ø3/4-10 GC STOVER LOCKNUT PN:57193
13	4	Ø3/4-10 x 3.5 LG G8 HHCS PN:56901
12	8	Ø3/4 SAE G8 FLAT WASHER PN:57197
11	4	BALL BEARING PN:62247
10	4	BEARING SPINDLE PN:2270
9	2	MOUNTING BRACKET PN:21684
8	2	MOUNTING BRACKET PN:21685
7	2	Ø3/32 HAIR PIN PN:56905
6	2	Ø3/8 CLEVIS PIN x 2.5 LG. PN:56903
5	2	PRIMARY CARRIER TRACK PN:21013
4	1	LEFT SIDE CARRIER TRACK EXTENSION PN:1398
3	1	RIGHT SIDE CARRIER TRACK EXTENSION PN:1319
2	2	Ø9/16 PIN PN:57116
1	2	JACK STAND PN:21297
ITEM	RBQ'D	DESCRIPTION

DO NOT SCALE DWG.

SERVICE TRACK KIT#1508

STADCO
STAUFFER DIESEL INC
 EPHRATA, PA., U.S.A. 17522

DRAWN BY:	SCALE:	DATE:
TJS		3/9/01
GROUP NO.	ORDER NO.	DRAWING NO.
		1508

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10.3 Mounting Using Optional Isolation Mounting Kit#1499.

The intent of the Isolation mounting kit is to reduce vibration transmitted by the engine through the frame to the railcar structure. This is accomplished by installing a set of (4) rubber mounts at the corners of the generator enclosure. Since the enclosure is mounted on rubber it will be able to move with vibration as well as when coupling the railcars together. For this reason all attaching parts such as fuel lines, exhaust system, wiring etc. **can not** be rigidly attached when making your connections. Make sure these connections are installed with sections of flexible material as required. The following installation instructions will refer to **Figure 10.3.1 & 10.3.2.**

Before beginning installation read **Section 10.1 General Mounting Instructions.**

Begin by determining distance "A" on chart **Figure 10.3.1.** After distance "A" is determined, you will need to decide what support members are going to be used to carry the generator set. The generator set is carried by attaching to (4) brackets **Item #2, Figure 10.3.1.** Be sure to provide support members with ample strength to withstand and maintain structural integrity under the impact of coupling railcars and stresses of railroad travel. If welding to the railcar structure, have a certified welder perform the installation. If you are fastening the support members by means of bolting, use Grade 8 hardware or better. When installing, be sure the mounting surfaces of the support members are parallel and level. The holes for attaching to bracket **Item #2** can be drilled according to layout shown in **Figure 10.3.1.**

After the carrying members are securely attached to the railcar structure assembly of the mounting kit can begin.

The following instructions refer to Figure 10.3.2.

First, attach mounting brackets **Item #1** to the generator endplate. Make sure the mounting brackets are parallel with each other and with the top of the generator enclosure.

This will help ensure a level mounting when installed on the railcar. Use Grade 8 hardware (provided) **Item #7, Item #8 & Item #9**, 6 places each bracket. Tighten securely.

Note: A chart of general tightening specs for different grade hardware is shown in **Figure 10.7.2.**

Second, place isolation mounts **Item #10** onto brackets **Item #2** and secure with Grade 8 hardware (provided) **Item #7, Item #8 & Item #9**, 2 places each mount. Tighten securely.

Next, align bracket **Item #2** with 13/16" dia. hole in bracket **Item #1.** Place washer **Item #4** on 3/4-10 Grade 8 bolt **Item #3.** Insert bolt through bracket **Item #1** and rubber mount **Item #10** and secure by placing snubber washer **Item #5** and locknut **Item #6** onto bolt **Item #3.** Thread locknut onto bolt only to locking section of the nut. This will allow you to align the brackets more easily with the main carrier members.

Repeat for remaining (3) brackets.

After the brackets are assembled, the unit is ready to be mounted and fastened to the railcar structure.

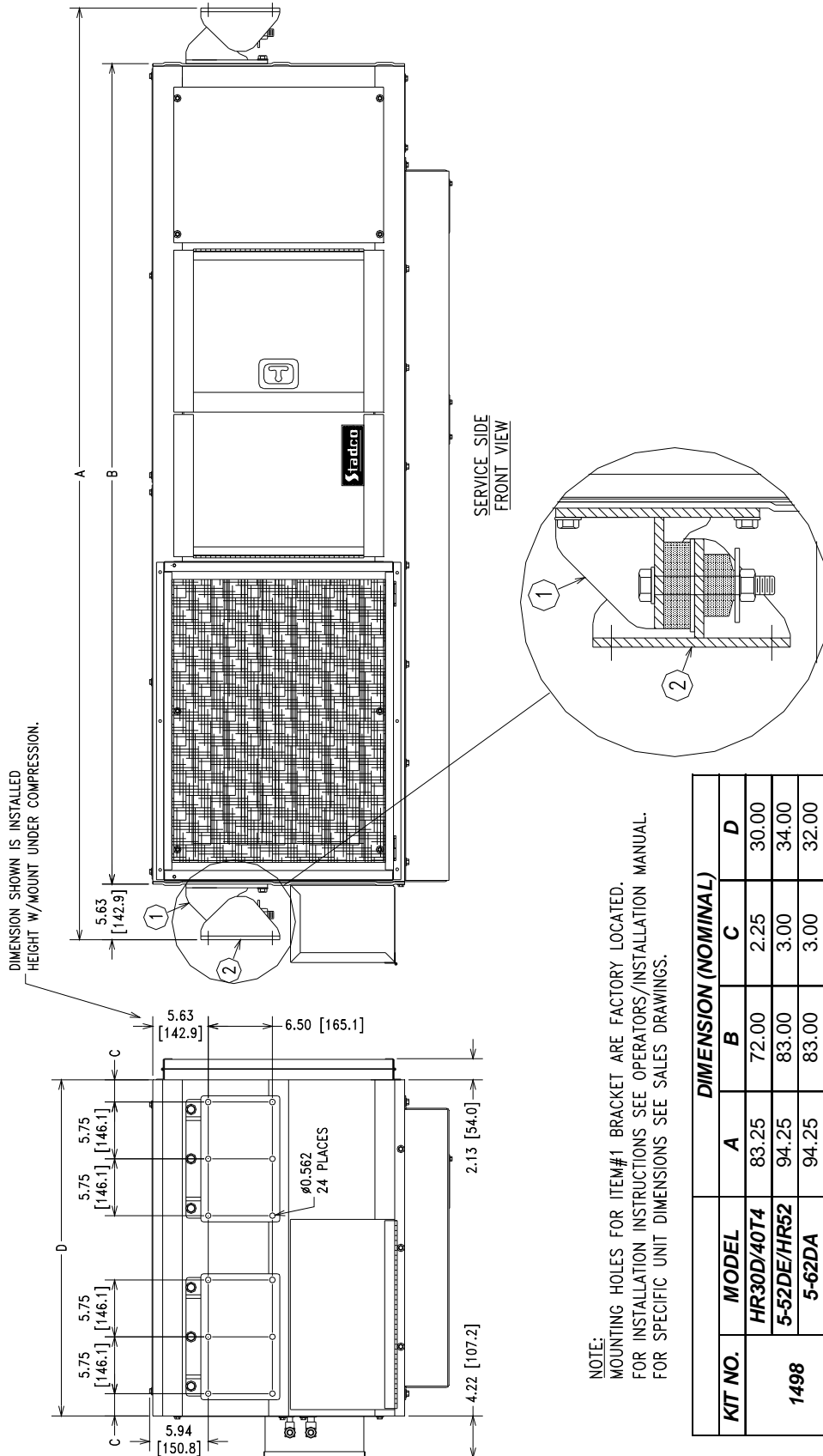
Lift the genset enclosure into the designed position and attach to the railcar using Grade 8 bolts & locknuts (not provided). Each bracket **Item #2** is designed to be attached using (6) 1/2" diameter bolts. Tighten securely.

Make sure that all mounts are equally loaded when in the installed position. This will provide the best isolation from vibration and also will prevent overloading of one mount. To check equal load, keep center bolts **Item #3** loose. Lift one end of the generator enclosure until brackets **Item #1** do not make contact with rubber mount **Item #10.** Next, slowly lower down until either bracket **Item #1** contacts the rubber mount. Adjust brackets as needed to correctly align. Repeat this process for the opposite end.

When the genset is positioned and properly aligned, tighten (4) locknuts **Item #6** onto bolts **Item #3.**

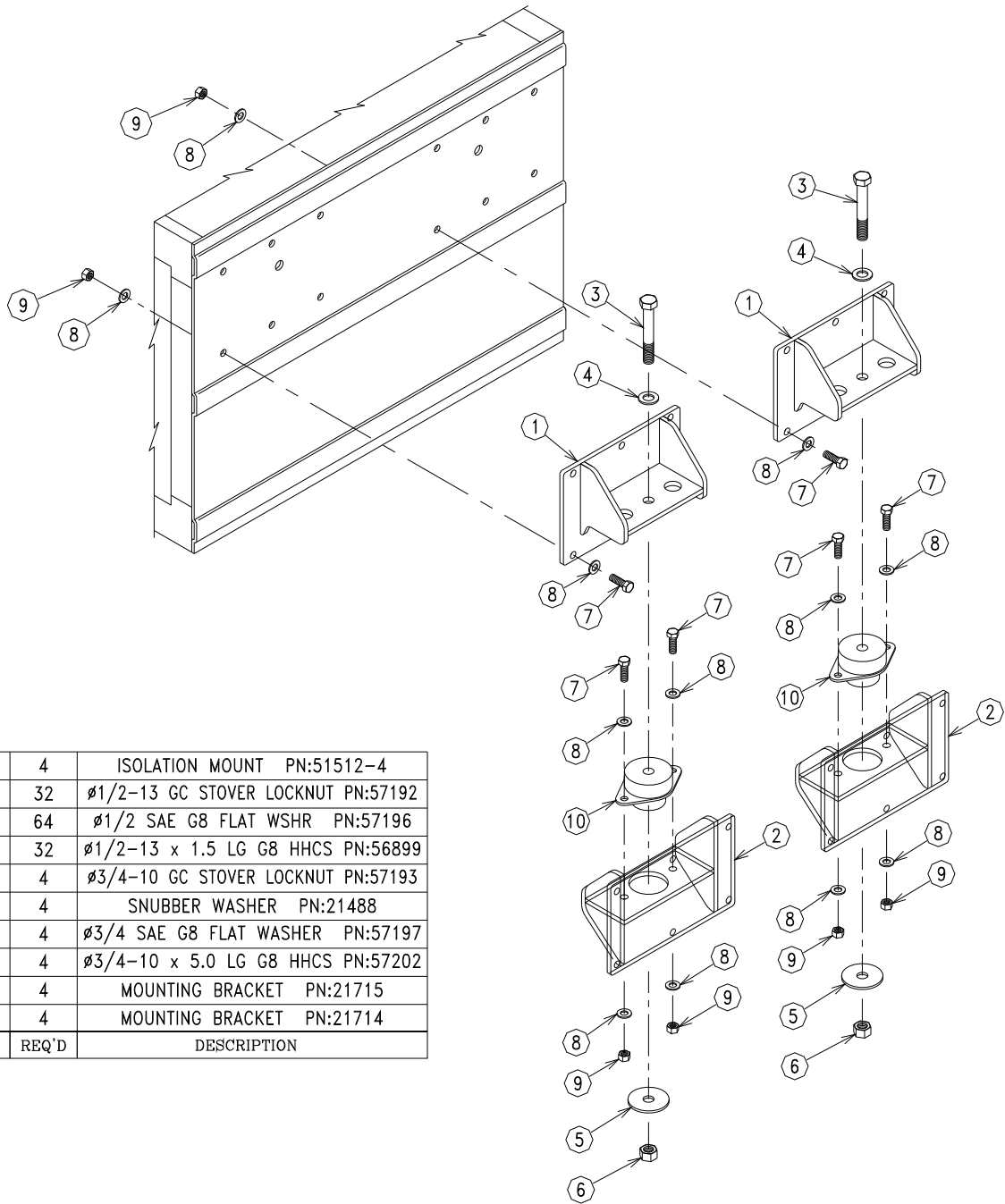
Before completing, recheck all fastening hardware for tightness.

Figure 10.3.1 (Dwg 12239)



KIT NO.	MODEL	DIMENSION (NOMINAL)			
		A	B	C	D
1498	HR30DI/40T4	83.25	72.00	2.25	30.00
	5-52DE/HR52	94.25	83.00	3.00	34.00
	5-62DA	94.25	83.00	3.00	32.00
1499	5-65DE/A	94.25	83.00	3.00	34.00
	5-80DA/T3	100.75	89.50	3.00	34.00
	5-80DE	100.75	89.50	4.00	36.00
1500	5-110DA/T3	102.25	91.00	3.00	34.00
	5-120DE	116.25	105.00	4.00	36.00
	5-140DE	116.25	105.00	4.00	36.00
	5-150DA	116.25	105.00	3.00	38.00
	5-175DA	121.25	110.00	3.00	38.00

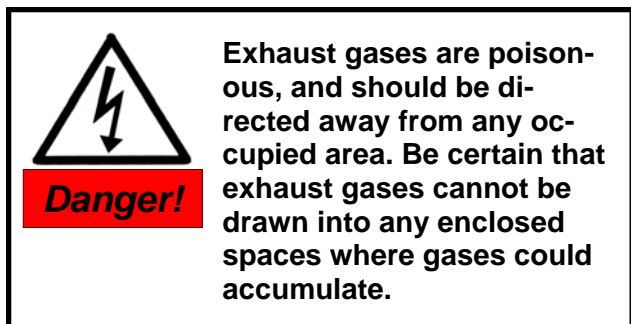
Figure 10.3.2 (Dwg 1499)



10	4	ISOLATION MOUNT PN:51512-4
9	32	∅1/2-13 GC STOVER LOCKNUT PN:57192
8	64	∅1/2 SAE G8 FLAT WSHR PN:57196
7	32	∅1/2-13 x 1.5 LG G8 HHCS PN:56899
6	4	∅3/4-10 GC STOVER LOCKNUT PN:57193
5	4	SNUBBER WASHER PN:21488
4	4	∅3/4 SAE G8 FLAT WASHER PN:57197
3	4	∅3/4-10 x 5.0 LG G8 HHCS PN:57202
2	4	MOUNTING BRACKET PN:21715
1	4	MOUNTING BRACKET PN:21714
ITEM	REQ'D	DESCRIPTION

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10.4 Exhaust System



An exhaust tailpipe is supplied from the engine manifold to the outside of the unit. To complete the exhaust system an exhaust components kit has been shipped loose with the generator unit. **Refer to Figure 10.4.1.**

Muffler

The exhaust muffler should be mounted as far as possible away from the generator air inlet openings. The outlet end of the muffler should be pointed away from the air inlet side of the generator unit so as not to recirculate the exhaust heat. Two mounting brackets are supplied for mounting the exhaust muffler.

Rain Protection

With vertical exhaust systems the entry of rain and/or snow must be prevented by installing a rain cap, or by bending the tailpipe to provide a horizontal exhaust outlet.

Piping

When installing piping between genset unit and muffler refer to **Figure 10.4.1 & 10.4.2** for assembly. The flexible exhaust piping may be cut to length for proper installation. It may be necessary to provide additional piping if mounting the muffler a greater distance from the generator unit. If excessively long runs are required it may be necessary to increase piping size. Consult Stadco main office for determining piping size.

Exhaust Elbows

Provide sweeping bends to minimize exhaust backpressure. 90° elbows must have a bend radius not smaller than the pipe I.D. Do not miter cut piping to create elbows. This will greatly restrict the exhaust flow, which can cause engine overheating.

Exhaust Backpressure

The exhaust system will produce a certain resistance to the exhaust gas flow (“exhaust backpressure”) consisting of the total resistance of the system, including the pipes, pipe bends, muffler, tailpipe and/or exhaust accessories. The exhaust backpressure of a given engine installation will depend upon the size of the pipes, the number and types of bends and joints and the chosen muffler. Exhaust system design must ensure that the total system flow resistance does not exceed the maximum permissible backpressure, Refer to **Section 10.7** for exhaust backpressure limit. The exhaust system supplied by Stadco has been designed to be within these parameters.

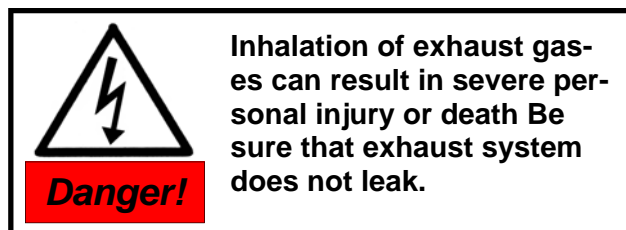


Figure 10.4.1 (Dwg 1434)

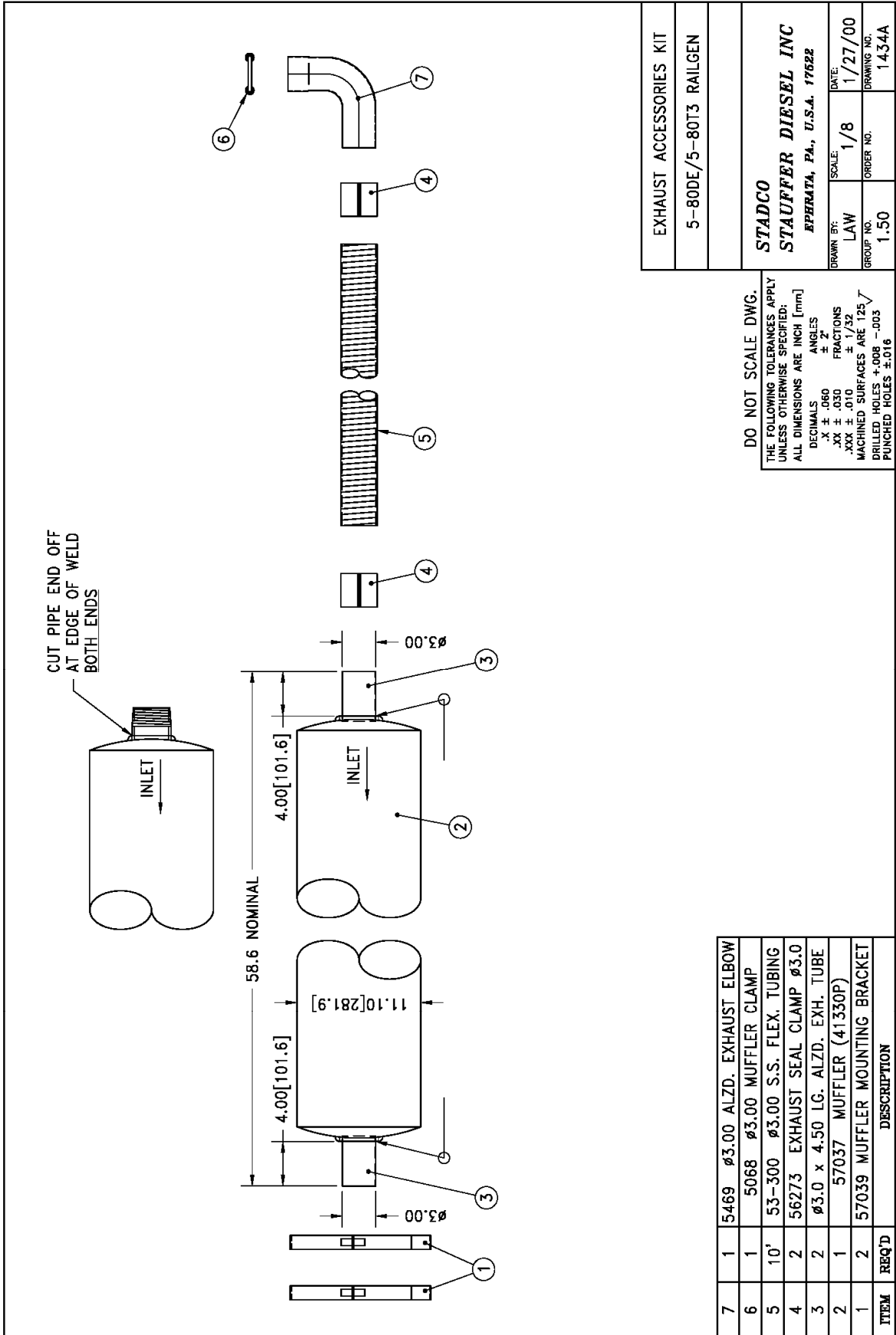
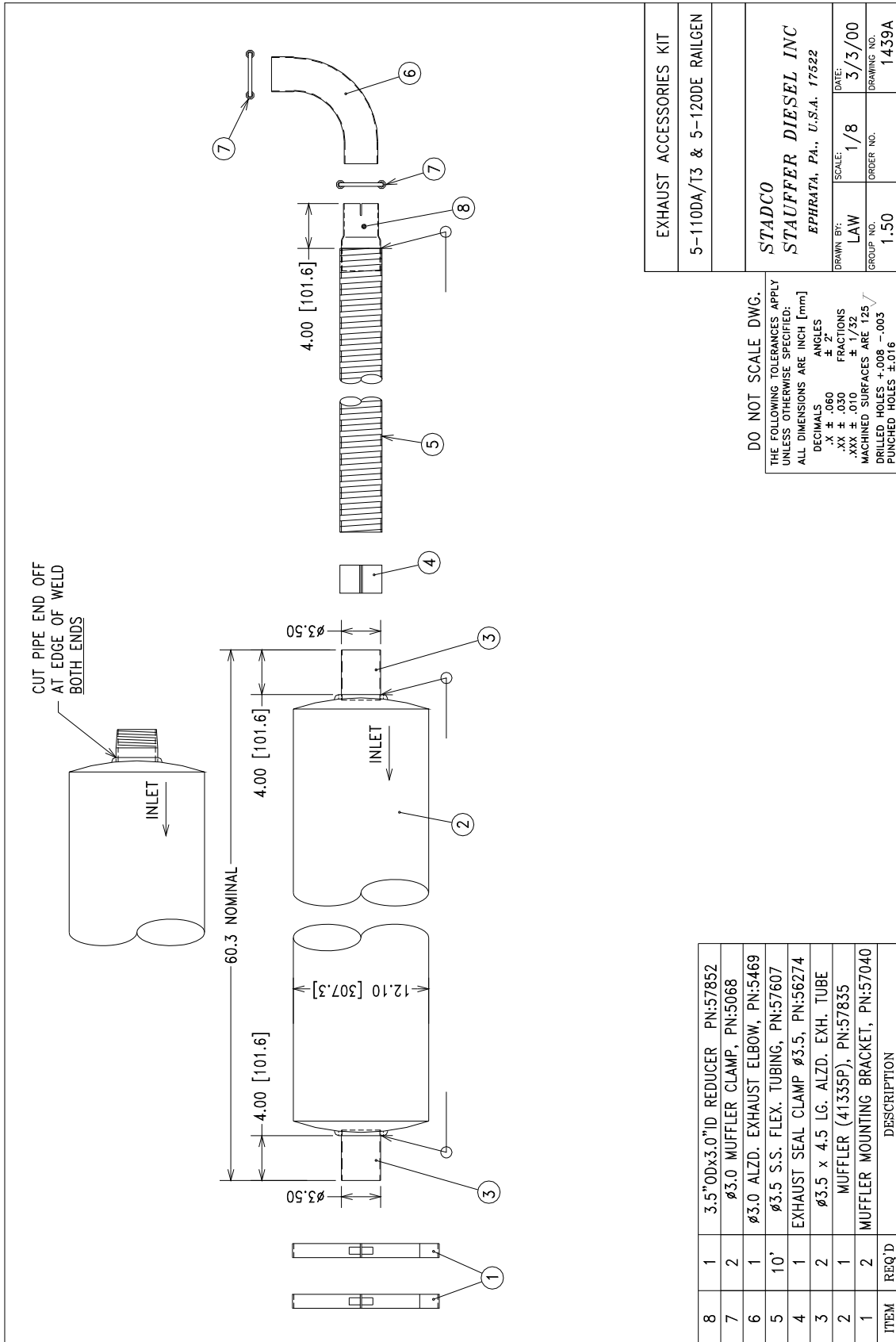


Figure 10.4.2 (Dwg 1439)



10.0 Installation & Specifications

10.5 Fuel System

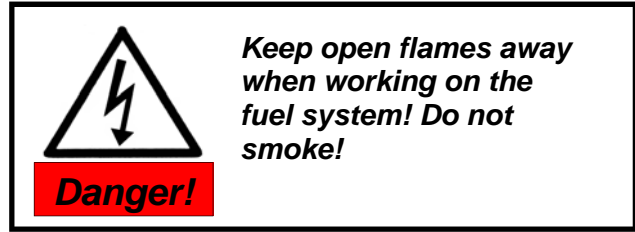
The fuel system, supplied with this unit, is equipped with (2) secondary fuel filters and a primary fuel filter/water separator. ***It is imperative to have a clean supply of fuel to prevent contamination of the fuel injection system.***

Refer to the Fuel System Layout, **Figure 10.5.1**, for a typical layout. Fuel supply fittings are provided, located on the exhaust outlet side of the unit. Use a minimum of 1/2" ID hose for connection between the genset and the fuel tank < 20 ft. in length. If fuel suction line is > 20 ft. to < 50 ft., use min. 9/16" ID hose. In order for this system to work properly make certain that all connections are air tight. Place a clamp on all fuel hose connections to prevent air from entering the system and fuel from leaking out. Rigid lines or Push-Loc type fuel hoses may be used to make the connections. Rigid lines made of copper or scale-free steel, should be carefully cleaned before installation. Flexible hoses should be used to make connections between rigid lines and genset unit to allow for movement. All fuel lines and hoses should be adequately retained to prevent chafing. In areas where hoses may come in contact with frame members or other equipment, the hose should be covered with a protective loom and firmly clamped.

The primary fuel filter/water separator should be installed into the fuel suction line, in a vertical manner, and in an accessible area to permit periodic draining of accumulated water. This filter must be mounted outside the genset enclosure. See warranty notices.

Each unit is equipped with a mechanical engine mounted fuel transfer pump which feeds the fuel supply from the fuel tank to the fuel filter system and subsequently to the fuel injection pump.

IMPORTANT: Air cavitation causes engine starting problems by virtue of fuel starvation. Make sure that all joints and connections in the fuel system are 100% air tight. Install spring loaded type, fuel check valve at fuel tank if difficulty is encountered with fuel drain-back.



10.6 Cooling Air System

It is essential that liquid-cooled diesel engines be installed in such a way that a proper supply of cooling air is guaranteed under all operational conditions.

Cooling air flow to the genset must be isolated from all extraneous heat producing equipment. Recirculated heat may cause engine to overheat at full rated load, especially at or above rated ambient temperatures (80°F). When the engine is running, a vacuum is formed in front of the cooling air inlet of the enclosure, drawing air streams there from all directions. The key to a proper installation is to allow only fresh ambient air to enter the unit and to eliminate the possibility of hot air recirculation.

Cooling air flow enters the enclosure exclusively at the air intake **Figure 4.1.1** on the service side as shown on STADCO sales drawing. Do not cover the air intake or restrict cooling air flow to the panel. Prior written Stadco factory approval must be obtained for installation where cooling air inlet will be restricted in any way. On railcars with side skirts, a sealed duct to the outside of the skirt must be provided to allow air to enter only from outside the skirting. Hot air discharges downward from the front of the unit **Figure 4.1.1**. The air intake opening is protected with a cleanable filter system to prevent the passage of dirt and debris which could clog the radiator. Hot air discharge opening is protected with a rock guard/screen to protect the cooling system. Always keep these openings clean and free of obstructions.

Cooling system is filled at the factory with 50/50 mixture of coolant. Make sure coolant levels are up to full marks before starting the engine. All gensets are equipped with a low coolant level switch and will cause the engine to shut down and/or not start if not properly maintained.

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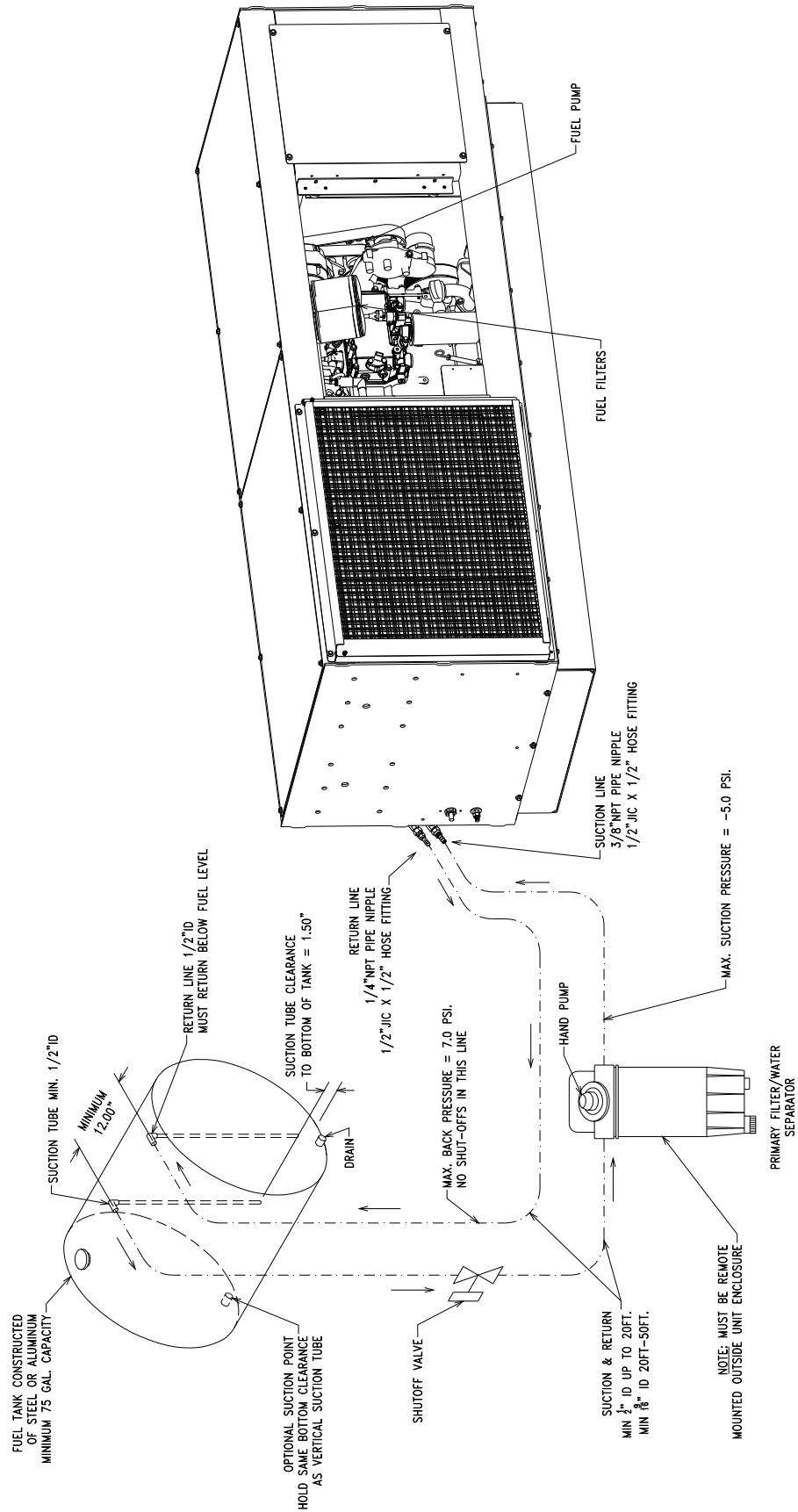


Figure 10.5.1

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10.7 Design Features and Specifications

GENSET RATINGS - 60Hz		5-80T3	5-110T3
Type: -T240/T480 Unit Output Rating (1) 12- Leads, 3-Phase 240/480V. WYE, 0.8PF	Intermittent	80 KW	110 KW
	Prime	71 KW	100 KW
	Continuous	68 KW	95 KW
Unit Max. Rated Current: (1) @ 0.8 PF.	Amps @ 240V	240	330
	Amps @ 480V	120	165
A.C. Alternator Max. Capacity (2) 240/480V, 3-ph., 0.8 PF. WYE Connection	KW @ 125°C Rise	83	117
	Motor Starting Capability @ 35% Dip	270 SKVA	370 SKVA
	% Efficiency - 0.8PF	91	91
Type: -T208 Unit Output Rating (1) 12- Leads, 3-Phase 208V. WYE, 0.8PF	Intermittent	75 KW	105 KW
	Prime	75 KW	100 KW
	Continuous	70 KW	95 KW
Unit Max. Rated Current: @ 0.8 PF.	Amps @ 208V	260	364
A.C. Alternator Max. Capacity (2) 208V, 3-ph., WYE Connection	KW @ 125°C Rise	75	105
	Motor Starting Capability @ 35% Dip	195 SKVA	290 SKVA
	% Efficiency - 0.8PF	90	90
Engine Specifications			
Deutz diesel engine with basic components liquid cooled & turbocharged.	Model	TCD2012L04-2V	TCD2013L04-2V
	No. of Cylinders	4	4
	Liters / C.I.D.	4.04 / 246	4.76 / 290.4
	Max. HP @ 1800 RPM	118	161
Speed/Frequency regulation (typical)		0.5 Hertz	0.5 Hertz
Battery Charging Alternator		14V, 55A	14V, 45A
Fuel Consumption @ Continuous rating	100% Load GPH	5.3	7.5
	50% Load GPH	2.7	3.8
Typical Cold Starting Capability (3)	without cold starting aid	(-10°C) (14°F)	(-15°C) (5°F)
	w/ starting aid, uprated batteries & lube oil	(-20°C) (-4°F)	(-20°C) (-4°F)
Emissions Certification		EPA Tier3	EPA Tier3
Exhaust Flow / Max. exhaust Backpressure		520CFM/ 40inH2O	790CFM/ 40inH2O
Unit Specifications			
Lube oil change interval (4)		500 Hrs.	500 Hrs.
Lube oil capacity: quarts (liters) (5)		16.4(15.5)	13.7(13.0)
Recommended Fuel		ASTM #2-D	ASTM #2-D
Recommended 12V Battery Capacity (CCA)		1000	2x 1000
Recommended 12V Battery type: BCI#		31	(2x) 31
Approx. Unit Size w/o battery box (inches)	Frame Length	89.5	91
	Frame Width	34	34
	Height	30.6	32.2
Impact, Allowable Maximum		2.0G	2.0G
Approx. Unit Weight (Lbs.)		2800	3000

Figure 10.7.1

- (1) "Unit Output Rating" refers to the rating of the engine/generator combination w/o fan burden.
- (2) "A.C. Alternator Max Capacity" refers to the manufacturers capacity rating of the alternator.
- (3) Requires glow plugs and SAE 5W30 oil. For lower starting temp. coolant heater & battery warmer are required.
- (4) See Section 9.1 for specific oil requirements.
- (5) Quantity is only approximate. Fill to upper dipstick marking. Do not overfill.

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10.8 Climatic Derate Factors

CAUTION! When operating in temperatures or altitudes above 40°C / 1000 Meters ASL, a reduction of output is required.

Note:

The engine electronic controller (EMR) is equipped with an altitude sensor which will automatically reduce the engine power based on the altitude of operation. See **Figure 10.8.1**

A 4 % reduction of power is also required for every 10°C(18°F) above 40°C(104°F).

Note: Power reductions are accumulative.

When operating in high ambient temperature and/or altitude conditions, pay close attention to engine critical temperatures. Units are equipped with safety engine shutdown features which monitor critical temperatures & levels. When critical high operating temperatures are reached the engine control unit (ECU) will respond in the following manner.

The ECU will begin to reduce the available power output to allow engine parameters to return below a critical level. If engine parameters remain beyond the critical level the ECU will continue to reduce output until the maximum level is reached at which point the engine will be shutdown to preserve engine life. The engine control panel will display a fault code for the parameter which caused the shutdown. These fault codes can be looked up in the **Diagnostic Trouble Codes** section of this manual.

Since the safety protection system is not fail safe, periodic manual checking of the engine control system is required. Have this maintenance performed by your authorized Deutz dealer.

Figure 10.8.1 Climatic Derate Factors

Technische Daten
technical explanation
Leistungsreduktion
power derating

TCD 2013 L04 2V
COM III / EPA III

Seite/Page

2.204/E



		TCD 2013 L04 2V DCR											
		1000	1500	1600	1800	2000	2100	2200	2300	2400			
Drehzahl / speed	1/min												
Leistung / rating	kW					128	129	129	129	129			
Drehmoment / torque	Nm	536		670									
	0	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	
	500	0,99	1,00	1,00	1,00	1,00	1,00	0,99	0,99	0,99	0,98		
	1000	0,98	1,00	1,00	1,00	1,00	0,99	0,97	0,97	0,96	0,96		
	1500	0,97	1,00	1,00	1,00	1,00	0,98	0,96	0,96	0,94	0,94		
	2000	0,95	0,99	0,99	0,98	0,98	0,95	0,91	0,91	0,88	0,88		
	2500	0,95	0,98	0,98	0,95	0,93	0,89	0,83	0,83	0,79	0,79		
	3000	0,95	0,98	0,96	0,92	0,88	0,82	0,75	0,75	0,69	0,69		
	3500	0,90	0,92	0,90	0,84	0,78	0,73	0,67	0,67	0,61	0,61		
	4000	0,85	0,87	0,83	0,76	0,68	0,64	0,58	0,58	0,53	0,53		
	4500	0,80	0,81	0,77	0,68	0,59	0,55	0,50	0,50	0,46	0,46		
	5000	0,75	0,75	0,70	0,59	0,49	0,45	0,41	0,41	0,38	0,38		
Einsatzhöhe / altitude [m]													

Die o.a. Leistungsreduktionsfaktoren sind im Motorsteuergerät hinterlegt und beziehen sich auf die Dachkurve der Leistungsgruppe I.
 The above mentioned factors of power derating are stored in the engine control unit and refer to the torque curve of power category I.

Die Kühlerauslegung ist entsprechend der Deutz-Vorgaben durchzuführen.
 The design of the cooling unit has to meet the Deutz requirements.

10.0 Installation & Specifications

10.9 Installation Checks

Prestart Checks

Before starting the generator set, perform these steps:

- Check oil level in oil pan (**Section 11.4**)
Check for leaks. See **Section 9.1** for the recommended oil grade.
- Check Battery connections for tightness.
- Check all electrical connections and be sure that all bolts have been securely tightened.
- Refer to Installation Review, this section.
- Follow the Start-Up Section in Section 6.

Do not attempt to start generator system until all Installation Review questions have been answered satisfactorily. Once this has been done, proceed to the Operator's Section for the Start-Up sequences.

Installation Review

Prior to initial start-up of the generator system, address each of the following installation review items; correct as necessary.

- Is the generator securely mounted ?
(**Section 10.1**)
- Are all the generator power output cables routed in such a way as to prevent chaffing?
- Are the power output cables of the generator connected properly & tightened? (See Wiring Diagram **Figure 8.1.1**)
- Are the battery cables connected properly & tightened? (**Section 7.2**)
- Are the fuel supply & return lines properly connected & tightened to prevent leaks (**Section 10.5 & Figure 10.5.1**).
- Are the exhaust outlets protected to prevent ingress of rain & snow into the engine (**Section 10.4**).

Can the Following Routine Maintenance be Performed?

- Check oil level in engine.
- Change oil, oil filters.
- Change fuel filters and air filter.
- Check & add coolant.
- Check the valve clearance.

10.0 Installation & Specifications

10.10 Bolt Torques

The following charts are for reference only, bolts are non-lubricated & unplated. Torques do not apply for engine/alternator components. Use a thread locking substance for tapped fasteners.

Metric Steel Bolts Torque Specifications					
Bolt Size Millimeters	Coarse Thread Pitch	Standard Dry Torque in Foot-Pounds			
		Class 5.6 71,160 psi	Class 8.8 113,800 psi	Class 10.9 142,000 psi	Class 12.9 170,674 psi
		Med. Carbon Steel	Med. Carbon Steel	Med. Carbon Steel	Med. Carbon Steel
6mm	1.00	5	6	8	10
8mm	1.00	10	16	22	27
10mm	1.25	31	40	45	49
12mm	1.25	34	54	70	86
14mm	1.25	55	89	117	137
16mm	2.00	83	132	175	208
18mm	2.00	111	182	236	283
22mm	2.50	182	284	394	464
24mm	3.00	261	419	570	689

Standard Steel Bolt Torque Specifications				
Bolt Size (in.)	Coarse Threads/ inch	Standard Dry Torque in Foot-Pounds		
		SAE Grade 2 74,000 psi	SAE Grade 5 120,000 psi	SAE Grade 8 150,000 psi
		Low Carbon Steel	Med. Carbon Heat T. Steel	Med. Carbon Alloy Steel
1/4	20	6	10	14
5/16	18	12	19	29
3/8	16	20	33	47
7/16	14	32	54	78
1/2	13	47	78	119
9/16	12	69	114	169
5/8	11	96	154	230
3/4	10	155	257	380
7/8	9	206	382	600
1	8	310	587	700