



OPERATION MANUAL

INDUSTRIAL ENGINES

TNV

**2TNV70
3TNV70
3TNV76
3TNV82A
3TNV82A-B
3TNV84
3TNV88
3TNV88-B
3TNV88-U
3TNV88-Z
3TNV84T
3TNV84T-B
3TNV84T-Z
4TNV84
4TNV88
4TNV88-B
4TNV88-U
4TNV88-Z
4TNV84T
4TNV84T-B
4TNV84T-Z
4TNV94L
4TNV98
4TNV98-Z
4TNV98-E
4TNV98T
4TNV98T-Z
4TNV106
4TNV106T**

**California
Proposition 65 Warning**

Diesel engine exhaust and some of its constituents are known to the state of California to cause cancer, birth defects, and other reproductive harm.

**California
Proposition 65 Warning**

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the state of California to cause cancer and reproductive harm.

Wash hands after handling.

Disclaimers:

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Date of issue: Nov. 2009

OPERATION MANUAL	Model	TNV Series
	Code	0ATNV-G00102

YANMAR WARRANTIES

YANMAR LIMITED WARRANTY

What is Covered by this Warranty?

Yanmar warrants to the original retail purchaser that a new Yanmar TNV Series Industrial Engine will be free from defects in material and / or workmanship for the duration of the warranty period.

Note: Yanmar engines may be equipped with external components including, but not limited to: wiring harnesses, electrical devices, control panels, radiators, air filters, fuel filters, and / or exhaust systems that are supplied and / or installed by manufacturers other than Yanmar. For warranty information on such external components, please contact the machine or component manufacturer directly or see your authorized Yanmar dealer or distributor.

THIS WARRANTY IS PROVIDED IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. YANMAR SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, except where such disclaimer is prohibited by law. IF SUCH DISCLAIMER IS PROHIBITED BY LAW, THEN IMPLIED WARRANTIES SHALL BE LIMITED IN DURATION TO THE LIFE OF THE EXPRESS WARRANTY.

How Long is the Warranty Period?

The Yanmar standard limited warranty period runs for a period of **twenty-four (24) months or two-thousand (2000) engine operation hours**, whichever occurs first. An extended limited warranty of thirty-six (36) months or three thousand (3000) engine operating hours, whichever occurs first, is provided for these specific parts only: the cylinder block, cylinder head, crankshaft forging, connecting rods, flywheel, flywheel housing, camshaft, timing gear, and gear case. The Warranty Period for both the standard limited warranty and the extended limited warranty (by duration or operation hours) begins on the date of delivery to the original retail purchaser and is valid only until the applicable warranted duration has passed or the operation hours are exceeded, whichever comes first.

YANMAR WARRANTIES

Yanmar Limited Warranty - Continued

What the Engine Owner Must Do:

If you believe your Yanmar engine has experienced a failure due to a defect in material and / or workmanship, you must contact an authorized Yanmar industrial engine dealer or distributor within thirty (30) days of discovering the failure. You must provide proof of ownership of the engine, proof of the date of the engine purchase and delivery, and documentation of the engine operation hours. Acceptable forms of proof of delivery date include, but are not limited to: the original warranty registration or sales receipts or other documents maintained in the ordinary course of business by Yanmar dealers and / or distributors, indicating the date of delivery of the Yanmar product to the original retail purchaser. This information is necessary to establish whether the Yanmar product is still within the warranty period. Thus, Yanmar strongly recommends you register your engine as soon as possible after purchase in order to facilitate any future warranty matters.

You are responsible for the transportation of the engine to and from the repair location as designated by Yanmar.

To Locate an Authorized Yanmar Industrial Engine Dealer or Distributor:

You can locate your nearest authorized Yanmar industrial engine dealer or distributor by visiting the Yanmar Corp., LTD. website at:

<http://www.yanmar.co.jp> (The Japanese language page will be displayed.) For English language “click” on “English Page.”)

- “Click” on “Network” in the website heading to view the “Yanmar Worldwide Network.”
- Choose and “Click” on the desired product group.
- “Click” on the Icon closest to your region.
- “Click” on the desired country or Associate company to locate your nearest authorized Yanmar industrial engine dealer or distributor.

You may also contact Yanmar by clicking on “Inquiry” in the website heading and typing in your question or comment.

What Yanmar Will Do:

Yanmar warrants to the original retail purchaser of a new Yanmar engine that Yanmar will make such repairs and / or replacements at Yanmar’s option, of any part(s) of the Yanmar product covered by this Warranty found to be defective in material and / or workmanship. Such repairs and / or replacements will be made at a location designated by Yanmar at no cost to the purchaser for parts or labor.

Yanmar Limited Warranty - Continued

What is Not Covered by this Warranty?

This Warranty does not cover parts affected by or damaged by any reason other than defective materials or workmanship, including, but not limited to, accident, misuse, abuse, "Acts of God," neglect, improper installation, improper maintenance, improper storage, the use of unsuitable attachments or parts, the use of contaminated fuels, the use of fuels, oils, lubricants, or fluids other than those recommended in your Yanmar Operation Manual, unauthorized alterations or modifications, ordinary wear and tear, and rust or corrosion. This Warranty does not cover the cost of parts and / or labor required to perform normal / scheduled maintenance on your Yanmar engine. This Warranty does not cover consumable parts such as, but not limited to, filters, belts, hoses, fuel injector nozzles, lubricants and cleaning fluids. This Warranty does not cover the cost of shipping the product to or from the Warranty repair facility.

Warranty Limitations:

The foregoing is Yanmar's only obligation to you and your exclusive remedy for breach of warranty. Failure to follow the requirements for submitting a claim under this Warranty may result in a waiver of all claims for damages and other relief. **In no event shall Yanmar or any authorized industrial engine dealer or distributor be liable for incidental, special or consequential damages.** Such consequential damages may include, but not be limited to, loss of revenue, loan payments, cost of rental of substitute equipment, insurance coverage, storage, lodging, transportation, fuel, mileage, and telephone costs. The limitations in this Warranty apply regardless of whether your claims are based on breach of contract, tort (including negligence and strict liability) or any other theory. Any action arising hereunder must be brought within one (1) year after the cause of action accrues or it shall be barred. Some states and countries do not allow certain limitations on warranties or for breach of warranties. **This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state and country to country.** Limitations set forth in this paragraph shall not apply to the extent that they are prohibited by law.

Warranty Modifications:

Except as modified in writing and signed by the parties, this Warranty is and shall remain the complete and exclusive agreement between the parties with respect to warranties, superseding all prior agreements, written and oral, and all other communications between the parties relating to warranties. **No person or entity is authorized to give any other warranty or to assume any other obligation on behalf of Yanmar, either orally or in writing.**

Questions:

If you have any questions or concerns regarding this Warranty, please call or write to the nearest authorized Yanmar industrial engine dealer or distributor or other authorized facility.

YANMAR WARRANTIES

Yanmar Limited Warranty - Continued

Retail Purchaser Registration

It is very important for the original retail purchaser to register the Yanmar product. Registration enables Yanmar to provide the best support for your Yanmar product.

At the time of purchase, Yanmar highly recommends registering the retail purchaser's information through website <http://www.yanmar.co.jp> as soon as possible.

If it is not possible to access the website, please contact the nearest authorized Yanmar industrial engine dealer or distributor.

EMISSION SYSTEM WARRANTY

YANMAR CO., LTD. LIMITED EMISSION CONTROL SYSTEM WARRANTY - USA ONLY

Your Warranty Rights and Obligations:

California

The California Air Resources Board (CARB), the Environmental Protection Agency (EPA) and Yanmar Co., Ltd. hereafter referred to as Yanmar, are pleased to explain the **emission control system warranty** on your industrial compression-ignition engine. In California, model year 2000 or later off-road compression-ignition engines must be designed, built and equipped to meet the State's stringent anti-smog standards. In all states, 1998 and later non-road compression-ignition engines must be designed, built and equipped to meet the United States EPA emissions standards. Yanmar warrants the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel injection system, the air induction system, the electronic control system and the EGR (Exhaust Gas Recirculation) system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, Yanmar will repair your non-road compression-ignition engine at no charge to you including diagnosis, parts and labor.

Manufacturer's Warranty Period:

The model year 1998 or later certified and labeled non-road compression-ignition engines are warranted for the periods listed below. If any emission-related part on your engine is found to be defective during the applicable warranty period, the part will be replaced by Yanmar.

Engine Type	Warranty Period by Number of Years or Hours of Operation
Constant speed engines rated at or above 50 hp SAE (37 kW)	The warranty period is five (5) years or 3,000 hours of use, whichever occurs first. In the absence of a device to measure the hours of use, the engine has a warranty period of five (5) years.
Constant speed engines rated under 50 hp SAE (37 kW) with rated speeds greater than or equal to 3,000 rpm	The warranty period is two (2) years or 1,500 hours of use, whichever occurs first. In the absence of a device to measure the hours of use, the engine has a warranty period of two (2) years.
Constant speed engines rated under 50 hp SAE (37 kW) and engines rated at or above 26 hp SAE (19 kW) with rated speeds less than 3,000 rpm	The warranty period is five (5) years or 3,000 hours of use, whichever occurs first. In the absence of a device to measure the hours of use, the engine has a warranty period of five (5) years.
Engines rated at or above 26 hp SAE (19 kW)	The warranty period is five (5) years or 3,000 hours of use, whichever occurs first. In the absence of a device to measure the hours of use, the engine has a warranty period of five (5) years.
Engines rated under 26 hp SAE (19 kW)	The warranty period is two (2) years or 1,500 hours of use, whichever occurs first. In the absence of a device to measure the hours of use, the engine has a warranty period of two (2) years.

YANMAR WARRANTIES

Limited Emission Control System Warranty - USA Only - Continued

Warranty Coverage:

This warranty is transferable to each subsequent purchaser for the duration of the warranty period. Repair or replacement of any warranted part will be performed at an authorized Yanmar industrial engine dealer or distributor.

Warranted parts not scheduled for replacement as required maintenance in the Operation Manual shall be warranted for the warranty period. Warranted parts scheduled for replacement as required maintenance in the operation manual are warranted for the period of time prior to the first scheduled replacement. Any part repaired or replaced under warranty shall be warranted for the remaining warranty period.

During the warranty period, Yanmar is liable for damages to other engine components caused by the failure of any warranted part during the warranty period.

Any replacement part which is functionally identical to the original equipment part in all respects may be used in the maintenance or repair of your engine, and shall not reduce Yanmar's warranty obligations. Add-on or modified parts that are not exempted may not be used. The use of any non-exempted add-on or modified parts shall be grounds for disallowing a warranty.

Warranted Parts:

This warranty covers engine components that are a part of the emission control system of the engine as delivered by Yanmar to the original retail purchaser. Such components may include the following:

- Fuel Injection System
- Electronic Control System
- Cold Start Enrichment System
- Intake Manifold
- Turbocharger Systems
- Exhaust Manifold
- EGR System
- Positive Crankcase Ventilation System
- Hoses, belts, connectors and assemblies associated with emission control systems

Since emissions-related parts may vary slightly between models, certain models may not contain all of these parts and other models may contain the functional equivalents.

Limited Emission Control System Warranty - USA Only - Continued

Exclusions:

Failures other than those arising from defects in material and / or workmanship are not covered by this warranty. The warranty does not extend to the following: malfunctions caused by abuse, misuse, improper adjustment, modification, alteration, tampering, disconnection, improper or inadequate maintenance or use of non-recommended fuels and lubricating oils; accident-caused damage, and replacement of expendable items made in connection with scheduled maintenance. Yanmar disclaims any responsibility for incidental or consequential damages such as loss of time, inconvenience, loss of use of equipment / engine or commercial loss.

Owner's Warranty Responsibilities:

As the engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Yanmar recommends that you retain all documentation, including receipts, covering maintenance on your non-road compression-ignition engine, but Yanmar cannot deny warranty solely for the lack of receipts, or for your failure to ensure the performance of all scheduled maintenance.

Yanmar may deny your warranty coverage of your non-road compression-ignition engine if a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with applicable emissions requirements.

You are responsible for initiating the warranty process. You must present your engine to a Yanmar dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible. If you have any questions regarding your warranty rights and responsibilities, or would like information on the nearest Yanmar dealer or authorized service center, you should contact Yanmar America Corporation at 1-800-872-2867.

YANMAR WARRANTIES

EMISSION-RELATED INSTALLATION INSTRUCTIONS (REF)

Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates Federal Law (40 CFR1068.105(B)), subject to fines or other penalties as described in the clean air act.

Installation of Nonroad Engines into Equipment

To ensure engines operate under the certified configurations, Yanmar has established defined application requirements when installing any certified engine into a piece of equipment. The instructions outlined below are included in our certification process and any failure to comply will be considered tampering.

Yanmar certifies engines to operate under variable speed or constant speed conditions. Engines certified as constant speed are prohibited from installation into variable speed applications. The emission control information label will identify an engine certified as constant speed.

Allowable Air Intake Restriction and Exhaust Back Pressure

Resistance to intake airflow and exhaust gas flow is generated in the intake and exhaust systems. Exceeding the limitations will affect the operation of an engine and its certified configuration. Refer to the installation requirements and limitations of the TNV Series Application Manual for the engine being equipped with these systems.

Allowable Air Intake Restriction

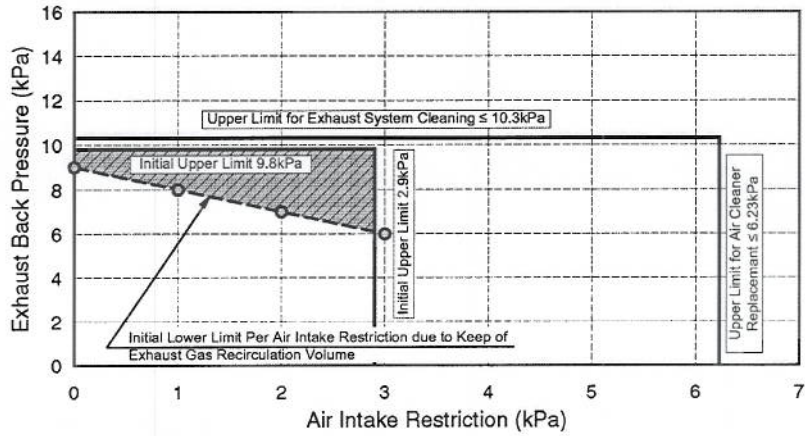
Engine Model	Allowable Air Intake Restriction ≤ kPa (mmAq)	
	Initial upper limit	Upper limit for air cleaner replacement
All TNV Models	2.94 (300)	6.23 (635)

Allowable Exhaust Back Pressure

Engine Model	Allowable Exhaust Back Pressure ≤ kPa (mmAq)	
	Initial upper limit	Upper limit for exhaust system cleaning
2TNV70	4.90 (500)	5.88 (600)
3TNV70, 3TNV76	9.81 (1000)	11.77 (1200)
3TNV82A, 3TNV84/88, 4TNV84/88, 4TNV94L, 4TNV98, 4TNV106	12.75 (1300)	15.30 (1560)
3TNV84T	7.85 (800)	9.81 (1000)
4TNV84T, 4TNV98T, 4TNV106T	9.81 (1000)	11.77 (1200)
4TNV84T-Z	Figure 1: EGR Equipped Engines	
4TNV98-E/Z	<VM>Figure 2: EGR Equipped Engines	
	<CL>Figure 3: EGR Equipped Engines	
4TNV98T-Z	Figure 4: EGR Equipped Engines	

Intake/Exhaust Pressure Allowances

4TNV84T-Z<VM>Allowable Air Intake Restriction and Exhaust Back Pressure<On The Rating>



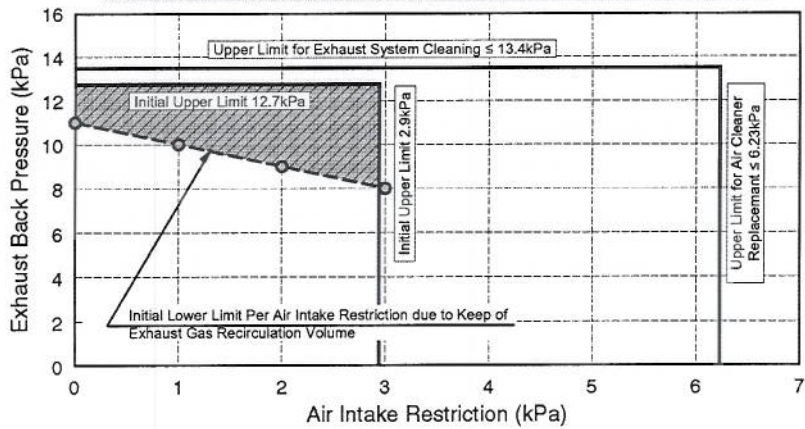
Lower Limit of Exhaust Back Pressure set by Air Intake Restriction

Air Intake Restriction (kPa)	0	1	2	3
Exhaust Back Pressure (kPa)	9	8	7	6

022182-01E

Figure 1

4TNV98-E/Z<VM>Allowable Air Intake Restriction and Exhaust Back Pressure<On The Rating>

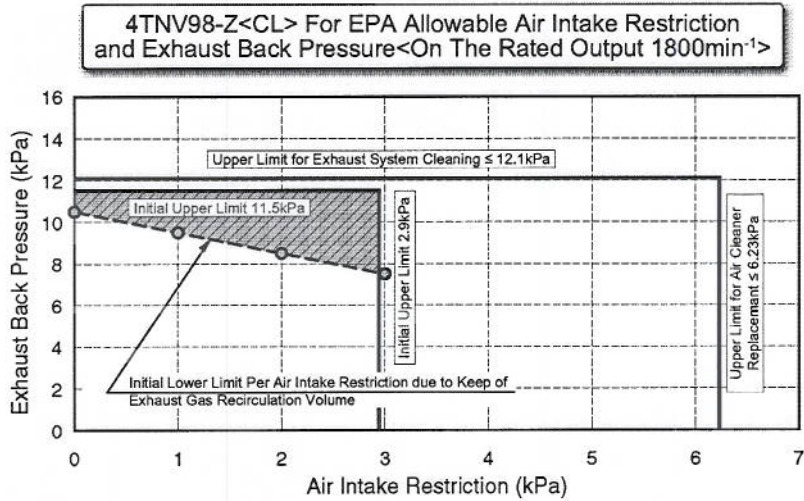


Lower Limit of Exhaust Back Pressure set by Air Intake Restriction

Air Intake Restriction (kPa)	0	1	2	3
Exhaust Back Pressure (kPa)	11	10	9	8

022183-01E

Figure 2

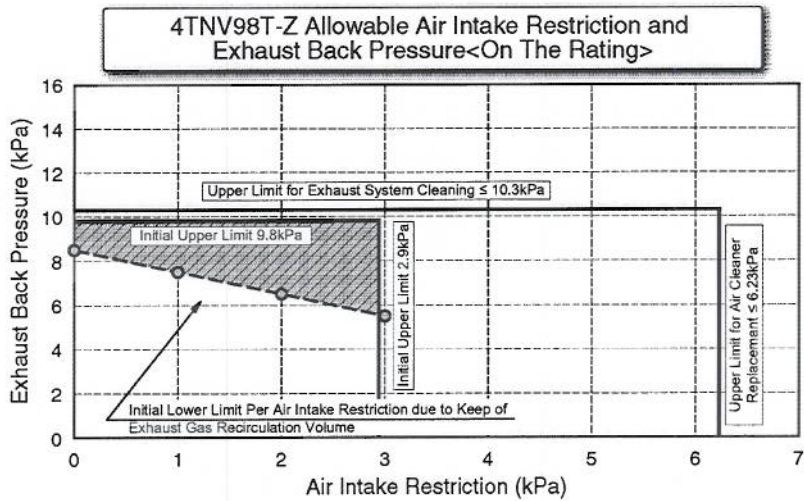


Lower Limit of Exhaust Back Pressure set by Air Intake Restriction

Air Intake Restriction (kPa)	0	1	2	3
Exhaust Back Pressure (kPa)	10.5	9.5	8.5	7.5

023286-01E

Figure 3



Lower Limit of Exhaust Back Pressure set by Air Intake Restriction

Air Intake Restriction (kPa)	0	1	2	3
Exhaust Back Pressure (kPa)	8.5	7.5	6.5	5.5

028316-00E

Figure 4

Note: EGR-equipped engines have a range of allowable intake and exhaust restrictions; a minimum and a maximum value. Larger versions of these figures are in the TNV Series Application Manual.

Breather System

Crankcase breather systems should be designed to return crankcase blow-by gas to the intake manifold-closed breather system. Yanmar's naturally aspirated engines are produced with the components completing the exhaust breather system. For turbocharged engines (excluding the variable speed 4TNV98T), the breather system components must be installed with the intake system under the following guidelines:

- Route the breather pipe from the valve cover to the return joint; avoid creasing and pitting
- The breather pipe and intake hoses must be made of oil resistant material
- The breather pipe will be installed to avoid any downward slopes that could create oil traps
- The return joint must be elevated above the outlet on the valve cover
- The return joint must be located between the air cleaner and turbocharger; ≤ 300 mm from the air cleaner
- The return joint must meet the following dimensions (mm):

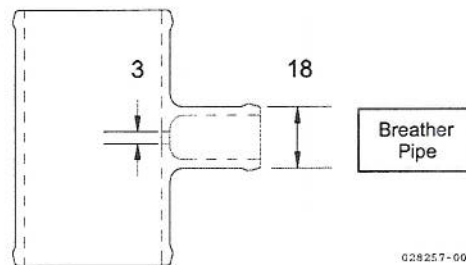


Figure 5

Yanmar offers a line of components compatible for our engines that can be used to install a crankcase blow-by return. Refer to the installation requirements of the TNV Series Application Manual for further explanation regarding application and components.

In-Use Testing Requirements

Exhaust systems should be designed so that a 20 cm (7.87 in) extension can be installed to the end of the exhaust pipe for purposes of sampling emissions. For equipment that does not allow installation of an extension pipe, a connection must be designed into the exhaust system for temporary attachment of exhaust sampling equipment. An example of an approved connection would be internally threaded with standard pipe threads of a size not larger than one-half inch, and shall be closed by a pipe-plug when not in use.

Emission Control Label

If you install the engine in a way that makes the engine's emission control information label hard to read during normal engine maintenance, you must place a duplicate label on the equipment, as described in 40 CFR 1068.105.

YANMAR WARRANTIES

Fuel Inlet Label

Unless otherwise specified, Yanmar will also provide a supplemental fuel inlet label with each certified engine for installation on the equipment. Permanently attach this label to the equipment near the fuel inlet.

Installation Evaluation

Yanmar Co. Ltd. and its regional headquarters will determine approval of applications to the guidelines of the Application Manual, including these Emission-Related Installation Instructions.

To ensure engine performance and exhaust emissions compliance Yanmar will review net rated output based on engine build, intake air restriction, exhaust back pressure, engine heat balance and any other operational characteristic required under the Engine Installation Evaluation process.

Engine Maintenance

Equipment manufacturers are responsible for relaying all emission-related service intervals to the final consumer of the product.

For equipment manufacturers who prepare their own warranty cards, owner's manuals, service manuals, operation manuals and any related documents; they must reference the emission-related service intervals and procedures indicated in Yanmar's technical documents: Warranty Statement, Operation Manual, Service Manual and Application Manual.