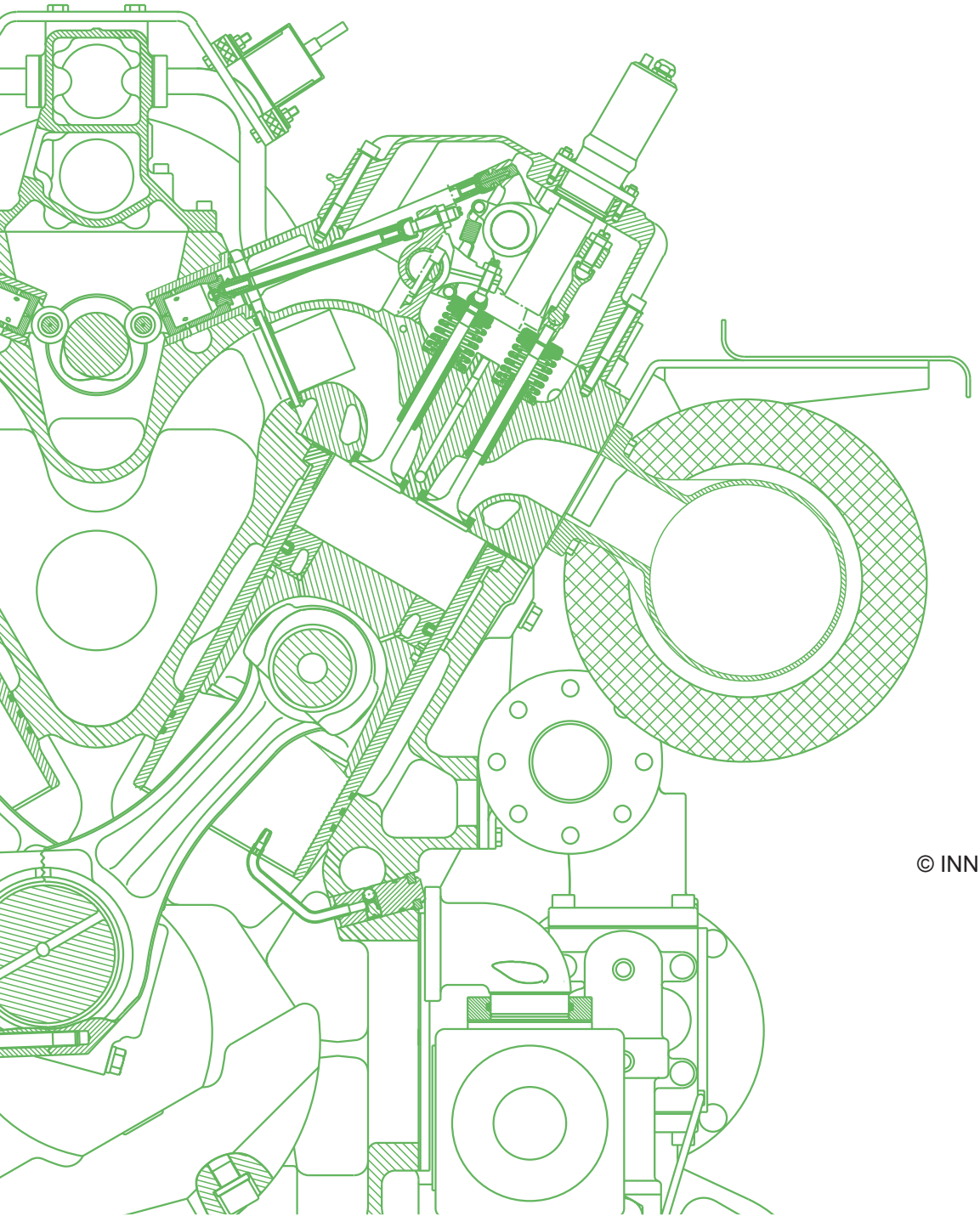
JENBACHER

TA 3100-0111

Technical Instruction

General conditions - Operation and Maintenance



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The target recipients of this document are:

Prospective Customers, Customers, Distribution Partners, Service Partners, Commissioning Partners, Subsidiaries/ Branches, Location Jenbach

NOTE

Observance of the conditions of this Technical Instruction and performance of the activities described therein is the basis of safe and efficient plant operation.

Non-observance of the conditions of this Technical Instruction and/or non-performance of the prescribed activities or any departure from the prescribed activities may result in the loss of guarantee rights.

The activities and conditions defined in this Technical Instruction shall be performed and/or observed by the plant operator. This shall not apply if this Technical Instruction is expressly allocated to the area of responsibility of INNIO Jenbacher GmbH & Co OG or a contractual agreement between the operator and INNIO Jenbacher GmbH & Co OGprovides for a different arrangement.

1 Scope

This Technical Instruction (TA) applies to all INNIO Jenbacher GmbH & Co OG high-speed diesel engines and special products, unless a modified version of this document is provided.

2 Purpose

This Technical Instruction (TA) describes the general conditions that must be observed during the operation and maintenance of INNIO Jenbacher GmbH & Co OG high-speed diesel engines.

3 Basic conditions

The boundary conditions for high-speed diesel engines as specified in Technical Instruction 1100-0110DS must be observed. The work specified in the operational-data sheet must be carried out and this sheet must be filled in correctly. All specified maintenance work must be performed regularly, expertly and on schedule. Knock-free operation must be guaranteed.

4 Cooler/heat exchanger (INNIO Jenbacher scope of supply)

When integrated into the hot water system, appropriate measures must be taken to prevent dirt or sediment building up in these components on the water side.

Refer to technical diagram and technical instructions for settings.

5 Connection Points

The requirements specified applicable TECHNCIAL DESCRIPTIONS, TECHNICAL DIAGRAM, TECHNICAL SPECIFICATION OF CONTROL SYSTEM, and INTERFACE LIST shall be fulfilled for any equipment to be supplied for each specific system.

Failure to comply with these requirements may have an adverse effect on the characteristics of the product and on its reliability of operation and, in the end, restrict or invalidate warranty claims.

6 Maintenance staff

Work on the installation may only be carried out by specialist staff having relevant electrical and mechanical training. Service contracts may be concluded with INNIO Jenbacher GmbH & Co OGsubsidiaries or authorised specialist contractors. INNIO Jenbacher GmbH & Co OG, INNIO Jenbacher GmbH & Co OG subsidiaries and service companies authorised by INNIO Jenbacher GmbH & Co OG offer long-term maintenance contracts for this.

7 Safety instructions

Always follow the safety instructions in the operator's manual. Statutory safety regulations and accident prevention rules must be observed. Before performing any maintenance work on the plant, the customer must make sure that the relevant safety instructions are being followed.

See also:

- TA 2300-0001: Employee protection
- TA 2300-0005: Safety regulations

For work which may only be carried out when the engine has been shut down, the system must be shut down as specified in TI 1100-0105 and measures must be taken to ensure that it cannot be started accidentally.

See also:

- TA 1100-0105: Engine shut-down
- TA 2300-0010 – Guidelines for Using the LOTO Kit

The operator is responsible for ensuring that the workplaces for service and maintenance work are adequately lit; additional mobile lighting must be provided if necessary.

8 Cleanliness when working on INNIO plants

- The highest cleanliness standards must always be maintained when working on INNIO Jenbacher GmbH & Co OG engines, plants and components.
- Thoroughly clean the working area before opening any engine components or parts. Remove all dirt and deposits on the outside of the engine before opening the engine.
- The ingress of dirt from outside or inside must always be prevented during all service and maintenance work. Example:
  - Deposits inside the engine or other plant components: carefully remove gasket residues or deposits from engine parts by suitable means.
  - Dirty tools:
    tools must be cleaned before use.
- Do not use rotating metal brushes inside an engine room.
- Only clean, approved and undamaged tools may be used; see TA 2300-0005: Use of recommended tools.

Components to be used or fitted in or on the engine should not be cleaned until immediately before use.

- Make sure to select the right covers and means of protection for properly carrying out the work.
- When refitting components, ensure that all covers on the outside and inside of components and lines are removed.
- Ensure before recommissioning that all systems are free of foreign bodies, dirt and loose bolts or tools.

Failure to comply with this instruction can result in serious damage to components or systems, or in personal injury!

Observe check list TA 2102-0020 when carrying out maintenance work or overhauling engines.

9 Risk assessment

The CUSTOMER is required to undertake a risk assessment to determine the measures necessary to ensure the availability and safe use of the plant and equipment and to comply to comply with all applicable regulations, standards, safety rules and laws governing the operation of the plant. The

CUSTOMER must take the necessary measures to ensure that each attendant is only provided with equipment which is suitable for the conditions pertaining at the workplace and guarantees their health and safety if used properly.

The risk assessment will cover approval, planning, assembly, commissioning, operation, maintenance, servicing, decommissioning and disposal.

The risk assessment to be performed by the CUSTOMER in accordance to applicable regulations, standards, safety rules and laws may give rise to acceptance tests, inspections and maintenance operations which are not included in the Maintenance Plan. The CUSTOMER is responsible for implementing and enforcing these additional measures.

10 Start-up conditions

All INNIO Jenbacher GmbH & Co OG high-speed diesel engines are fitted with a preheating system for the engine cooling water. Only preheated engines with a cooling water temperature of >55°C may be started, loaded and operated at full-load, otherwise engine damage may result.

11 Failures

When the installation is operational, the engine management system will not only control the engine but will also perform engine-failure management. The engine-failure management system checks all relevant system variables and will issue a warning or switch off the installation if certain set values are exceeded or underrun.

NOTE

The cause of a TRIPPING fault MUST be rectified before the plant is restarted.

If a failure results in a WARNING being issued, the cause of the failure MUST BE rectified first before the failure is reset.

Failure to do this may result in serious damage to the system and may also invalidate any warranty claim.

Shut down the engine in accordance with Technical Instruction no. 1100-0105 and secure it against unauthorised restarting in accordance with Technical Instruction 2300-0010.

Critical Messages

If the system shuts down with a critical message, the cause of the failure must be rectified first before the failure is reset. The list of critical messages can be found in chapter “Failure Checklist” in the DESCRIPTION / OPERATION book. If one of these messages appears, contact your GE service partner immediately

Remote acknowledgement

Based on the risk category selected by the customer (0-4), trip faults can be acknowledged using remote access to the display system (max. 5 times every 6 hours' running under load).

Failures:	Diane No.:	National restrictions	Risk category
Misfiring failure	1047, 3005 - 3024		0
Cooling water temperature high	1021	*	0
Room temperature high	1135	*	0
Failure of auxiliary equipment	1129		0
Synchronising failure	1039		0

Failures:	Diane No.:	National restrictions	Risk category
Heating water supply temperature high	1063		0
High fuel temperature	1619 - 1621		0
Low fuel temperature	1622 - 1624		0
Low fuel pressure	1625 - 1627		0
Leak in High Pressure Rail System	1656		0
Mechanical Relief Valve Failed. Rail Overpressure Rail Overpressure	1663		0
Problem in High Pressure Fuel System	1657		0
Engine Shutdown due to fuel metering valve flow greater than injector flow	1659		0
Engine operation conditions missing	1025		1
Start up failure	1023	*	1
Oil temperature high	1043		1
Malfunction of engine cooling water pump	1090		1
Generator frequency too low.	1110		1
Actual generator power measuring signal failure	1113		1
Speed measuring signal failure	1120		1
Charge temperature maximum	1040		2
Charge temperature fluctuation speed maximum	1105		2
Engine oil level low	1018		2
Generator reverse power	1038		2
Cylinder exhaust gas temperature deviation from average value high	1044		2
Cylinder exhaust gas temperature high excess over absolute value	1049		2
Cooling water pressure high	1050		2
Generator loss of excitation	1109		2
Neutral current high	1112		2
Engine oil level low	1018		2
Generator reverse power	1038		2
Cylinder exhaust gas temperature deviation from average value high	1044		2
Cylinder exhaust gas temperature high excess over absolute value	1049, 2001 – 2020		2
Cooling water pressure high	1050		2
Generator loss of excitation	1109		2
Neutral current high	1112		2
Deviation cylinder 1 high excess over absolute value	2001		2
Deviation cylinder X from average high positive deviation	2021 - 2040		2
Deviation cylinder X from average high negative deviation	2041 - 2060		2
Oil pressure low	1017		3

Failures:	Diane No.:	National restrictions	Risk category
Power signal missing	1041		3
Oil filter differential pressure high	1059		3
All other faults not listed in risk categories 0 – 3.			4

Due to national restrictions, risks listed in category 0 and 1 may be promoted to category 4 risks.

Single or multiple acknowledgements of all other trip faults without remedying the cause first will result in a considerable potential risk of injury or damage. The CUSTOMER will be entirely liable for such injury or damage.

12 Recording operational data, maintenance record sheet

All operational data must be recorded, together with detailed descriptions of any events or incidents deviating from normal operation.

Note:

Merely recording the facts in writing is not enough. Data must be compared with commissioning data to ensure that they are identical. In the event of deviations such as abnormal noises, a rise or fall in observed parameters, etc., the cause must be ascertained in full and remedied. If no cause can be found, the INNIO Jenbacher GmbH & Co OG Customer Service must be informed without delay.

It is in the CUSTOMER'S best interests to maintain and record operational data (maintenance record sheet, operational data journal, data recorded in the Maintenance folder). Properly maintained operational data journals and data record sheets are important documents, enabling analysis and support in case of failures. Moreover, these documents are also important when deciding on warranty claims.

13 Spare parts

Only original INNIO Jenbacher GmbH & Co OG spare parts (particularly oil filters!) should be used. Warranty claims in respect of defects and damage will be invalidated by the use of non-original spare parts.

Important: In order to avoid unscheduled downtimes due to maintenance work, it is strongly recommended that a stock of spare parts be held.

14 Lubricating oil

The lubricating oil in INNIO Jenbacher GmbH & Co OG high-speed diesel engines must be changed depending on its condition. INNIO Jenbacher GmbH & Co OG does not issue any guaranteed fixed oil change intervals. It is the CUSTOMER'S responsibility to take all necessary measures and initiate the corresponding actions to ensure the protection and safe operation of the plant and guarantee the plant's availability.

The oil service life (depending on fuel quality, mean pressure, engine type, oil consumption, oil temperature and oil type) can be prolonged by fitting an additional oil tank. If premature wear is claimed, the results of the lubricating oil analysis, subject to the limit levels laid down in Technical Instruction No. 3000-0099B, must be presented in full, even after the warranty period has expired.

15 Elastomer components

Elastomer components age and become brittle, even when engines are not operational. That is why the service life of these components does not depend solely on the length of time for which the module has been in service, the cooling water temperature and pressure, etc. With a normal running time of 5,000-6,000 operating hours annually and a maximum cooling water temperature of 90°C, all elastomer

components are replaced at the normal intervals as described in the maintenance plan. If this number of operating hours is not reached, the elastomer components (e.g. O-rings on cylinder liners, flexible coupling, etc.) should still be replaced as a precautionary measure after a maximum of 5 years.

16 Decommissioning the plant

When prolonged scheduled or unscheduled downtimes occur, engine plants must be prepared for their standstill time (preservation, change old lubricating oil, close off the flue connection, etc.) according to their geographical location (climate, proximity to the sea, etc.)

As conditions can vary enormously, we recommend that you consult a suitable specialist firm concerning the measures to be taken or contract it to carry out the work.

Of course, before recommissioning the plant, you must make sure that it is back in its normal operational condition.

17 Welding work on the module

Always make sure to attach the negative pole as close as possible to the weld location when carrying out welding work on the module – not on the mass connection (earth cable) though.

Before any welding work is carried out on the generating set, the ignition rail must be removed to prevent any possible damage to it and it must be stored in a dry place. The ignition rail may not be refitted and correctly connected until the welding work on the generating set has been completed.

18 Components coming into contact with exhaust gas

All parts that come into contact with exhaust gas are state-of-the-art materials with a specified service life. Due to the different operating modes and different fuel contents (including traces of harmful substances), no binding guarantee can be given on the service life of components such as the exhaust manifold, etc. Where silencers are situated in the open air without external heat insulation, condensate (acid, water) can occur even in installations without heat exchangers (hot exhaust gases) and shorten the service life. This also applies to silencers with internal insulation, where the temperature in the rock wool insulation can fall below the dew point.

19 Consumables

The service life and safe operation of the plant depend to a considerable extent on the operating materials used. Only use operating materials such as diesel, engine cooling water, warm water, anti-freeze agent, anti-corrosive agent, lubricating oil, etc. as specified in the respective INNIO Jenbacher GmbH & Co OG Technical Instructions.

20 Diesel Fuel Quality

The operator is under an obligation to use diesel fuel that meets the specifications of TA 1000-0001 - Fuel Quality - Diesel Fuel. If these values differ from the values stipulated in the contract, immediate measures must be taken by agreement with the INNIO Jenbacher GmbH & Co OG customer service department.

21 Maintenance Intervals

The intervals stated in the maintenance schedule are average empirical values. Where operational problems or a lack of maintenance occur (such as inadequate oil management, large accumulations of dust or other problematic circumstances), maintenance operations may well have to be carried at far shorter intervals than those specified.

The CUSTOMER must take all these influences into account when setting the maintenance intervals.

If during the daily inspection - particularly during the warranty period - irregularities occur, such as abnormal noises, etc., the CUSTOMER must take mitigating measures to minimise any damage (e.g. shut down the engine at once, determine and rectify the cause, and/or inform the INNIO Jenbacher customer service department).

The CUSTOMER must be aware that any impending maintenance work must be carried out before the maintenance interval is reached in order to prevent trips or interruptions to operation (e.g. during the heating period). Maintenance intervals may not be extended to avoid downtime during the heating season.

22 Documents from original equipment manufacturers

The customer documentation from INNIO Jenbacher GmbH & Co OG contains documents from the original equipment manufacturers for certain bought-in parts in addition to INNIO Jenbacher GmbH & Co OG documents.

The following must be observed in relation to this:

- The appropriate information and documents from the original equipment manufacturer are taken into account when drawing up INNIO Jenbacher GmbH & Co OG documentation.
- In the event of discrepancies between INNIO Jenbacher GmbH & Co OG documents and enclosed documentation from the original equipment manufacturer, the documentation from INNIO Jenbacher GmbH & Co OG shall take priority (including any appropriate Technical Instructions, maintenance plans and maintenance etc.)
- Any documents from the original equipment manufacturer that are provided are supplementary to the INNIO Jenbacher GmbH & Co OG documentation and should be observed in addition to this.

23 Revision code

Revision history

Index	Date	Description / Revision summary	Expert *Auditor*
3	15.04.2019	GE durch INNIO ersetzt / GE replaced by INNIO	**Opoku** *Pichler R.*
2	27.05.2015	Ergänzung „Klassifizierung – Potenzieller Kunde“ / Additional „Classification - Prospective Customers“	**Bilek** *Kelly*
1	02.12.2014	Erstausgabe / First issue	**Bacher A.** *Rocha V.*