



TA 1530-0192

Technical Instruction

P3 spark plugs



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1 Scope

This Technical Instruction (TA) applies to the following Jenbacher Gas Engines:

- Type 2 engines
- Type 3 engines
- Type 4 engines

when using spark plugs of type P3.

2 Purpose

This Technical Instruction (TA) describes the use of P3 spark plugs.

3 Safety information

WARNING



Danger from unauthorised start-up!

- Shut down the engine as described in TA 1100-0105.
- Secure the engine against unauthorised restarting in accordance with TA 2300-0010.



WARNING



Personal injury

Failure to use personal protective equipment and comply with safety instructions or employee protection information may lead to personal injury.

- Wear the relevant personal protective equipment (PPE).
- Observe the safety instructions as per TA 2300-0005.
- Observe the employee protection information as per TA 2300-0001.

4 Additional information

Relevant documents:

TA 1100-0105 – Engine shut-down

TA 2300-0001 – Employee protection

TA 2300-0005 – Safety instruction

TA 2300-0010 – Guidelines for using the LOTO kit

5 Setting values for spark plugs



ATTENTION



Maximum ignition voltage requirement

The ignition voltage requirement stated below must (at full load) not be exceeded under any circumstances. This could lead to voltage flash-overs at the engine. In addition, the maximum design voltage of the components is exceeded. This may result in damage to engine components.

- Observe the maximum ignition voltage.

Spark-plug type	Engine type	NOx [mg/Nm ³]	Gas type	Ignition voltage requirement [< kV]	Spark plug setting guideline value: Electrode gap [mm]	Spark plug tightening torque in cylinder head [Nm]
P3V3i	2, 3, 4	250 - 500	All	32	0.35	40
P3.V3	2, 3, 4	250 - 500	All	32	0.35	40
P3.V5	2, 3, 4	250 – 500	With biogases, wood gas, pyrolysis gas, process gas if the P3.V3 spark plug exhibits severe corrosion	32	0.35	40
			 <i>P3V3i</i>  <i>P3V3N1</i>			

6 Wear signs, and adjusting the spark plugs

NOTE



Insulator nose breakage

Make sure not to leave the feeler gauge between the spark plug electrodes when adjusting the electrode gap, as the pressure could be transferred to the central electrode, possibly causing the nose of the spark-plug insulator to break.

- Only use the feeler gauge for checking the electrode gap and not for anything else.
- Only the setting tool included with the device may be used to set the electrodes.

6.1 Analysing used spark plugs

6.1.1 Premature sparking / overheating

Electrode condition (spark plug photo):

Melting beads and metallic deposits near electrode.



Type: P3.V3 or P3.V5

Type: P3.V3 or P3.V5

Possible causes	Results / effects	Remedial measure
Too much gas when starting the engine	Spark plug electrodes melt.	Check the gas mixer/TecJet setting (reduce/adjust the gas quantity).
The spark plug is insufficiently tightened.		Visual inspection of the spark plug sleeve (thread).
Early sparking due to defective ignition box.		Inspect ignition box and replace if necessary.
Combustion knocking causing electrode to overheat.	Power reduction followed by engine damage.	Installing a new spark plug. Clean piston and cylinder head local to combustion room.
Defective valves.	Possible spark plug insulator cracking due to overheated central electrode.	Fit new valves.
Auto-ignition due to deposits.		Clean and adjust the spark plug, replace if necessary.
Incorrectly set LEANOX.		Re-adjust LEANOX and re-establish control for entire load range.

6.1.2 Faulty noble metal electrode

Electrode condition (spark plug photo):

At one or more earth electrodes – loss of the precious metal.



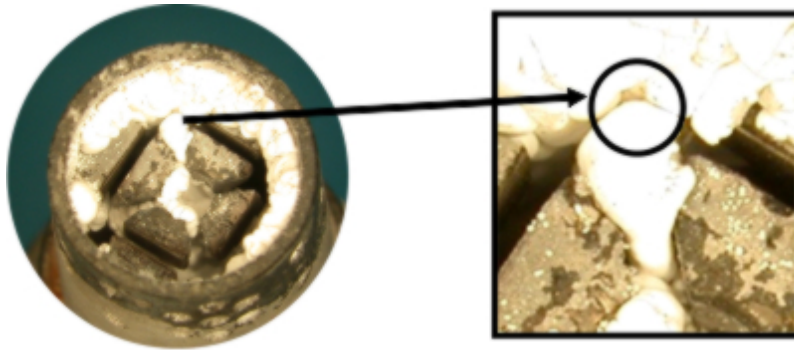
Missing noble metal

Possible causes	Results / effects	Remedial measure
Too much sulphur or ammonia in the fuel gas (see TA 1000-0300).	Ignition voltage increases sharply when several electrodes fail. Noble metal residues can get stuck between valve and valve seat, causing damage (valve burn-through). This can cause auto-ignition.	Use the right spark plug type.

6.1.3 Silicon and combustion deposits

Electrode condition (spark plug photo):

Massive silicon and combustion deposits near the electrodes and the whirl chamber.

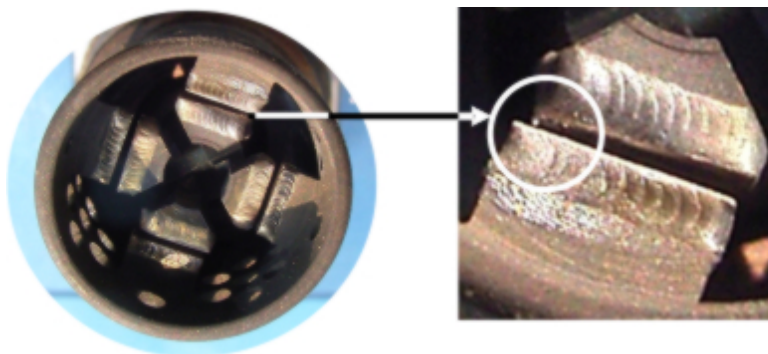


Possible causes	Results / effects	Remedial measure
Silicon values (see TA 1000-0300). Increased oil consumption. Poor blow-by oil separation. Defective piston rings.	Ignition voltages decrease until the cylinder fails. Deposits can flake off, resulting in auto-ignition.	Installing a new spark plug. Carefully clean the spark plug electrodes.

6.1.4 Electrode short-circuit

Electrode condition (spark plug photo):

Thread formation (molten conductive noble metal) between central and earth electrode.



Possible causes	Results / effects	Remedial measure
Insufficient distance between electrodes. Incorrect spark-plug type. Wrong ignition timing (plug overheats). Combustion knocking (spark-plug overheating).	Continuously decreasing ignition voltages until the cylinder in question fails completely (no more combustion): Exhaust gas temperature drops far below average value.	The cleaning can often be confined to a simple removal of the pearls/threads with the feeler gauge. Adjust the electrodes correctly (see the following section). Adjust electrode distance using feeler gauge. Check the engine settings.

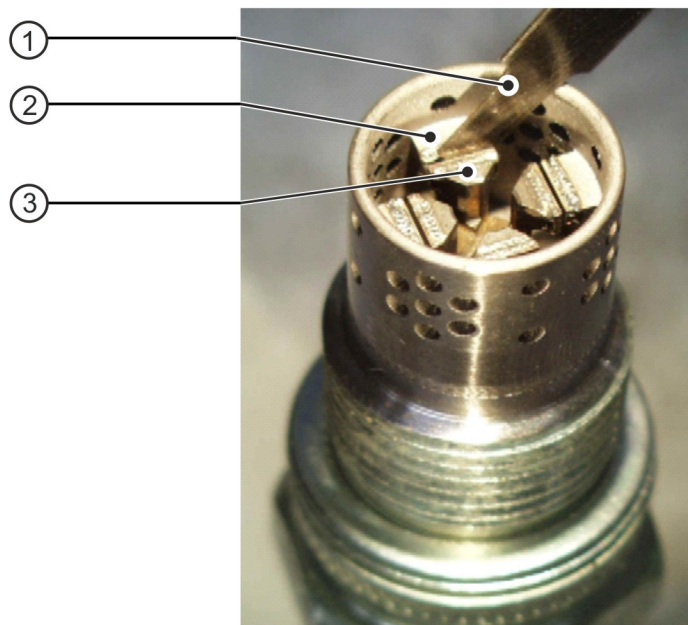
6.2 Adjusting the spark plugs

6.2.1 P3.V3 and P3.V5 spark plugs

Signs of wear/adjustment:

Measure the electrode gap with the feeler gauge provided. Select the gauge marked 0.35 mm. This gauge should just fit between the two electrodes when a spark plug is ideally adjusted.

If the gap between the earth electrode and the central electrode is greater than 0.35 mm, it must be corrected using the adjustment tool. Apply the tool tangentially to the ground electrode at exactly the height of central electrode. When the tool is pressed together, the central electrode is bent towards the earth electrode. Measure the gap again with a feeler gauge after adjusting it. If the gap is still too large, repeat the procedure.



①	Feeler gauge	③	Central electrode
②	Earth electrode		

6.2.2 P3V3i spark plugs

attributes/readjustment:

The spark plug P3V3i is a further development of the P3.V3 model. It achieves up to 0.2% more electrical efficiency. The centre electrode is made of a single component, which has the advantage compared to the P3.V3 that the individual "feet" can no longer break so easily during service. The screen is manufactured with a different hole pattern (slots). These slots allow the electrodes to be readjusted via the screen using the same adjustment tool as for the spark plug P7N1.

Measure the electrode gap with the feeler gauge provided. Select the gauge marked 0.35. This gauge should just fit between the two electrodes when a spark plug is ideally adjusted.

If the gap between the earth electrode and the central electrode is greater than 0.35 mm, it must be corrected using the adjustment tool. Apply the tool tangentially to the ground electrode at exactly the height of central electrode. When the tool is pressed together, the earth electrode is bent towards the central electrode. Measure the gap again with a feeler gauge after adjusting it. If the gap is still too large, repeat the procedure.



7 Revision code

Revision history

Index	Date	Description / Revision summary	Expert Auditor
3	10.04.2019	GE durch INNIO ersetzt / GE replaced by INNIO	Opoku <i>Pichler R.</i>
2	28.09.2018	Strukturelle Anpassungen / Structural adaptations Neue Zündkerzen P3V3i und P3V3N1 hinzugefügt / New spark plugs P3V3i and P3V3N1 added	Mai T. <i>Kopecek H.</i>
1	12.06.2015	Erstausgabe / First issue	Provin <i>Mai, Perger</i>

