



TA 1000-0200

Technical Instruction

Cooling water quality



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NOTE

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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 OG provides for a different arrangement.

1 Scope

This Technical Instruction [TA] applies to the following Jenbacher Engines:

- Type 2 engines
- Type 3 engines
- Type 4 engines
- Type 6 engines
- Type 9 engines

with closed primary circuits (engine cooling circuit).

2 Purpose

This Technical Instruction [TA] describes the guidelines and procedures that keep the coolant in a serviceable condition.

It covers the following points:

- Anti-freeze and anti-corrosion product selection overview
- Base water quality
- Checking the cooling water
- Completing the sample report sheet

Failure to observe the guidelines and procedures described in this Technical Instruction may lead to unplanned maintenance work and its associated additional costs.

3 Additional information

An aqueous solution is used as the cooling water in Jenbacher Engines. This consists of the base water and the anti-corrosion additive, plus an anti-freeze agent (propylene glycol / ethylene glycol) if required.



Premixed ready-made products (ready-to-use mixture) are recommended by Jenbacher.

These products already contain the required amount of frost protection and a sufficient amount of corrosion protection, diluted with the appropriate quality of base water.

Further dilution of a premixed ready-made product or mixing with other coolant additives is inadmissible.

If premixed products are not used, Jenbacher recommends mixing the base water and additives outside the engine in order to achieve the optimal mixture ratio.

If premixed products are used, verification of the quality of the base water is not necessary.

Products not or no longer mentioned in this Technical Instruction are not necessarily unsuitable for Jenbacher Engines. However, the data or test methods necessary to assess their suitability are not available.

Use of such products is under the operator's own responsibility.

The analysis reports must be documented and kept by the customer, and made available to Jenbacher on request.

If the values lie outside of the specified range, the product must be brought within the specified range or replaced, in accordance with anti-freeze/anti-corrosion manufacturer's instructions.

Failure to adhere to the specified limit values may lead to corrosion and cause further serious damage.



If the corrosion inhibitors in the cooling water are used up, the danger of corrosion is significantly higher than with pure water. The cooling water must therefore be tested regularly to check that the anti-freeze and anti-corrosion are adequate and that the water quality is suitable (for the intervals, see W 8080 A0).



If additional maintenance needs to be carried out to the cooling water circuit which may cause dirt contamination of the cooling water, an analysis of the cooling water must be performed in accordance with this Technical Instruction as a precaution.

Laboratories for cooling water analysis:

- Spectro/ Jet-Care: recommended by Jenbacher

Other product-specific laboratories/analysis systems:

- ALcontrol Laboratories
Contact: barbara.monse@alcontrol.com
Address: Oberstrasse 16, D-06632 Freyburg (Unstrut)
- BayWa AG – Analytik-Service
Contact: analytik-service@baywa.de
Address: Max-von-Laue-Str.12, 97080 Würzburg
Tel.: +49 (0)931-99 172 440
Fax: +49 (0) 89 921248 17
- OELCHECK GmbH
Contact: info@oelcheck.de
Address: Kerschelweg 28, D-83098 Brannenburg
Tel.: +49 8034 9047 210

Cooling water analyses by the coolant manufacturers are also permissible, provided at least that the analysis program is carried out in accordance with this Technical Instruction.

Relevant documents:

TA 1000-0112 – Taking lubricating oil samples / lubricating oil sampling protocol (Registering with Spectro/Jet Care)

W 8080 A0 – Engine – cooling water circuit / Mixture recirculating water (Intervals – Cooling water analysis/sampling locations)

W 8080 A9 – Cooling water (Intervals – Cooling water analysis/sampling locations)

4 Anti-freeze and anti-corrosion product selection overview

Anti-freeze products – selection overview

Company	Product name	Concentration/temperature
Texaco/Chevron/Caltex	Havoline XLC 40/60	40%/-30°C
Texaco/Chevron/Caltex	Havoline XLC	40%/-30°C
Arteco	Havoline XLC 40/60	40%/-30°C
Arteco	Havoline XLC	37%/-27°C
Total	Glacelf CHP Supra	20%/-7°C
Total	Coolelf CHP Supra	20%/-7°C
Total	Glacelf Supra	40%/-26°C
Total	Coolelf Supra	40%/-26°C
BASF	Glysantin G48	37%/-27°C
Mobil	Antifreeze Extra Concentrate	37%/-27°C
Castrol	Radical NF	37%/-27°C
Lukoil (OMV)	Coolant Plus	37%/-27°C
Lukoil	Antifreeze HD G11	37%/-27°C
Deicer	E	37%/-27°C
Fuchs Petrolub SE	Maintain Fricofin	37%/-27°C

Company	Product name	Concentration/temperature
Härtol	FrostoxW206	37%/-27°C
Cepsa	XTAR Super Coolant Hybrid NF	37%/-27°C
Kuwait Petroleum	Q8 Antifreeze LL	37%/-27°C
Kuwait Petroleum	Q8 Mahler Cool	37%/-27°C
Kuwait Petroleum	Q8 Antifreeze LL 4060	40%/-30°C
ROLOIL	ROL-ICE SNF 4060	40%/-30°C
Engen	Antifreeze and Summer Coolant	37%/-27°C
Valvoline	Zerex G48	37%/-27°C
Addinol	Antifreeze Extra 40/60	40%/-30°C
Addinol	Antifreeze Extra	40%/-30°C
Gazprom neft	G-Energy Antifreeze NF	37%/-27°C

Anti-corrosion products – selection overview

Company	Product name	Concentration
GE	Corrshield NT4201	0.6 to 1%
Texaco/Chevron/Caltex	Havoline XLI	5 to 10%
Arteco	Havoline XLI	5 to 10%
NALCO	Nalco2000	3 to 4%
DREW AMERIOD	Maxigard	1.6 to 2%
Coracon	BL1	4 to 6%
	BL6	3 to 6%
Total	WT Supra	5 to 10%

5 Base water quality

The following table describes the water quality required for mixing anti-freeze and anti-corrosion agents, unless otherwise specified by the product manufacturer:

Analysis value	Unit	Permissible range
Appearance	-	Clear, free of sediment and suspended matter
Odour	-	Neutral
pH value at 25°C	-	6,5 - 7,5
Total Hardness (CaCO ₃)	°dH ppm	< 15 < 250
Calcium	mg/l	< 100
Sulphates	mg/l	< 100
Chloride	mg/l	< 80
Iron	mg/l	< 0.2
Zinc	mg/l	< 0.1
Fluorides	mg/l	< 20
Electrical conductivity	µS/cm	< 500

Rainwater, brackish water, sea water and condensate do not possess the required properties without appropriate treatment.

You must exercise great care and be very precise when carrying out the water analysis.

Because of the minute quantities of substances in the water, with an order of magnitude of less than 0.1% and in some cases even less than 0.01%, a water analysis is similar to a chemical trace analysis and therefore requires very sensitive detection methods.

Always use uniform units of measure to indicate the concentrations of substances in the water.

The most common units are "mg/l" or "g/l" or "µg/l".

6 Checking the cooling water

6.1 Interval



For the analysis interval, see W 8080 A0 or W 8080 A9 – Maintenance Interval section.

6.2 Checking the anti-freeze products

If water with the properties required in the ⇒ Base water quality section is mixed with anti-freeze or anti-corrosion products, the pH, hardness and conductivity values will automatically change.

The engine cooling water must therefore be checked in accordance with the tables below. If all values lie within the specified range, the cooling water may continue to be used. If this cannot be realised using appropriate methods, replace the cooling water.

Classification of the coolant products is necessary due to the range of product compositions and the resulting different permissible ranges. The numbering of the different groups is not a classification in terms of performance or quality.

Scope and permissible ranges of the engine cooling water analysis:

All groups

Parameter	Permissible range
Appearance	Clear, slightly opaque, small amount of sediment
pH value at 25°C	≥ 7,5
Iron [ppm]	0 – 7
Copper [ppm]	0 – 5
Aluminium [ppm]	0 – 5
Lead [ppm]	0 – 5

6.2.1 Group 1

Product	
Company	Product name
Addinol	Antifreeze Extra 40/60
Addinol	Antifreeze Extra
Arteco	Havoline XLC 40/60
Arteco	Havoline XLC
Texaco/Chevron/Caltex	Havoline XLC 40/60
Texaco/Chevron/Caltex	Havoline XLC

Parameter	Permissible range
Sodium [ppm]	1400-2000
Boron [ppm]	<1
Molybdenum [ppm]	<1
Potassium [ppm]	0-50
Nitrate [ppm]	0-20
Nitrite [ppm]	1-20
Freezing point [°C] / glycol [%]	-25 to -30 / 35-40

6.2.2 Group 2

Product	
Company	Product name
BASF	Glysantin G48
Castrol	Radical NF
Cepsa	XTAR Super Coolant Hybrid NF
Deicer	E
Engen	Antifreeze and Summer Coolant
Fuchs Petrolub SE	Maintain Fricofin
Gazprom neft	G-Energy Antifreeze NF
Hartöl	FrostoxW206
Kuwait Petroleum	Q8 Antifreeze NL
Kuwait Petroleum	Q8 Mahler Cool
Kuwait Petroleum	Q8 Antifreeze LL 4060
Lukoil	Antifreeze HD G11
Lukoil (OMV)	Coolant Plus
Mobil	Antifreeze Extra Concentrate
ROLOIL	ROL-ICE SNF 4060
Valvoline	Zerex G48

Parameter	Permissible range
Sodium [ppm]	2000-2500
Boron [ppm]	-300 to -500
Molybdenum [ppm]	<1
Potassium [ppm]	80-120
Nitrate [ppm]	800-1000
Nitrite [ppm]	0-20
Freezing point [°C] / glycol [%]	-25 to -30 / 35-40

6.2.3 Group 3

Product

Company	Product name
Total	Coolelf CHP Supra
Total	Glacelf CHP Supra

Parameter	Permissible range
Sodium [ppm]	4200-4600
Boron [ppm]	<1
Molybdenum [ppm]	<1
Potassium [ppm]	0-50
Nitrate [ppm]	0-20
Nitrite [ppm]	1-20
Freezing point [°C] / glycol [%]	-6 to -8 / 15-17

6.2.4 Group 4

Product

Company	Product name
Total	Coolelf Supra
Total	Glacelf Supra

Parameter	Permissible range
Sodium [ppm]	2800-3500
Boron [ppm]	<1
Molybdenum [ppm]	<1
Potassium [ppm]	0-50
Nitrate [ppm]	0-20
Nitrite [ppm]	1-20
Freezing point [°C] / glycol [%]	-25 to -30 / 35-40



Exhaust gas heat exchanger

If the exhaust gas heat exchanger is not included in the Jenbacher scope of supply, its manufacturer must be contacted if there is a risk of frost in order to determine the cooling water requirements. The specifications of the exhaust gas heat exchanger manufacturer must be adhered to.

6.3 Checking the anti-corrosion products

If anti-freeze will definitely not be needed in the cooling water, an anti-corrosion agent alone may be added to the cooling water.

Scope of analysis and admissible ranges for coolants with Corrshield NT4201, Nalco2000 and Maxigard corrosion inhibitors:

Parameter	Unit	Corrshield NT4201	Nalco2000	Maxigard
		Limit values	Limit values	Limit values
Iron	ppm Fe	< 3	< 3	< 3

		Corrshield NT4201	Nalco2000	Maxigard
Copper	ppm Cu	< 0.2	< 0.2	< 0.2
pH	-	8.0 – 9.5	11.0 – 12.0	9 – 10
Nitrite	ppm NO ₂	1000 - 1200	1000 - 1200	700 - 900
Nitrate	ppm NO ₃	Document	Document	Document
Ammonia	ppm NH ₃	<3	<3	<3
Electrical conductivity	µS/cm	Document	Document	Document
Total hardness	ppm CaCO ₃	< 20	< 20	< 20
Chloride	ppm Cl	< 150	< 150	< 150
Sulphates	ppm SO ₄	< 150	< 150	< 150
Quartz	ppm SiO ₂	< 200	< 200	< 200

Test standards for coolants with Corrshield NT4201, Nalco2000 and Maxigard corrosion inhibitors:

Conductivity		EN 27888(C8)
pH		DIN 38404-C5
Chloride [ppm]	EPA Method 9056A	EN ISO 10304-1
Nitrite [ppm]	EPA Method 9056A	EN ISO 10304-1
Phosphate [ppm]	EPA Method 9056A	EN ISO 10304-1
Nitrate [ppm]	EPA Method 9056A	EN ISO 10304-1
Iron [ppm]	EPA 200.8	EN ISO 11885 (E22)
Calcium [ppm]	EPA 200.8	EN ISO 11885 (E22)
Silicon [ppm]	EPA 200.8	EN ISO 11885 (E22)
Boron [ppm]	EPA 200.8	EN ISO 11885 (E22)
Aluminium [ppm]	EPA 200.8	EN ISO 11885 (E22)
Copper [ppm]	EPA 200.8	EN ISO 11885 (E22)
Magnesium	EPA 200.8	EN ISO 11885 (E22)
Sulphates	EPA Method 9056A	EN ISO 10304-1

7 Sampling



For the detailed sampling as well as part numbers of the water sample containers for the laboratory recommended by Jenbacher, see W 8080 A0 or W 8080 A9 – Cooling water analysis section.

7.1 Completing the sample report sheet

Only sample report sheets completed correctly and in full will ensure that the analysis is clearly allocated to the right engine.

The following is mandatory information to be included on the sample report sheet:

Data	Note	Where to find
Site name	Project name, address	Supplied by the operator

Data	Note	Where to find
Engine number	7-digit number	On the plant type plate – see the Appendix. The system type plate is located on the frame of the module.
UZ number (design number, ID number)	J XXXX	On the cover sheet of the site documentation – see Appendix.
Jenbacher / Spectro ID number		Supplied by the customer
Module type	JMS XXX GS – X.X	On the plant type plate – see the Appendix. The system type plate is located on the frame of the module.
Engine operating hours	Total operating hours since commissioning	On the DIA.NE display
Operating hours since last water change		Specified by the operator. Must be recorded in operational data sheet E0101 – refer to the maintenance manual for the plant concerned.
Coolant product	Consists of the name of the manufacturer and the name of the specific product	Specified by the operator.
Sample date		

7.2 Registering plants and engines

It is essential to register plants and engines for coolant analyses, preferably at the time of commissioning the engines. This procedure is necessary so that the laboratory can allocate the samples to the correct plant (for how to register with Spectro/Jetcare, see TA 1000-0112 – Registering plants and engines section).



If an engine has already been registered for a used oil analysis, no additional registration for the coolant analysis is required.

8 Appendix

Oil/Coolant Analysis for Jenbacher gas engines	
Site name	①
Serial number	②
UZ / Design / Identification number	③
Type	④
Spectro/Jet-Care unique number	⑤
Engine operating hours	⑥
Oil/Coolant brand	⑦
Hours since last Oil/Coolant change	⑧
Date of last Oil/Coolant change	⑨
Top up since last Oil/Coolant change	⑩
Sample date (dd/mm/yy)	⑪

Sampling accompanying certificate

Generating Set ISO 8528		JMS XXX GS-X.X	
JENBACHER <small>INNIO Jenbacher GmbH & Co OG Achenseestraße 1-3</small> Type _____ Serial No. _____ Year of manufacture _____ Rated power _____ COP _____ kW Rated power factor _____ Maximum site altitude of installation _____ m Max. ambient temperature (intake air) _____ °C Rated frequency _____ Hz Rated voltage _____ V Rated current _____ A Mass _____ kg Performance class _____ GZ CE		Description / Operation Combined Heat and Power Module EASTER BUSH Engine number: XXXXXX Module number: XXXXXX © INNIO Jenbacher GmbH & Co OG Achenseestraße 1-3 A-6200 Jenbach, Austria www.innio.com JENBACHER <small>INNIO</small>	

System type plate

Engine description cover sheet

①	Plant name	⑦	Name of cooling water/oil
②	Engine number	⑧	Operating hours since last cooling water change/oil change

③	UZ number (design number, ID number)	⑨	Date of last cooling water change/oil change
④	Module type	⑩	Operating hours since last cooling water change/oil change
⑤	Jenbacher / Spectro ID number	⑪	Sample date
⑥	Engine operating hours		



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Cedar Knolls
NJ 07927
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Hatchwood Place
Farnham Road
Odiham, Hampshire
RG 29 1AB
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Rinaustrasse 452
4303 Kaiseraugst
Switzerland

Spectro addresses

9 Revision code

Revision history

Index	Date	Description / Revision summary	Expert Auditor
8	03.05.2019	GE durch INNIO ersetzt / GE replaced by INNIO	Kecht S. <i>Pichler R.</i>
7	31.03.2017	Aktualisierung des Probenentnahme Begleitscheins und der Spectro Adressen / Update of the sampling accompanying certificate and spectro addresses	Chvatal S. <i>Waldron P.</i>
6	14.11.2016	Zusammenfassung der TA 1000-0200, TA 1000-0201 und TA 1000-0204 / Summary of TA 1000-0200, TA 1000-0201 and TA 1000-0204	Chvatal S. <i>Waldron P.</i>
5	27.05.2015	Ergänzung „Klassifizierung – Potenzieller Kunde“ / Additional „Classification - Prospective Customers“	Bilek Kelly
4	05.11.2014	Hinweis zur Einhaltung der Bedingungen / Information on observing the conditions	Bilek Lippert
3	06.09.2012	Ergänzung rechtlicher Hinweis / legal notice added	Provin Spieker

