NUMBER OF SHEETS: 7	SHEET: 1	REGULATION No.: 61 - 0 – 0281.1	11 INDEX

NAME: **ENGINE OIL CHARGES FOR STATIONARY GAS TEDOM ENGINES**

1. DETERMINATION OF THE SCOPE OF VALIDITY

This Regulation covers engine oil charges specified for stationary gas TEDOM engines.
To provide warranty must be used the approved oil in the item 2.

2. APPROVED ENGINE OILS

The following symbols are applied for individual gases: G - natural gas, S - sewage gas, L - landfill gas, B - biogas, P - propane-butane, W - wood gas, H - hydrogen gas

Oil designation	Viscosity class SAE	Approved fuel	Note
ADDINOL ECO GAS 4000 XD	40	G, P	
ADDINOL GASMOTORENÖL MG 40 EXTRA PLUS	40	L, B, S	
AGIP CLADIUM 120	40	L, B, S	
AUTOL GASMOTORENÖL BGJ 40	40	L, B, S, G, P	
AVIA GASMOTORENÖL HA 40	40	L, B, S	
AVIA GASMOTORENÖL LA-PLUS 40	40	G, P	
CHEVRON, CALTEX, TEXACO HDAX 5200 LA GEO 40	40	G, P	
CHEVRON, CALTEX, TEXACO HDAX 6500 LFG	40	L, B, S	
CHEVRON, CALTEX, TEXACO HDAX 9200 LA GEO 40	40	G, P	+CAT (by the item 6)
LUKOIL EFFORSE HD 4009	40	G, P	
MADIT GAS	15W-40	G, P	
MOL DYNAMIC GAS SUPER	15W-40	G, P	
MOBIL PEGASUS 1	15W-40	G, P	Synthetic oil
MOBIL PEGASUS 605	40	G, P	
MOBIL PEGASUS 610	40	L, B, S	
MOBIL PEGASUS 705	40	G, P	+CAT (by the item 6)

				SUPERSEDES THE REGULATION: 61-0-0263.2
576/19	18.10.2019	11	VENCL	
512/19	11.3.2019	10	VENCL	ELABORATED by: Ing. Jiří Čapek
594/18	11.12.2018	9	VENCL	
599/17	28.2.2018	8	VENCL	
503/17	30.1.2017	7	VENCL	
608/16	6.12.2016	6	VENCL	APPROVED by: Ing. Marcel Škarohlíd
572/16	21.10.2016	5	VENCL	
517/16	16.2.2016	4	VENCL	DATE: 28.11.2006
509/16	21.1.2016	3	VENCL	
504/16	18.1.2016	2	VENCL	**TEDOM** A.S. DIVIZE **MOTORY** (**ENGINE** DIVISION)
502/16	4.1.2016	1	ULRICH	
602/15	8.12.2015	z	ULRICH	
CHANGE	DATE	IND.	SIGN.	

MOBIL PEGASUS 710	40	G, P	
MOBIL PEGASUS 805	40	G, P	
MOBIL PEGASUS 1005	40	G, P	+CAT (by the item 6)
MOBIL MOBILGARD 450	40	L, B, S	
PARAMO MOGULGAS	15W-40	G, P	
PARAMO MOGULGAS 40	40	G, P	
PARAMO MOGULGAS B	15W-40	G, S, L, B, P	
Petro-Canada SENTRON CG 40	40	L, B, S	
Petro-Canada SENTRON LD 8000	40	G, P	+CAT (by the item 6)
Q8 MAHLER GR5	40	G, P	+CAT (by the item 6)
Q8 MAHLER GR8	40	L, B, S, G, P	
Q8 MAHLER T	15W-40	G, P	
Q8 MAHLER HA	40	L, B, S, G, P	
ROLOIL MOGAS-AC/40	40	L, B, S, G, P	
ROLOIL MOGAS GR5	40	G, P	+CAT (by the item 6)
ROLOIL MOGAS GR8	40	L, B, S, G, P	
SCHNELL PROTECT OIL SAE 40	40	L, B, S	
SHELL MYSELLA S5 N 40	40	G, P	+CAT (by the item 6)
SHELL MYSELLA S5 S 40	40	L, B, S	+CAT (by the item 6)
STRUB JMS 320 PLUS	40	B	
TECTROL METHAFLEXX HC PREMIUM	40	L, B, S	
TECTROL METHAFLEXX NG PLUS	40	G, P	
TITAN GANYMET PLUS LA	40	G, P	+CAT (by the item 6)
TITAN GANYMET ULTRA	40	L, B, S	
TOTAL NATERIA MJ 40	40	L, B, S	
TOTAL NATERIA MP 40	40	G, P	

3. ENGINE OIL REPLACEMENT

Oil must always be replaced in the following cases:

- After 100 hours in case of the first charge (from the manufacturing plant)
- Once a year as a minimum
- In case of coolant leak into the oil
- If the limit values shown in the item 4.1 are exceeded; periodicity is determined by sampling in conformity with the item 3.1 below
- If the values pursuant to table 3.2 are reached, provided that sampling is not applied for determination of the periodicity of oil.

If the engine is put out of operation for prolonged period of time there is a risk of damage to the engine components caused by the oil acidity. To prevent possible damages the limit values in the item 4.2 must not be lower. If lower limit values are measured the oil must be exchanged. Once the oil is exchanged the engine has to be operated for a minimum of 12 hours.

3.1 DETERMINATION OF PERIODICITY FOR ENGINE OIL REPLACEMENT BY SAMPLING

Periodicity of oil replacement, when the oil does not exceed the limit values shown in the item 4.1 below, is determined by sampling. The scope of oil analysis must correspond to the oil features preset by the item 4.1; the analysis must be carried out by the accredited laboratory. Results of analyses must be archived. The archiving period is necessary for at least the warranty provided by company TEDOM a.s. Sampling is commenced after replacement of the first oil charge (filled by the manufacturing plant). Oil samples are taken every 150 hours of operation – in case of the natural gas and every 75 hours – for all other gases. The periodicity is determined upon reach of the limits preset in the item 4.1 below. For your illustration the procedure is shown in Fig. 1 on the abrasion metals.

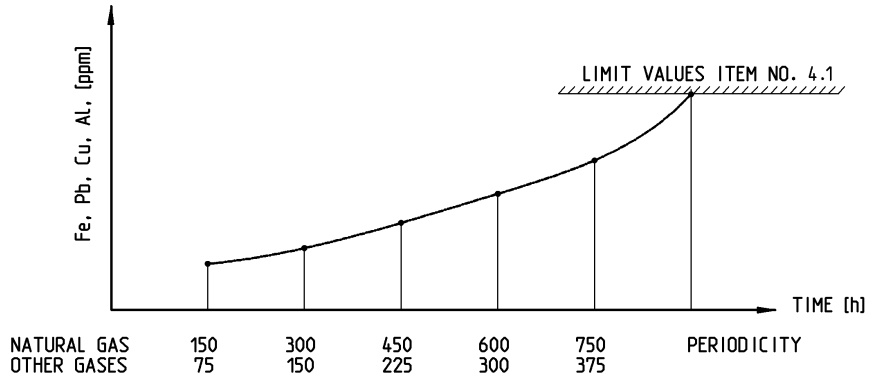

Fig. 1

To confirm periodicity, the process of sampling must be carried out twice more as a minimum. Periodicity of sampling remains preserved. If the time period between sample taking and evaluation during the first sampling procedure does not provide replacement of the oil filling in due time, then the first oil replacement (except the first charge by the manufacturing plant) must be carried out pursuant to the item 3.2. For financial reasons the following exception for the periodicity of sampling may be applied. The beginning of the testing could be started at 500 hours for natural gas. The second and third sampling (for all gases) can always be commenced one interval before the end of the preceding sampling procedure. If the values from the oil sampling are close to the limit values it is necessary to reduce each time interval from one engine oil analysis to the next engine oil analysis to its half.

In case of change: of kind of oil
Lubricating charge size
Fuel properties/features
Engine power
Method of engine load
Ambient conditions

periodicity for oil replacement must be confirmed by a new sampling procedure.

3.2 PERIODICITY OF ENGINE OIL REPLACEMENT WITHOUT SAMPLING

A. Natural gas

Periodicity of engine oil replacement for natural gas without sampling is according to the table and apply only to those selected engine oils:

Type of engine	Selected engine oils for operation without sampling
Stoichiometric, 1500 rpm	CHEVRON, CALTEX, TEXACO - HDAX 9200 LA GEO 40
Lean burn, 1500 rpm Lean burn, 1800 rpm	CHEVRON, CALTEX, TEXACO - HDAX 9200 LA GEO 40
	Petro-Canada SENTRON LD 8000
	Q8 MAHLER GR5
	ROLOIL MOGAS GR5
	SHELL MYSELLA S5 N 40

Operation	Power [kW]			
	up to 150 (stoichiometric, 1500 rpm)	up to 170 (lean burn, 1500 rpm)		above 170 (lean burn 1500 rpm)
	Engine oil charge of [l]			
	56	30,5	56	56
	Periodicity [hours]			
Continuous operation [1)] Predominant output 30-75%	1100	900	1700	1600
Continuous operation [1)] predominant output 75-100%	1100	700	1600	1600
Periodicity of engine oil replacement for all other, not mentioned here operations, outputs and powers are determined by sampling according to the item 3.1.				

[1)] Continuous operation is defined as an operation lasting for at least 16 hours without break. The engine is not started between work cycles.

Periodicity of engine oil replacement for natural gas for stoichiometric engines with rated speed 1800 rpm is always determined by sampling according to the item 3.1.

B. Landfill gas

Periodicity of approved engine oil replacement (from the item 2.) for landfill gas without sampling is 150 hours.

C. Others gases

Periodicity of engine replacement for others gases is always determined by sampling according to the item 3.1.

4.1 LIMIT ENGINE OIL VALUES – THE ENGINE IN OPERATION

Property		Limit value	Test method
Cinematic viscosity (100°C)	[mm^2/s]	min. 12, max. 18; max. fresh oil value + 3	ČSN EN ISO 3104, (ČSN 65 6216)
TBN	[mg KOH/g]	min. 50% of the fresh oil, min. 2	ISO 3771, ČSN 65 6069
TAN	[mg KOH/g]	max. fresh oil value + 2.5	ASTM 664, ČSN 65 6214
pH	[-]	min. 4.0	
Oxidation at 5.8 µm	[A/cm]	max. 25	DIN 51 451
Nitration at 6.1 µm	[A/cm]	max. 25	DIN 51 451
Al	[ppm]	max. 10	DIN 51 391 ASTM D5185
Fe	[ppm]	max. 60	
Pb	[ppm]	max. 20	
Cu	[ppm]	max. 23	
Si [2)]	[ppm]	max. 15	
Glycol	[%]	max. 0.02	DIN 51375
Water	[%]	max. 0.2	DIN 51 777, ČSN EN ISO 9029 (ČSN 65 6062)

[2)] The silicon content in oil can be increased due to presence of siloxanes in the sewage gas (S) and landfill gas (L). If the content of abrasion metals (Fe) does not rise, the limit for silicon is 100 ppm.

4.2 LIMIT ENGINE OIL VALUES – THE ENGINE OUT OF OPERATION

Property		Limit value	Test method
TBN	[mg KOH/g]	min. 3.5	ISO 3771, ČSN 65 6069
pH	[-]	min. 5.0	

5. CHARACTERISTIC FEATURES OF APPROVED OILS

Oil	Viscosity SAE	Sulphate ash [weight %]	TBN [mg KOH/g]	TAN [3)] [mg KOH/g]	Viscosity [mm^2/s] 40°C	100°C
ADDINOL ECO GAS 4000 XD	40	0.63	7.3	1.5	116.5	13.27
ADDINOL GASMOTORENÖL MG 40 EXTRA PLUS	40	0.9	9.8	-	132	14.2
AGIP CLADIUM 120	40	1.5	12	-	160	15.7
AUTOL GASMOTORENÖL BGJ 40	40	0.9	7.9	-	141.2	14.1
AVIA GASMOTORENÖL HA 40	40	0.9	9.8	-	132	14.2

AVIA GASMOTORENÖL LA-PLUS 40	40	0.63	7.3	-	116.5	13.27
CHEVRON, CALTEX, TEXACO HDAX 5200 LA GEO 40	40	0.5	4.2	1.0	124	13.5
CHEVRON, CALTEX, TEXACO HDAX 6500 LFG	40	0.55	4.5	1.2	121	13.9
CHEVRON, CALTEX, TEXACO HDAX 9200 LA GEO 40	40	0.5	4.2	0.8	125	13.5
MADIT GAS	15W-40	0.48	5.3	-	98.8	14.7
MOL DYNAMIC GAS SUPER	15W-40	0.84	8.3	-	102.9	14.1
MOBIL PEGASUS 1	15W-40	0.51	6.5	-	93.8	13
MOBIL PEGASUS 605	40	0.5	7.1	0.6	126	13.3
MOBIL PRGASUS 610	40	0.98	10.8	0.45	131	13.3
MOBIL PEGASUS 705	40	0.52	5.6	1.7	126.2	13.2
MOBIL PEGASUS 710	40	0.94	6.5	-	121	13.2
MOBIL PEGASUS 805	40	0.54	6.2	-	130	13.5
MOBIL PEGASUS 1005	40	0.5	5	1.1	125	13
MOBIL MOBILGARD 450	40	1.5	13.5	-	140	14.2
LUKOIL EFFORSE HD 4009	40	0.9	9.5	-	154	14.8
PARAMO MOGULGAS	15W-40	0.5	5	-	107.8	14.9
PARAMO MOGULGAS 40	40	0.45	5	-	160	16
PARAMO MOGULGAS B	15W-40	1.2	9.5	-	107.8	14.9
Petro-Canada SENTRON CG 40	40	0.93	8.1	-	123	13.6
Petro-Canada SENTRON LD 8000	40	0.52	4.6	-	121	13.3
Q8 MAHLER GR5	40	0.5	6	1.5	88.7	13.2
Q8 MAHLER GR8	40	0.8	8.0	1.5	88.2	13.1
Q8 MAHLER T	15W-40	0.9	6.9	-	102.4	13.9
Q8 MAHLER HA	40	0.9	7.9	1.5	141.2	14.1
ROLOIL MOGAS-AC/40	40	0.9	7.9	1.5	141.2	14.1
ROLOIL MOGAS GR5	40	0.5	6	1.5	88.7	13.2
ROLOIL MOGAS GR8	40	0.8	8.0	1.5	88.2	13.1
SCHNELL PROTECT OIL SAE 40	40	0.72	8.4	-	107	13.5
SHELL MYSELLA S5 N 40	40	0.48	4.5	0.95	135	13.5
SHELL MYSELLA S5 S 40	40	0.57	5.3	1.03	125	13.5
STRUB JMS 320 PLUS	40	0.9	8.8	-	122	13.4
TECTROL METHAFLEXX HC PREMIUM	40	0.7	8.5	-	105	13.6
TECTROL METHAFLEXX NG PLUS	40	0.49	5.5	-	141.5	14.9

TITAN GANYMET PLUS LA	40	0.49	5.5	-	141.5	14.9
TITAN GANYMET ULTRA	40	0.7	8.5	-	105	13.6
TOTAL NATERIA MJ 40	40	0.82	8.8	-	148	15.1
TOTAL NATERIA MP 40	40	0.48	4.6	-	122.5	13.8

[3)] The TAN value of fresh engine oil confirmed by the manufacturer.

6. OILS FOR ENGINES WITH CATALYTIC CONVERTER

For catalytic converter engines (stoichiometric three-way, oxidation) are usable only oils marked "+CAT" (from the item 2.). These oils meet the following limits:

- Sulphated Ash max. 0,6 [weight %]
- Sulphur max. 0,3 [weight %]
- Phosphorus max. 0,08 [weight %]

7. UNAPPROVED OILS – NOT WARRANTED

If it is used unapproved oil, the user will have to pass the following rules:
- Periodicity of oil replacement is always determined by sampling present by the item 3.1.
- The exception for reduction of second and third sampling must not be used.
- The exception for beginning of testing after 500 hours for natural gas must not be used.
- Using oils from reputable manufacturers is decreased risk of possible defects.

8. OIL CLEANER CHANGE

Replacement of the approved full-flow oil cleaner or cleaner element is carried out always during oil change.

9. APPROVED OIL CLEANERS AND CLEANER ELEMENTS

Element - cleaner
Cleaner element MANN FILTR JIPAP O 11 OTO
Cleaner element MANN FILTR JIPAP H 1173/1
Cleaner element FILTRON OM 501
Cleaner TEDOM 7085 501
Cleaner TEDOM 7085 502
Cleaner FLEETGUARD LF 3658
Cleaner FLEETGUARD LF 4112
Cleaner FLEETGUARD LF 9667
Cleaner MANN HUMMEL W 11 102
Cleaner BALDWIN B218

Concrete type of cleaner or cleaner element for every engine is mentioned inside of catalogue of spare parts and inside of service instructions.

10. CENTRIFUGAL CLEANER CLEANING

Cleaning of the centrifugal oil cleaner is carried out always during oil change.