



NORTH ATLANTIC COUNCIL  
CONSEIL DE L'ATLANTIQUE NORD

**NATO UNCLASSIFIED**  
Releasable to Interoperability Platform

21 March 2023

**DOCUMENT**  
AC/112(ARMY-FLWP)D(2023)0003

**PETROLEUM COMMITTEE (PC)**  
**ARMY FUELS AND LUBRICANTS WORKING PARTY (ARMY FLWP)**  
**STUDY DRAFT 1 OF AFLP-7091(EDITION C)(VERSION 1) - GUIDE SPECIFICATION**  
**FOR NATO LAND SYSTEM OILS FOR ENGINES AND TRANSMISSIONS**

**Note by the Staff Officer**

Reference: AC/112(ARMY FLWP)DS(2022)0001, paragraph 9

1. Further to reference, the German Custodian prepared Study Draft 1 of AFLP-7091 (Edition C)(Version 1) at Enclosure 1. The new Section 5 covers the NATO Guide Specification for Lubrication Gear Oil, Extreme Pressure: O-262 (ISO VG 100), O-210 (ISO VG 150), O-211 (ISO VG 220), O-212 (ISO VG 320) and O-213 (ISO VG 460).
2. Nations are invited to review the document and to send their comments to the Custodian ([SteffenSchneider@bundeswehr.org](mailto:SteffenSchneider@bundeswehr.org)), the Chair ([fabrice.guidotti@mil.be](mailto:fabrice.guidotti@mil.be)) and the Staff Officer ([van-exem.philippe@hq.nato.int](mailto:van-exem.philippe@hq.nato.int)) **by Friday, 28 April 2023**.
3. The attached Study Draft 1 will be used as a basis for further discussion and decision at the 2023 ARMY FLWP meeting in May 2023.

(Signed) Philippe Van Exem

1 Enclosure

Action Officer: Mr. Van Exem, Ext.4564  
Original: English

**NATO UNCLASSIFIED**

-1-



**NATO UNCLASSIFIED**  
**Releasable to IP**

# **NATO STANDARD**

## **AFLP-7091**

# **GUIDE SPECIFICATION FOR NATO LAND SYSTEM OILS FOR ENGINES AND TRANSMISSIONS**

**Edition C Version 1**  
**Study Draft 1**



**NORTH ATLANTIC TREATY ORGANIZATION**  
**ALLIED FUELS AND LUBRICANTS PUBLICATION**

Published by the  
**NATO STANDARDIZATION OFFICE (NSO)**  
© NATO/OTAN

**NATO UNCLASSIFIED**  
**Releasable to IP**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**INTENTIONALLY BLANK**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**NORTH ATLANTIC TREATY ORGANIZATION (NATO)**

**NATO STANDARDIZATION OFFICE (NSO)**

**NATO LETTER OF PROMULGATION**

[DATE]

1. The enclosed Allied Fuels and Lubricants Publication AFLP-7091, Edition C, Version 1, GUIDE SPECIFICATION FOR NATO LAND SYSTEM OILS FOR ENGINES AND TRANSMISSIONS which has been approved by the nations in the PETROLEUM COMMITTEE, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 7091.

2. AFLP-7091 Edition C, Version 1, is effective upon receipt and supersedes AFLP-7091 Edition B, Version 2 which shall be destroyed in accordance with the local procedure for the destruction of documents.

No part of this publication may be reproduced, stored in a retrieval system, used commercially, adapted, or transmitted in any form or by any means, electronic, mechanical, photo-copying, recording or otherwise, without the prior permission of the publisher. With the exception of commercial sales, this does not apply to member or partner nations, or NATO commands and bodies.

4. This publication shall be handled in accordance with C-M(2002)60.

Dimitrios SIGOULAKIS  
Major General, GRC (A)  
Director, NATO Standardization Office

**NATO UNCLASSIFIED**  
**Releasable to IP**

**INTENTIONALLY BLANK**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**RESERVED FOR NATIONAL LETTER OF PROMULGATION**

**INTENTIONALLY BLANK**

## RECORD OF RESERVATIONS

[illegible]



**INTENTIONALLY BLANK**

**RECORD OF SPECIFIC RESERVATIONS**

[nation]	[detail of reservation]
The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

**INTENTIONALLY BLANK**

SECTION 1	GENERAL .....	1-1
SECTION 2	NATO GUIDE SPECIFICATION FOR LUBRICATING OIL ENGINE, SEVERE DUTY, DIESEL & GASOLINE SERVICE O-236 (GRADE 15W-40).....	2-1
SECTION 3	NATO GUIDE SPECIFICATION FOR LUBRICATING OIL, SEVERE DUTY ENGINE MULTIGRADE 5W 30: O 1178; LUBRICATING OIL ENGINE SYNTHETIC GRADE 5W-40: O 1179 AND GRADE 10W-40: O 1180 .....	3-1
SECTION 4	NATO GUIDE SPECIFICATION FOR LUBRICATING OIL, GEAR: EXTREME PRESSURE O 185 (GRADE 75W); O 186 (GRADE 75W); O 226 (GRADE 80W-90); O 228 (GRADE 85W-140).....	4-1
SECTION 5	NATO GUIDE SPECIFICATION FOR LUBRICATING GEAR OIL, EXTREME PRESSURE: O-262 (ISO VG 100); O-210 (ISO VG 150); O-211 (ISO VG 220); O-212 (ISO VG 320); O-213 (ISO VG 460).....	5-1

**INTENTIONALLY BLANK**

<b>SECTION 1      GENERAL</b>
-------------------------------

0101. STANAG 1135, Section 4 - Interchangeability chart of NATO standardized fuels, lubricants and associated products - lists under individual product descriptions of national specifications which have been agreed as interchangeable.

0102. Under previous agreements, a single national specification has been selected for each land systems product to provide the quality standard which other nations' specifications are expected to meet in order to achieve interchangeability. Since product development is constantly in progress and national specifications are frequently revised to take advantage of this, a nation whose specification is used as a guide may find it difficult to make such changes without altering the product quality standard in a manner unacceptable to other nations. Therefore, a nation that has made technical changes to a specification listed in Table-1 (page1-2), is to send it to the AC/112 – Petroleum Committee Staff Officer for distribution to the AC/112 Army Fuels and Lubricants Working Party (Army FLWP) delegates at least one month prior to discussion at the annual ARMY FLWP meeting.

0103. NATO guide specifications have therefore been prepared to define the minimum quality requirements of the most important products. Further specifications may be prepared as considered necessary. The values specified in the sections of this AFLP shall also apply to stored product subject to re-inspection. The requirement, frequency and test parameters are specified in STANAG 4714/AFLP-4714 - Minimum quality surveillance of lubricants and associated products.

NO	NATO CODE	PRODUCT DESCRIPTION (AS LISTED IN STANAG 1135)	GUIDE SPECIFICATION (NOTE 1)
(a)	(b)	(c)	(d)
1	O-185	Lubricating oil, gear extreme pressure, grade 75W, API GL4	see Section 4
2	O-186	Lubricating oil, gear extreme pressure, grade 75W, API GL5	see Section 4
3	O-226	Lubricating oil gear extreme pressure, grade 80W-90	see Section 4
4	O-228	Lubricating oil gear extreme pressure, grade 85W-140	see Section 4
5	O-236	Lubricating oil engine severe duty Diesel & gasoline service 15W-40	see Section 2
6	O-237	Lubricating oil engine severe duty Diesel service, grade 10W	MIL-PRF-2104 M, Grade 10W
7	O-238	Lubricating oil engine severe duty Diesel service, grade 30	MIL-PRF-2104 M Grade 30
8	O-239	Lubricating oil engine severe duty Diesel service, grade 50	NME-2992
9	O-262	Lubricating gear oil, ISO VG 100	see Section 5
10	O-1176	Lubricating oil engine severe duty multigrade 10W-30	D.STAN 91-113 OMD-90
11	O-1177	2 strokes spark lubricating oil biodegradable	DCSEA 242
12	O-1178	Lubricating oil heavy duty engine multigrade 5W-30	see Section 3
13	O-1179	Lubricating oil engine duty multigrade 5W-40	see Section 3
14	O-1180	Lubricating oil engine multigrade 10W-40	see Section 3
15	O-1236	Lubricating oil severe duty Diesel engine 15W-40	MIL-PRF-2104 Grade 15W-40

Table - 1

Note 1 – Consult STANAG 1135 for the applicable version unless otherwise indicated herein





<b>SECTION 2</b>	<b>NATO GUIDE SPECIFICATION FOR LUBRICATING OIL ENGINE, SEVERE DUTY, DIESEL &amp; GASOLINE SERVICE O-236 (GRADE 15W-40)</b>
------------------	---

NO	REQUIREMENTS	UNITS	TEST METHODS	LIMITS	NOTES
(a)	(b)	(c)	(d)	(e)	(f)
1	Flash point	°C	ISO 2592	+195 min.	
2	Total Base Number	mg KOH/g	ISO 3771	12 min.	ASTM D 2896 technical equivalent
3	Sulfated Ash	wt %	ISO 3987	1,5 max.	ASTM D 874 identically, DIN 51575 technical equivalent; NOTE 1
4	Viscosity HTHS	mPa.s	CEC L-036-90	3,5 min.	
5	Evaporation Loss	%	CEC L-040-93	13 max.	
6	Foaming Tendency, Sequence I / II / III	ml	ASTM D 892	10/50/10	
7	Load carrying capability	Load Stage	CEC L-07-95	11 min.	Failure Load stage, FZG
8	Engine Performance			ACEA E3-96 (obsolete)	

NOTE 1: ACEA E 4: 2,0 wt % max. Limitation to 1,5 wt % for use in gasoline and two stroke diesel engines

**NATO UNCLASSIFIED**  
**Releasable to IP**

**AFLP 7091**

**INTENTIONALLY BLANK**

**2-2**

**Edition C Version 1**  
**Study Draft 1**

**NATO UNCLASSIFIED**  
**Releasable to IP**

<b>SECTION 3</b>	<b>NATO GUIDE SPECIFICATION FOR LUBRICATING OIL, SEVERE DUTY ENGINE MULTIGRADE 5W 30: O 1178; LUBRICATING OIL ENGINE SYNTHETIC GRADE 5W-40: O 1179 AND GRADE 10W-40: O 1180</b>
------------------	---

NO.	REQUIREMENTS	UNITS	TEST METHODS	LIMITS			NOTES
				O-1178	O-1179	O-1180	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1	SAE Viscosity Grade		SAE J 300	5W-30	5W-40	10W-40	
2	Flash point	°C	ISO 2592	200 min.			
3	Total Base Number	mg KOH/g	ISO 3771	9 min.			ASTM D 2896 technical equivalent
4	Sulfated Ash	wt %	ISO 3987	1,65 max.	1,65 max.	1,0 max.	ASTM D 874 identically, DIN 51575 technical equivalent
5	Viscosity HTHS	mPa.s	CEC L-036-90	3,5 min.			
6	Evaporation Loss	%	CEC L-040-93	13 max.			
7	Foaming Tendency Sequence I / II / III	ml	ASTM D 892	10 / 50 / 10			
8	Load carrying capability	Load Stage	CEC L-07-95 CEC L-84-02	10 min.	9 min.	10 min.	Failure Load Stage FZG

9	Engine performance			ACEA E2-96 (obsolete)	ACEA A3 / B4 / E7	ACEA E6 + API CI-4	
---	--------------------	--	--	--------------------------	----------------------	-----------------------	--

**NATO UNCLASSIFIED**  
**Releasable to IP**

**AFLP-7091**

**INTENTIONALLY BLANK**

**3-2**

**Edition C Version 1**  
**Study Draft 1**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**SECTION 4 NATO GUIDE SPECIFICATION FOR LUBRICATING OIL, GEAR: EXTREME PRESSURE O 185 (GRADE 75W);  
O 186 (GRADE 75W); O 226 (GRADE 80W-90); O 228 (GRADE 85W-140)**

NO	REQUIREMENTS	UNITS	TEST METHODS	LIMITS				NOTES
				O-185	O-186	O-226	O-228	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1	API Classification			API GL-4	API GL-5	API GL-5	API GL-5	
2	SAE Viscosity Grade		SAE J 306	75W	75W	80W-90	85W-140	
3	Channel Point	° C	FED-STD 791-3456	- 45 max.	- 45 max.	- 35 max.	- 20 max.	
4	Flash Point	° C	ISO 2592	+150 min.	+150 min.	+165 min.	+180 min.	
5	Foaming Tendency Seq. I / II / III	ml	ASTM D 892	20 / 50 / 20				
6	Copper Corrosion (+121 °C, 3 h)		ISO 2160	2 a max.				
7	Gear Performance							
7.1	Thermal Oxidation Stability (+100 °C, 50 hrs) - Viscosity Increase - Pentane Insolubles - Toluene Insolubles - Carbon Varnish - Sludge	% % % rating rating	ASTM D 5704 (L-60-1)	(1)	100 max. 3 max. 2 max. 7,5 min. 9,4 max.			(1) Only additive-packages with enhanced thermal stability, approved in L-60-1 test are permitted

NO	REQUIREMENTS	UNITS	TEST METHODS	LIMITS				NOTES
				O-185	O-186	O-226	O-228	
7.2	High Speed – Low Torque High Torque – Low Speed	rating rating rating rating rating	ASTM D 6121 (L-37)		Ridging: 8 min. Rippling: 8 min. Wear: 5 min. Pitting / Spalling: 9,3 min. Scoring: 10 min.			
7.3	High Speed and Shock Loading Scoring – Pinion and Ring		ASTM D 7452 (L-42)		Equal to or better (lower) than the mean scoring value of the passing reference oil test results used to calibrate the stand.			
7.4	Corrosion Resistance	rating	ASTM D 7038 (L-33)		Final rust: 9,0 min.			



**SECTION 5 NATO GUIDE SPECIFICATION FOR LUBRICATING GEAR OIL, EXTREME PRESSURE: O-262 (ISO VG 100); O-210 (ISO VG 150); O-211 (ISO VG 220); O-212 (ISO VG 320); O-213 (ISO VG 460)**

NO	REQUIREMENTS	UNITS	TEST METHODS	LIMITS					NOTES
				O-262	O-210	O-211	O-212	O-213	
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
1	ISO VG Classification		ISO 3448	ISO VG 100	ISO VG 150	ISO VG 220	ISO VG 320	ISO VG 460	
2	Kinematic Viscosity (40°C)	mm <sup>2</sup> /s	ISO 3104 ASTM D 7042	90 min 110 max	135 min 165 max	198 min 242 max	288 min 352 max	414 min 506 max	
3	further requirements			ISO DIS 12925-1					

**NATO UNCLASSIFIED**  
**Releasable to IP**

**INTENTIONALLY BLANK**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**NATO UNCLASSIFIED**  
**Releasable to IP**

**AFLP-7091(C)(1)**

**NATO UNCLASSIFIED**  
**Releasable to IP**