NORTH ATLANTIC TREATY ORGANIZATION
ORGANISATION DU TRAITE DE L'ATLANTIQUE NORD

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MAS/228-NAV/4287
18 August 1988

To : See Distribution Overleaf

Subject : STANAG 4287 NAV (EDITION 1) - ELECTROLYTE FOR MAIN LEAD ACID BATTERIES OF SUBMARINES

Reference : AC/141(IEG/6)SG/4-D/30 dated 6 June 1986

Enclosure : STANAG 4287 (Edition 1)

1. The enclosed NATO Standardization Agreement which has been ratified by nations as reflected in page iii is promulgated herewith.

2. The reference listed above is to be destroyed in accordance with local document destruction procedures.

3. AAP-4 should be amended to reflect the latest status of the STANAG.

ACTION BY NATIONAL STAFFS

4. National staffs are requested to examine page iii of the STANAG and if they have not already done so, to advise the Defence Support Division, IS, through their national delegation as appropriate of their intention regarding its ratification and implementation.

A.J. MELO CORREIA
Major-General, POAF
Chairman, MAS

241 mv
ST4287A

DISTRIBUTION

Action : All MODs through Members of the Naval Board, MAS

Information : SECGENNATO (DS DIV), SACEUR, SACLANT, CINCHAN, CINCNORTH, CINCENT, CINCSOUTH, CINCUKAIR, COMBALTAP, COMNAVBALTAP, COMNAVSOUTH, COMSTRIKFORSOUTH, CINCWESTLANT, CINCEASTLANT, COMSUBEASTLANT, COMIBERLANT, COMSTRIKFLTLANT, COMSUBACLANT, NAMSA.

STANAG 4287
(Edition 1)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)

MILITARY AGENCY FOR STANDARDIZATION
(MAS)

STANDARDIZATION AGREEMENT

SUBJECT : ELECTROLYTE FOR MAIN LEAD ACID BATTERIES OF SUBMARINES

Promulgated on 18 August 1988

For
A. J. MELO CORREIA
Major-General, POAF
Chairman, MAS

STANAG 4287
(Edition 1)

RECORD OF AMENDMENTS

No.	Reference/date of amendment	Date entered	Signature
1-4		10/07/21	D F

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Chairman MAS under the authority vested in him by the NATO Military Committee.

2. No departure may be made from the agreement without consultation with the tasking authority. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

DEFINITIONS

4. Ratification is "The declaration by which a nation formally accepts the content of this Standardization Agreement".

5. Implementation is "The fulfilment by a nation of its obligations under this Standardization Agreement".

6. Reservation is "The stated qualification by a nation which describes that part of this Standardization Agreement which it cannot implement or can implement only with limitations".

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

7. Page iii gives the details of ratification and implementation of this agreement. If no details are shown it signifies that the nation has not yet notified the tasking authority of its intentions. Page iv (and subsequent) gives details of reservations and proprietary rights that have been stated.

Agreed English/French Texts

STANAG 4287
(Edition 1)

NAVY

NATO STANDARDISATION AGREEMENT
(STANAG)

ELECTROLYTE FOR SUBMARINE MAIN LEAD ACID BATTERIES

Annex: A. Specific Nations' Requirements
B. Tests for Impurities

Related documents: STANAG 4248 on Purified Water for Submarine Main Lead Acid Batteries

AIM

1. The aim of this Agreement is to facilitate the provision of electrolyte for submarine main lead acid batteries of participating NATO Navies in NATO Naval Bases.

AGREEMENT

2. Participating nations agree that the electrolyte for submarine main lead acid batteries will be stocked and provided to submarines of NATO Navies in NATO Naval Bases according to the following specifications, with the specific nations' requirements expressed in Annex A.

3. Electrolyte

The filler electrolyte is sulphuric acid diluted with purified water in accordance with STANAG 4248.

4. Purity of the filler electrolyte

The impurities of the filler electrolyte with a relative density (specific gravity) of 1.280 at 25° must not exceed:

		mg/dm³ (*)	ppm (*)
(1)	Copper	0.5	0.39
(2)	Arsenic	0.1	0.08
(3)	Antimony	1.0	0.78
(4)	Manganese	0.2	0.16
(5)	Chromium	0.2	0.16
(6)	Iron	20.0	15.60
(7)	Nickel	1.0	0.78
(8)	Chlorides	5.0	3.91
(9)	Nitrogen as ammonium	25.0	19.50
(10)	Nitrogen oxides	5.0	3.91
(11)	Volatile organic acids (determined as acetic acid)	20.0	15.60
(12)	Oxidizable organic substances (corresponding to the consumption of $KmnO_4$	30.0	23.40
(13)	Residue on ignition	200.0	156.00

IMPLEMENTATION OF THE AGREEMENT

5. This STANAG is implemented when nations have issues instructions to use electrolytes which conform to the above specifications.

*) With a relative density (specific gravity) of the electrolyte of 1.280 kg/dm³, impurities in mg/dm³ can be transformed into ppm by multiplication with the factor 0.78125 dm³/kg.

ANNEX A to
STANAG 4287

SPECIFIC NATIONS' REQUIREMENTS

Electrolyte to Specifications	Canada	United States	Greece and Turkey
(1) Copper	1.0	20.0	0.5
(2) Arsenic	0.1	0.4	1.0
(3) Antimony	1.0	0.4	1.0
(4) Manganese	0.2	0.08	0.2
(5) Chromium	0.44	not spec.	0.2
(6) Iron	25.0	20.0	30
(7) Nickel	1.0	0.4	1.0
(8) Chlorides	5.0	4.0	5.0
(9) Nitrogen as ammonium	25.0	4.0	50
(10) Nitrogen oxides	5.0	2.0	10
(11) Volatile organic acids (as per STANAG)	20.0	not spec.	20
(12) Oxidizable organic substances (as per STANAG)	30.0	not spec.	30
(13) Residue on ignition	200.0	not spec.	250

ANNEX B to
STANAG 4287

TESTS FOR IMPURITIES

In order to achieve a confirmed quality, i.e., the standard set out in the STANAG, the following tests have been found acceptable.

ANNEX B to
STANAG 4287

TESTS FOR IMPURITIES

Impurity	Testmethod / Document
(1) Copper	- Atomic absorption, alternatively - British Standard 3031 Appendix H
(2) Arsenic	ISO 5792 in conjunction with ISO 2590
(3) Antimony	Atomic absorption
(4) Manganese	- Atomic absorption, alternatively - British Standard 3031 Appendix J
(5) Cromium	Atomic absorption
(6) Iron	- Atomic absorption, alternatively - British Standard 3031 Appendix G
(7) Nickel	Atomic absorption
(8) Chlorides	ISO 2877
(9) Nitrogen as ammonium	ISO 2899
(10) Nitrogen oxides	ISO 2363
(11) Volatile organic acids (determined as acetic acid)	Note: The testmethod, annex B1 has been proposed
(12) Oxidizable organic substances (correspondending to the consumption of $KMnO_4$)	Note: The testmethod, annex B 2 has been proposed
(13) Residue on ignition/ Residus fixes calcines	ISO 913

Annex B to
STANAG 4287

Method of testing for oxidizable organic substances (corresponding to the consumption of $KMnO_4$)

Reagents

0,01 n $KMnO_4$

0,01 n $H_2C_2O_4$

Execution

20 ml of the acid sample, 80 ml distilled water and 10 ml 0,01 n $KMnO_4$ solution are heated up quickly to boiling by a Bunsen burner in a flask with refluxer. Immediately after boiling starts the burner is exchanged to a boiling water bath and the sample is kept there for 10 minutes.
Now 10 ml 0,01 n oxalic acid are added to reduce the excess of permanganat. The excess of oxalic acid is reduced with 0,01 n $KMnO_4$ until a pink colour remains permanently.
The consumption of $KMnO_4$ is calculated in mg $KMnO_4$/1.
As Iron (II)ions are also oxidized the value of $KMnO_4$-consumption must be reduced by the value which is caused by the Iron(II)ions in the acid sample.
The correction is done by subtracting from the result:

0,57 mg/1 $KMnO_4$ per 1 mg/1 Fe^{2+}

Method of testing for volatile organic acids (determined as acetic acid)

50 ml of the acid sample are distilled with vapour. One has to take care that during distillation no sulfuric acid mists are transferred.
The volatile organic acids are collected in a distillate until the flask is filled with about 250 ml. Then the flask ist substituted by another one and the distillate will be titreted with 0,01 n NaOH using phenolphthalein as an indicator. The same procedure is done with the distillate in the second flask.
As soon as no more acid can be detected in one of the following distillates the determination is finished. The whole consumption of NaOH is equivalent to the content of acid which is reported as acetic acid.