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NSO

26 September 2014 NSA/1157(2014)ATM/3712

STANAG 3712 ATM (EDITION 8) – AIRFIELD RESCUE AND FIRE-FIGHTING SERVICES IDENTIFICATION CATEGORIES

References:
A. NSA0235(2010)CFR/3712 dated 2 March 2010
B. AC/92(ATM)N(2011)0014 (CFR) dated 17 May 2011

1. The enclosed NATO Standardization Agreement, which has been ratified by nations as reflected in the NATO Standardization Document Database (NSDD), is promulgated herewith.

2. The references listed above are to be destroyed in accordance with local document destruction procedures.

ACTION BY NATIONAL STAFFS

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

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

Enclosure:

STANAG 3712 (Edition 8)

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STANAG 3712
(Edition 8)

NORTH ATLANTIC TREATY ORGANIZATION
(NATO)

NATO STANDARDIZATION OFFICE
(NSO)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: AIRFIELD RESCUE AND FIRE-FIGHTING SERVICES IDENTIFICATION CATEGORIES

Promulgated on 26 September 2014

Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

RECORD OF AMENDMENTS

No.	Reference/Date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This STANAG is promulgated by the Director NATO Standardization Office under the authority vested in him by the NATO Standardization Organization Charter.

2. No departure may be made from the agreement without informing the tasking authority in the form of a reservation. 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.

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

4. Ratification, implementation and reservation details are available on request or through the NSO websites (internet http://nsa.nato.int; NATO Secure WAN http://nsa.hq.nato.int).

RESTRICTION TO REPRODUCTION

FEEDBACK

5. Any comments concerning this publication should be directed to NATO/NSO – Bvd Leopold III - 1110 Brussels - Belgium.

STANAG 3712
Edition 8

NATO STANDARDIZATION AGREEMENT (STANAG)

AIRFIELD RESCUE AND FIRE-FIGHTING SERVICES IDENTIFICATION CATEGORIES

Related Documents:

NFPA 403 *STANDARD FOR AIRCRAFT RESCUE AND FIRE-FIGHTING SERVICES AT AIRPORTS*

NFPA 418 *STANDARD FOR HELIPORTS*

Annexes: A. Categorizing Fixed Wing Airports for ARFF Services

B. Calculation of Total Water - Heliports

AIM

1. The aim of this agreement is to provide a common method of identifying the level of rescue and fire fighting services provided at fixed wing airfields and heliports; and to make this information available for inclusion in flight publications.

2. This STANAG revision is an amalgamation of previously ratified editions of STANAGs 3712 and 3861 developed during the 5th Crash Fire-Fighting Rescue Panel, and updates fighter aircraft from category 4 to category 5, establishes the development of a risk management plan, and incorporates minor administrative and format changes.

AGREEMENT

3. Participating nations agree to classify aircraft and to provide the minimum amounts of water for foam production, amounts of complementary agents and the number of vehicles as specified in Annex A for Fixed Wing Aircraft. In addition, due to inherent hazards associated with fighter aircraft (ejection seats, fuel capacity, armaments, advanced composites and aerospace materials), participating nations agree to classify all fighter aircraft as a category 5 aircraft (aircraft less than 90 feet in length). Additionally, participating nations agree to provide for heliports the minimum amounts of water for foam production as listed in Annex B.

The Fire Chief will establish a risk management plan addressing reduced operational capability during periods of time when the department must operate below the levels of service established within this STANAG. The plan must include control measures implemented by the Fire Chief that describe the potential risk and consequence of the identified risk. These levels of service include:

a. Vehicles out of service.
b. Reduced staffing.
c. Limited reserve firefighting agents.

RESPONSE TIME

4. Response time is considered to be the time between the initial call to the rescue and fire fighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in the tables 2, 3 and 6.

5. The operational objective of the rescue and fire fighting service shall be to achieve responses time not exceeding three minutes to any point of each operational runway, in optimum visibility and surface conditions.

6. Optimum visibility and surface conditions are defined as daytime operations, good visibility, and no precipitation within the normal response route that is free of surface contamination (e.g. water, ice or snow). To meet the operational objective as nearly as possible in less than optimum conditions of visibility, it may be necessary to provide suitable guidance and/or procedures for rescue and fire fighting vehicles.

7. Any other vehicles required to deliver the amounts of extinguishing agents specified in the table 2, 3 and 6 should arrive no more than one minute after the first responding vehicle(s) so as to provide continuous agent application.

IMPLEMENTATION OF THIS AGREEMENT

8. This STANAG is implemented when a nation has issued the necessary orders/instructions for the forces concerned putting the provisions outlined in the agreement into effect.

Annex A to
STANAG 3712
Edition 8

CATEGORIZING FIXED WING AIRPORTS FOR ARFF SERVICES

1. The authority having jurisdiction shall determine the level of protection required based on the largest aircraft scheduled into the airport. Airports shall be categorized for ARFF services in accordance with Table 1.

a. Exception: This STANAG does not exclude nor preclude the use or application of agent delivery technology, agent equivalency and/or proven and documented scientific methodology to achieve the agent gallonage required by Table 2. Should a nation use an alternative methodology, the nations' adopted national standard shall apply.

Table 1 Airport Category by Overall Length and Width of Aircraft

Airport Category			Overall Length of Aircraft up to but not including		Maximum Exterior Width up to but not including	
NFPA	FAA[1]	ICAO	ft	m	ft	m
1	A	1	30	9	6.6	2
2	A	2	39	12	6.6	2
3	A	3	59	18	9.8	3
4	A	4	78	24	13.0	4
5	A	5	90	28	13.0	4
6	B	6	126	39	16.4	5
7	C	7	160	49	16.4	5
8	D	8	200	61	23.0	7
9	E	9	250	76	23.0	7
10		10	295	90	25.0	8

2. Airport categories are used in the calculations to eliminate the need for calculating specific quantities of extinguishing agents for each type of aircraft. However, should specific calculations be used by a nation, the agent calculated shall be the amount required. Although only water is normally necessary for interior handline attack, logistically and tactically it should be discharged as foam and is therefore added to the quantities of water necessary for foam production in Tables 2 and 3.

3. The airport category for a given aircraft shall be based on the overall length of the aircraft or the fuselage width. If, after selecting the category appropriate to the

[1] FAA – Federal Aviation Administration

aircraft's overall length, the aircraft's fuselage width is greater than the maximum width given in Table 1, then the category for that aircraft shall be the next one higher.

EXTINGUISHING AGENTS FOR FIXED WING AIRFIELDS

PRIMARY AGENTS

4. One or more of the following types of primary agents shall be used for aircraft fire fighting involving hydrocarbon fuels.

a. Aqueous film-forming foam (AFFF)

b. Fluoroprotein foam (FP) or film-forming fluoroprotein foam (FFFP)

c. Protein foam (P)

5. All foam concentrates shall be listed based on the following performance test requirements.

6. Aqueous film-forming foam agents shall meet the requirements of U.S. Military Specification MIL-F-24385 or "equivalent"..

7. Film-forming fluoroprotein foam (FFFP), protein foam (P), and fluoroprotein foam (FP) agents shall meet the applicable fire extinguishment and burn back performance requirements of Underwriters Laboratories Inc. Standard UL-162 (type 3 application).

8. Primary agent used at the minimum quantities and discharge rates for AFFF in Table 2 or Table 3 and shall meet the applicable fire extinguishment and burnback performance requirements of para 6. The exception to this is where FFFP has an application rate of 5.5 (L/min)/m^2.

COMPLIMENTARY AGENTS

9. Either one or both of the following complimentary agents shall be available for aircraft fire fighting.

a. Dry chemical.

b. Halogenated agent.

QUANTITY of AGENTS

10. The minimum amount of water for foam production and the minimum amount of complementary agents necessary shall be as specified in Table 2 or Table 3 based on the system of categorizing airports listed in Table 1.

11. Sufficient foam concentrate shall be provided to proportion, at the prescribed percentage of foam concentrate to water into double the quantity of water specified in Table 2 or 3.

12. An alternate method to determine the level of fire-fighting agents required to combat an aircraft accident fire can be by using the formula found at Annex B.

Exception: This STANAG does not exclude nor preclude the use or application of agent delivery technology, agent equivalency and/or proven and documented scientific methodology to achieve the agent gallonage required by Table 2. Should a nation use an alternative methodology, the nations' adopted national standard shall apply.

COMPATIBILITY OF AGENTS

13. Chemical compatibility shall be ensured between foam and complementary agents where used simultaneously or consecutively.

AGENT DISCHARGE CAPABILITIES

14. The discharge capabilities of extinguishing agents shall not be less than the rates specified in Tables 2 and 3.

15. Other than at Category 1, 2 and 3 airports, where the handline nozzles can be used, the discharge rates for foam shall be met using only the ARFF vehicle turret(s).

16. All tables referred to within Annex A have been taken from NFPA 403 2009 Edition.

WATER SUPPLIES

17. Fire-fighting vehicles meeting the requirements of Tables 2 and 3 in Annex A carry a sufficient quantity of foam concentrate for one refill; therefore, rapid water resupply is a consideration of prime importance. The resupply water supply can be maintained in or provided by tankers or structural equipment. Additionally, hydrants may be considered if they are adequately located. Mutual aid services can be considered for this purpose if they are capable of responding in the critical time required to maintain the fire attack. Additionally, when water supplies are limited, or non-existent, a water tanker with one qualified operator shall be provided.

Table 2 Extinguishing Agents, Discharge and Response Capability in US Customary Units

Airfield Category	AFFF or FFFP [2] using a 5.5 application rate (see Note)		Fluoroprotein or Film Forming Fluoroprotein Foam		Protein Foam		Dry Chemical	
	Water	Discharge Rate	Water	Discharge Rate	Water	Discharge Rate	Discharge Rate	
	U.S. gal	gpm	U.S. gal	gpm	U.S. gal	gpm	lb	lb/sec
1	118	60	163	75	181	85	100	5
2	195	130	270	180	300	195	200	5
3	670	230	812	310	869	335	300	5
4	1335	390	1618	530	1731	575	300	5
5	2762	825	3344	1135	3575	1230	450	5
6	3744	1100	4704	1480	5087	1620	450	5
7	4877	1440	6272	1970	6830	2150	450	5
8	7778	1900	9808	2600	10620	2845	900	10
9	9570	2400	12289	3300	13377	3480	900	10
10	11764	3100	15326	4100	16752	4600	900	10

Note: Airport categories are used in the calculations to eliminate the need for calculating specific quantities of extinguishing agents for each type of aircraft. However, should specific calculations be used by a nation, the agent calculated shall be the amount required. Although only water is normally necessary for interior hand line attack, logistically and tactically it should be discharged as foam and is therefore added to the quantities of water necessary for foam production in Tables 2 and 3.

[2] FFFP meeting the MIL Spec.

Table 3 Extinguishing Agents, Discharge and Response Capability in SI Units

Airfield Category	AFFF or FFFP [3] using a 5.5 application rate		Fluoroprotein or Film Forming Fluoroprotein Foam		Protein Foam		Dry Chemical	
	Water	Discharge Rate	Water	Discharge Rate	Water	Discharge Rate	Discharge Rate	
	L	L/min	L	L/min	L	L/min	kg	kg/min
1	446.63	225	616.96	290	685.085	322	45	2.25
2	738.08	500	1021.95	680	1135.50	738	90	2.25
3	2535.95	800	3073.42	1165	3289.17	1268	135	2.25
4	5052.97	1500	6124.13	2000	6551.84	2176	135	2.25
5	10454.17	3000	12657.04	4300	13531.38	4656	205	2.25
6	14171.04	4000	17804.64	5600	19254.30	6132	205	2.25
7	18459.45	5500	23739.52	7450	25851.55	8038	205	2.25
8	29439.73	7000	37123.28	9850	40196.70	10768	410	4.5
9	36222.45	9000	46513.87	12500	50631.95	13172	410	4.5
10	44526.74	11700	58008.91	15500	63406.32	17411	410	4.5

18. The minimum number of ARFF vehicles provided at each airport shall be as specified in Table 4.

Table 4 Minimum Number of ARFF Vehicles

Airport Category	1	2	3	4	5	6	7	8	9	10
Number of Vehicles	1	1	1	1	2	2	3	3	4	4

[3] FFFP meeting the MIL Spec.

CATEGORIZING HELIPORTS FOR ARFF SERVICES

19. Heliports shall be categorized for ARFF services in accordance with Table 5.

Table 5 Heliport Category by Overall Length and Width of Helicopter

Heliport Category	Overall Length of Helicopter [1]	Fuselage Width[2]	Practical Critical Area (PCA)
H-1	0 m < 15.2 m	0 m < 1.53 m	34.8 m^2
H-2	15.2 m < 24.4 m	1.53 m < 2.13 m	78.0 m^2
H-3	24.4 m < 36.6 m	2.13 m < 2.43 m	133.8 m^2

Note 1: Overall length, measured from tip of main rotor fully extended to tip of tail rotor fully extended.
Note 2: Fuselage width = Actual fuselage width (does not include landing gear) measured from outside of cabin.
Note 3: PCA = (1/2 overall length) x (3 fuselage Width)

20. The heliport category for a given helicopter shall be based on the overall length of the helicopter or the fuselage width. If, after selecting the category appropriate to the helicopter's overall length, the helicopter's fuselage width is greater than the maximum width given in Table 5, then the category for that heliport shall be the next one higher. However, should specific calculations be used by a nation, the agent calculated shall be the amount required.

Table 6 Minimum Extinguishing Agent Quantities and Discharge Rates

	AFFF* or FFFP using a 5.5 application rate		Fluoroprotein or Film-Forming Fluoroprotein Foam*		Protein Foam*	
Heliport Category	Water (Litres)	Discharge Rate (Litres/min)	Water (Litres)	Discharge Rate (Litres/min)	Water (Litres)	Discharge Rate (Litres/min)
1	1508	225	1647	250	1696	275
2	1983	425	2295	550	2404	625
3	2597	750	3132	1000	3319	1100

*Calculations are shown at annex B.

3. A minimum of one ARFF vehicle meeting the quantities and discharge rates shall be provided.

The area concept for determining the level of fire-fighting agents and equipment needed to combat an aircraft accident fire can be determined for specific aircraft using the following formula:

$$Q = Q_1 + Q_2 + Q_3$$

Where Q_1 = water requirement for control of PCA[4]
Q_2 = water requirement to maintain control or extinguish the remaining fire or both
Q_3 = water requirement for interior fire fighting

The method for calculating the values for each component of Q are presented below:

Quantity Q_1 The quantity required to obtain one-minute control time in the PCA. The formula for the water required for control (Q_1) in the PCA can be expressed as:

$Q_1 = PCA \times R \times T$

Where PCA = (0.67) × TCA[5]
Where TCA = L (K + W)
L = length of aircraft
W = width of fuselage
R = application rate of selected agent
T = time of application (1 minute)
K = values shown below

		Feet			Meters
K	=	39 where L = less than 39	K	=	12 where L = less than 12
K	=	46 where L = 39 up to but not including 59	K	=	14 where L = 12 up to but not including 18
K	=	56 where L = 59 up to but not including 79	K	=	17 where L = 18 up to but not including 24
K	=	98 where L = 79 and over	K	=	30 where L = 24 and over

[4] Practical Critical Fire Area (PCA) - This area is two-thirds of the Theoretical Critical Fire Area (TCA).
[5] Theoretical Critical Fire Area (TCA) - The theoretical critical fire area (TCA) is a rectangle, the longitudinal dimension of which is the overall length of the aircraft, and the width includes the fuselage and extends beyond it by a predetermined set distance that is dependent on the overall width. Therefore, the aircraft length multiplied by the calculated width equals the size of the TCA.

Quantity Q_2 The quantity required for continued control of the fire after the first minute or for complete extinguishment of the fire or for both. Table 1 provides the Q_2 value.

Table 1 Q_2 as a Percentage of Q_1

Airport Category	Q_2% Q_1	Airport Category	Q_2% Q_1
1	0	6	100
2	27	7	129
3	30	8	152
4	58	9	170
5	75	10	190

Q_3 water flow requirements for the type of fire-fighting operations to be experienced when combating an interior aircraft fire. Table 2 provides the Q_3 value.

Table 2 Q_3 Water Flow Requirements

Airport Category	Q_3 Equals (U.S. gal)[6]	Q_3 Equals (Litres)
1	0	0
2	0	0
3	60 gpm 5 min = 300 gal	228 litres 5 min = 1140 litres
4	60 gpm 10 min = 600 gal	228 litres 10 min = 2280 litres
5	125 gpm 10 min = 1250 gal	475 litres 10 min = 4750 litres
6	125 gpm 10 min = 1250 gal	475 litres 10 min = 4750 litres
7	125 gpm 10 min = 1250 gal	475 litres 10 min = 4750 litres
8	250 gpm 10 min = 2500 gal	950 litres 10 min = 9500 litres
9	250 gpm 10 min = 2500 gal	950 litres 10 min = 9500 litres
10	250 gpm 10 min = 2500 gal	950 litres 10 min = 9500 litres

Required application rates for three generic foam types needed to extinguish fire in 1 m^2 or 1 ft^2 of the PCA as follows:

a. AFFF = 5.5 (L/min)/m^2 or 0.13 gpm/ft^2

b. FP[7] = 7.5 (L/min)/m^2 or 0.18 gpm/ft^2

c. PF = 8.2 (L/min)/m^2 or 0.20 gpm/ft^2

[6] 1 U.S. gal = 3.8 litres

[7] It should be noted that some FP is manufactured to 5.5 (L/min)/m^2 or 0.13 gpm/ft^2

Sample Calculation Using Airport Category 4 and AFFF Foam

TCA = L (K + W)
= 77.8 (56 + 12.9) = 5360 ft^2
PCA = 2/3 × TCA = 2/3 × 5360 ft^2 = 3573 ft^2
Q_1 = 0.13 gpm/ ft^2 × 3573 ft^2 × 1 = 464 gal
Q_2 = 58% × Q1 = 0.58 × 464 = 269 gal
Q_3 = 600 gal

Q = $Q_1 + Q_2 + Q_3$
= 464 + 269 + 600 = 1333 gal
rounded up to 1335 gal

1. All tables referred to within Annex A have been taken from NFPA 403 2009 Edition.

Annex B to
STANAG 3712
Edition 8

CALCULATION of TOTAL WATER

1. The quantities of agent shown at table 2 were calculated using well known formulae and application rate. The total quantities is based on the quantity (Q_1) required to obtain a 1 minute control of the Practical Critical Area (PCA), the quantity (Q_2) required for continued control of the fire after the first minute or for complete extinguishment of the fire or for both and the quantity (Q_3) required for interior fire fighting and rescue operations. Therefore the total quantity (Q) is $Q_1+Q_2+ Q_3$.

2. The following are the application rates (AR) used:

   a. AFFF = 5.5 (L/min)/m^2

   b. Fluoroprotein or FFFP = 7.5 (L/min)/m^2

   c. Protein Foam = 8.2 (L/min)/m^2

3. The total quantity of water $Q = Q_1 + Q_2 + Q_3$ where

   a. Q_1 = PCA x AR x 1 min

   b. Q_2 = 100 % x Q_1

   c. Q_3 = 225 L x 5 minutes

EXAMPLE Need to add the U.S gallons calculations.

4. For a Category 3 heliport, using AFFF, the calculation would be as follows:

   a. Q_1 = PCA x AR x 1 min
   Q_1 = 133.8 m^2 x 5.5 (L/min)/m^2 x 1 min = **735.9 litres**

   b. Q_2 = 100 % x Q_1
   Q_2 = 100 % x 735.9 litres = **735.9 litres**

   c. Q_3 = 225 L/minutes x 5 minutes = **1125 litres**

   d. Therefore: Q = **2596.8 litres**