



DEPARTMENT OF THE NAVY
NAVAL RESEARCH LABORATORY
WASHINGTON, D.C. 20375

IN REPLY REFER TO:
6180-373:JTL:ara
NRL Prob. No.
61-0051-G-2
23 APR 1982

From: Commanding Officer, Naval Research Laboratory
To: Commander, Naval Sea Systems Command (SEA 3112)
Subj: Qualification of AFFF liquid concentrate fire extinguishing
agents manufactured by The Ansul Company; results of
Ref: (a) NAVSEA Ltr 31121/PAP 4123/24385 SEA 05DC4, Ser 152 dated
17 March 1981
Encl: (1) Two copies of subject report

1. In accordance with reference (a), the subject products have been tested in order to determine compliance with the requirements of MIL-F-24385C. A report covering the work is forwarded herewith as enclosure (1).

F. E. Safford
F. E. SAFFORD
By direction

Copy to: (w/1 copy encl (1))
Naval Sea Systems Command (SEA 0534, 996, 05DC4)
Naval Weapons Support Centers (Code 304E)
Chief of Naval Materials (NAVMAT 04F)

6180-373A:JTL:ara
21 April 1982

Subj: Qualification Testing of AFFF liquid concentrate fire
extinguishing agents manufactured by The Ansul Company.
results of

Ref: (a) Military Specification MIL-F-24385C with Amendment 2

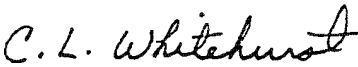
1. AFFF concentrates made by The Ansul Company and designated as AFC-5A (3% type) and AFC-5 (6% type) were tested in accordance with the procedures of reference (a) for compliance with the requirements of reference (a).
2. The test data obtained are summarized in the attached tables.
3. Both candidate AFFF concentrates met the requirements of reference (a).



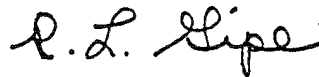
E.J. Jablonski
Hughes Associates, Inc.



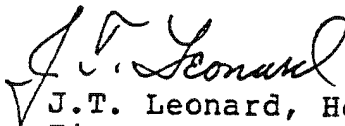
H.B. Peterson
Hughes Associates, Inc.



C.L. Whitehurst
Fire Protection Section
Combustion & Fuels Branch
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Combustion & Fuels Branch
Chemistry Division
Code 6180

Encl (1) to NRL Ltr
6180-373:JTL:ara
NRL Prob. #
61-0051-G-2

NAVAL RESEARCH LABORATORY
FIRE SUPPRESSION SECTION
WASHINGTON, D.C. 20375

MIL-F-24385C Qualification Test Results

Submitted by ANSUL - AFC-5A (3% Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul AFC-5A / 3M FC-203C

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.1	7.5	7.8	7.7
drain time, min, minimum	2.5	X	5.3	5.1	5.0	4.8
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	21	26	22	27
burnback, sec, min	360	X	560	500	480	465
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	<0.05	<0.05	X	X	<0.05	<0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL - AFC-5A (340 Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul AFC-5A/Natronal AOW-3

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	7.8	6.0	6.0	7.0
drain time, min, minimum	2.5	X	4.9	4.4	3.7	3.7
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	29	29	28	30
burnback, sec, min	360	X	465	580	475	465
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	<0.05	<0.05	X	X	<0.05	<0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL AFC-5A (3% Type)

Para 3.33 Compatibility

Mixture 33/33/33 Ansul AFC-5A/Net 1 AOW-3/3M FC-203C

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.1	7.5	5.4	7.7
drain time, min, minimum	2.5	X	5.3	4.8	3.8	5.5
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	19	29	26	28
burnback, sec, min	360	X	570	540	520	480
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	< 0.05	< 0.05	X	X	< 0.05	< 0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL - AFC-5 (6% Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul AFC-5 / National AOW-6MD

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	7.9	6.2	7.5	7.3
drain time, min, minimum	2.5	X	5.1	3.9	5.5	4.0
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	No Ignit
(c) Fire performance						
full strength						
ext time, sec, max	30	X	23	27	28	28
burnback, sec, min	360	X	485	600	475	480
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	<0.05	<0.05	X	X	<0.05	<0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL - AFC-5 (6% Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul AFC-5 / 3M FC 206-C

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.2	7.9	8.3	8.1
drain time, min, minimum	2.5	X	5.7	5.4	5.0	5.0
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	25	28	20	26
burnback, sec, min	360	X	460	510	480	515
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	<0.05	<0.05	X	X	<0.05	<0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL AFC-5 (6% Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul AFC-5 / 3m FC-7B0B

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	7.2	7.1	7.9	7.7
drain time, min, minimum	2.5	X	5.1	4.8	5.5	5.3
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	27	23	26	29
burnback, sec, min	360	X	480	460	50.5	490
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	< 0.05	< 0.05	X	X	< 0.05	< 0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL AFC-5 (6% Type)

Para 3.33 Compatibility

Mixture 50/50 Ansul/AFC-5/Ansul/AFC-3

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.1	7.5	7.8	7.8
drain time, min, minimum	2.5	X	5.1	5.4	5.0	4.9
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	21	26	28	29
burnback, sec, min	360	X	415	420	530	430
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	< 0.05	< 0.05	X	X	< 0.05	< 0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL AFC-5 (6% Type)

Para 3.33 Compatibility

Mixture 33/33/33 ANSUL/AFC-5/Kat'1/ACW-6/MD/3M FC-206C

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.2	7.3	7.7	7.5
drain time, min, minimum	2.5	X	5.6	4.4	5.3	5.6
(b) Film formation	no ignit.	X	no ignit.	no ignit.	no ignit.	no ignit.
(c) Fire performance						
full strength						
ext time, sec, max	30	X	20	25	25	2.4
burnback, sec, min	360	X	560	530	480	515
(d) Stratification	none	none	X	X	none	none
(e) Precipitation,						
volume percent, max	<0.05	<0.05	X	X	<0.05	<0.05

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MIL-F-24385C Qualification Test Results

Submitted by ANSUL AFC-5A (3% Type)
ANSUL AFC-5 (6% Type)

Para 3.33 Compatibility

6% Mixture of 50/50 Ansul AFC-5A / Ansul AFC-5

Requirement	Value	Liquid				
		Conc	Conc/ Fresh	Conc/ Sea	Fresh Premix	Sea Premix
(a) Foamability						
expansion, minimum	6.0	X	8.1	7.7	X	X
drain time, min, minimum	2.5	X	5.6	5.4	X	X
(b) Film formation	no ignit.	X	no ignit.	no ignit.	X	X
(c) Fire performance						
full strength						
ext time, sec, max	30	X	23	27	X	X
burnback, sec, min	360	X	510	470	X	X
(d) Stratification	none	none	X	X	X	X
(e) Precipitation,						
volume percent, max	< 0.05	< 0.05	X	X	X	X

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MIL-F-24385C Qualification Test Results

Submitted by: ANSUL

Para 3.4 Fire Performance

Requirement	Value	Results	
		AFC-5A	AFC-5
28 ft ² fire test			
extinguishing time, seconds, maximum			
fresh water, half strength	45	34	36
full strength	30	24	30
sea water, half strength	45	40	43
full strength	30	26	27
quintuple strength	55	36	40
burnback time, seconds, minimum			
fresh water, half strength	300	390	390
full strength	360	510	540
sea water, half strength	300	460	480
full strength	360	455	505
quintuple strength	200	400	410
50 ft ² fire test			
extinguishing time, seconds, maximum	50	46	36
burnback time, sec, minimum	360	380	390
40-sec summation, minimum	320	340	345

3.3.4	Total fluorine, percent		1.27%	0.613%
5.1.1.1.(f)	Cap removal torque,			
	in-lbs, maximum	50	40	46