

# **Fire Equipment Storage and Refurbishing Standards Appendix A**

- **Cleaning Instructions**
- **Nomex Clothing Exposed to Poison Oak/Ivy/Sumac**
- **Quality Assurance by Lot Sampling**
- **NFES Refurbishment Standard Change, Add or Delete Proposal**
- **NFES Refurbishment Standard Quality Complaint**

## Cleaning Instructions

Page #	Item Description	Washing Class
7	<b>BAG, BACKPACK PUMP</b>	1
8	<b>BAG, SLEEPING, CLOTH, WASHABLE</b>	4
9	<b>BAG, SLEEPING, FIREFIGHTERS, M-1981</b>	4
12	<b>BAG, SLINGABLE, WATER DRINKING WATER, 55 GALLON</b>	2
13	<b>BAG, SLINGABLE, WATER SUPPRESSION, 55 GALLON</b>	2
14	<b>BAG, TENT AND PERSONAL GEAR</b>	1
121	<b>CASE, CARRYING, FIRE SHELTER, M-2002</b>	1
123	<b>CASE, CARRYING, FIRE SHELTER, PRACTICE, M-2002</b>	1
23	<b>CHAPS, PROTECTIVE</b>	2
43	<b>CHEST HARNESS, FIRE SHELTER</b>	1
93	<b>FIRELINE PACK, COMPLETE</b>	1
34	<b>FLIGHT SUIT</b>	3
36	<b>FLY, SUNSCREEN, 20' x 20' W/GUY ROPES</b>	5
37	<b>FLY, TENT, TYPE II, 9' x 10'</b>	5
35	<b>FLY, TENT, 16" X 24" W/GUY ROPES</b>	5
60	<b>JEAN, BDU</b>	3
63	<b>KIT, FIRST AID, 10-25 PERSON, BELT TYPE</b>	1
93	<b>PACK, FIREFIGHTER'S FIELD</b>	1
93	<b>PACK, PERSONAL GEAR</b>	1
93	<b>PACKSACK, NYLON, W/STRAPS</b>	1
125	<b>SHIRTS, FLAME RESISTANT</b>	3
127	<b>SHROUD, NECK AND FACE, WILDLAND FIREFIGHTERS</b>	3
144	<b>TENT, 2 PERSON</b>	5

### **CLASS 1 – CORDURA (MACHINE WASH OK)**

1. Allow any mud or loose dirt to dry, and then remove using a stiff-bristle brush. If stains remain, wash as recommended below.
2. Remove light oil and dirt stains by brushing with a solution of warm water and a mild detergent, rinse thoroughly, and hang to dry. "Mild detergents" includes most home laundry detergents that contain no chlorine bleach or added scents.
3. For heavier oil or grease, soak in water-soluble biodegradable degreaser for at least 30 minutes, brush with a bristle brush, rinse thoroughly, and hang to dry.
4. If you machine wash, use only cold water on a gentle cycle and air dry.
5. Where no other method is cleaning the fabric, wash with pressure washer set at wide fan, warm water, and only allow nozzle close enough as necessary for cleaning, the further away the better for the fabric.

**DO NOT MACHINE DRY.**

**DO NOT USE BLEACH TO CLEAN FABRIC.**

## **CLASS 2 - CORDURA (NO MACHINE WASH)**

1. Allow any mud or loose dirt to dry, and then remove using a stiff-bristle brush. If stains remain, wash as recommended below.
2. Remove light oil and dirt stains by brushing with a solution of warm water and a mild detergent, rinse thoroughly, and hang to dry.
3. For heavier oil or grease, soak in water-soluble biodegradable degreaser for at least 30 minutes, brush with a bristle brush, rinse thoroughly, and hang to dry.

**DO NOT PRESSURE WASH**

**DO NOT MACHINE WASH OR DRY**

**DO NOT USE BLEACH TO CLEAN FABRIC.**

## **CLASS 3 – NOMEX<sup>®</sup>**

1. Follow the cleaning procedures described in the publication, Nomex<sup>®</sup> - Aramid Fiber -Laundering Guide (H-71603),  
[http://www2.dupont.com/Personal\\_Protection/en\\_US/assets/downloads/nomex/h71603launderingguidefor nomexaramidfiber.pdf](http://www2.dupont.com/Personal_Protection/en_US/assets/downloads/nomex/h71603launderingguidefor nomexaramidfiber.pdf).

Additional information can be obtained by calling Dupont at 1-800-453-8527 or by writing:

Dupont  
Advanced Fibers Systems  
Chestnut Run Plaza  
Laurel Run Building  
Wilmington, DE 19880-0705

2. Abbreviated washing procedures from above publication:

- a. *“Garments of NOMEX<sup>®</sup> should be washed separately from other articles to avoid contamination with lint of flammable fibers.”*
- b. *“Tests show that formulations designed for use at a temperature of 140 °F (60 °C) or less – such as high-surfactant, low-alkalinity products - adequately clean NOMEX<sup>®</sup> and provide the best fabric color retention.”*
- c. *“For heavily stained and oily garments of NOMEX<sup>®</sup>, a higher temperature wash formula may be required for adequate cleaning.”*
- d. *“Garments of NOMEX<sup>®</sup> must be adequately rinsed to remove residual wash chemicals.”*
- e. *“In some instances, tumble dry conditioning is the only finishing necessary for garments of NOMEX<sup>®</sup>.”*
- f. *“...dry cleaning is an alternative method of removing heavy soil and may be preferable to repeated high-temperature washing.”*

#### **CLASS 4 - SLEEPING BAGS**

1. Remove all contents not part of the bag and zip closed before laundering.
2. Launder bags in front-loading machine. Use mild soap in water of no more than 130 °F. Bags shall undergo three wash and rinse cycles, i.e. wash, rinse, wash, rinse, wash, rinse, sterilize with a bleach solution of 50 ppm in the last wash cycle.
3. With bag unzipped, dry in a tumble dryer with an average temperature not to exceed 130 °F. The dryer unit shall be of the reverse-action type. All bags shall be unfolded and shall tumble free. (To obtain the average temperature, test the temperature every 5 minutes and average the findings.)
4. After drying, zip bags closed.

#### **CLASS 5 – COATED NYLON**

1. Wash with water and mild degreaser detergent.
2. Rinse to remove all soap residues.
3. Air dry.

# Nomex Clothing Exposed to Poison Oak/Ivy/Sumac

## **RESEARCH**

At the request of the National Support Cache Refurbishing Standards Committee, MTDC researched the practicality of laundering Nomex firefighting clothing that has been contaminated with urushiol oil (the allergen to which the body reacts) from poison oak/ivy/sumac exposure. Current cache practices range from normal washing procedures to disposal of shirts and pants that have known urushiol contamination.

A search of on-line sources didn't produce any special care instructions beyond normal laundering. Some examples:

- "All clothing should be laundered, and everything else that may be contaminated with urushiol should be washed thoroughly." American Academy of Dermatology, [http://www.aad.org/public/publications/pamphlets/skin\\_poison.html](http://www.aad.org/public/publications/pamphlets/skin_poison.html)
- "...be sure to wash your clothing promptly with detergent..." Mayo Clinic, <http://www.mayoclinic.com/health/poison-ivy/DS00774/DSECTION=prevention>
- "Washing clothes with ordinary laundry soap will remove urushiol." Missouri Department of Conservation, <http://mdc.mo.gov/conmag/2005/03/50.htm>

A phone conversation with Daniel Boelman, RN, BSN, Customer Service Manager with Zanfel Laboratories, Inc. also indicated no special treatment beyond normal laundering. (Zanfel produces a commercially available poison oak/ivy cream). Mr. Boelman recommended using vinyl gloves when handling contaminated clothing.

On 11/17/2008 the Forest Service filed a SAFENET Supplemental Corrective Action concerning poison oak reactions experienced by firefighters during the 2008 fire season in California.

<http://safenet.nifc.gov/safenet.nsf/3e5de74de3df7e0087256c0000dbf79/BB5CAA2EF216986687257505000C39B1?OpenDocument>

In that posting, it is recommended that "All clothing and equipment should be laundered immediately ...A degreaser was recommended for helping to remove urushiol from clothing and equipment."

## **RECOMMENDATION**

MTDC recommends that fire clothing contaminated with urushiol oil be cleaned following normal Nomex laundering procedures. Extra care should be exercised when handling the contaminated clothing. Clearly labeled plastic bags should be used to separate contaminated clothing from other returned clothing. Commercial laundry personnel should wear long sleeves and vinyl gloves when handling contaminated clothing and dispose of any bags used for transporting the clothes to the laundering facility. As an extra precaution, supply cache and laundry workers could apply an over-the-counter skin-barrier product that contains bentoquatam (such as Ivy Block or Stokoguard) before handling contaminated clothing. Bentoquatam helps prevent urushiol from penetrating the skin. After exposure, workers' clothes should be washed and gloves disposed of.

## Quality Assurance by Lot Sampling

It is not practical to do a 100% inspection of several hundred complicated items in a lot. For this reason, Military Standard MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes, was developed. The standard is based on the statistical probability that if nonconformity exists in a lot at a properly chosen sampling rate the odds of you seeing one were good. Therefore, if a certain number of samples were chosen based on the size of the lot, you could be statistically certain that your samples represented the lot as a whole.

In 1995 the American Society for Quality (ASQ) Z1.4 completely replaced MIL-STD-105, but it is exactly the same as the Mil Std... The full document is available from <http://www.asq.org/>, or from Global Engineering <http://global.ihs.com/> and costs \$168. The document contains tables that provide the number of samples based on inspection level, lot size, and the number of nonconformities it will take to fail the lot.

First, understand that inspection level and the number of failures you accept is up to you. There is no rule that says you must use the tables of any standard. If you do an inspection and find one error and decide to therefore reject the entire lot, that is up to you, but also understand that the contractor needs to understand this ahead of time, that it will cost more for them and they will pass that extra expense on to you.

If you decide to use statistical sampling, there are some things that will need to be determined before using the tables: The inspection level ("Normal" is used most often), the "Acceptable Quality Level" (AQL - we use 6.5 usually for normal items), and the number of units in the lot being inspected.

From the attached Table 1 (cropped for use here), for a lot size of 100 items and using a General Inspection Level I, the Sample Size Code Letter is "D". From Table II-A, starting with code letter D, the sample size is 8 items, and moving to the column for the AQL of 6.5, you would accept the lot with 1 or less failures, and reject the lot for 2 or more failures.

Inspections can get a lot more complicated than that by just changing the parameters, such as making a non-conformity in an item fail, that item (and each item could have several non-conformities but still only counts as one since it failed the item), or counting each non-conformity found as a single non-conformity for the lot, which means each item could have several non-conformities counting towards the total. For simple items like a garment or a Tent Fly, I recommend failing the item for one or more serious non-conformities, and counting that failure as 1 towards the total.

If you have any questions, please contact me at 406-329-3929, or your local GSA Industrial Operations Analyst (IOA).

Dennis Davis  
MTDC

Table I - Sample size code letters

Lot or batch size			Special inspection level				General inspection levels		
			S-1	S-2	S-3	S-4	I	II	III
2	to	8	A	A	A	A	A	A	B
9	to	15	A	A	A	A	A	B	C
16	to	25	A	A	B	B	B	C	D
26	to	50	A	B	B	C	C	D	E
51	to	90	B	B	C	C	C	E	F
91	to	150	B	B	C	D	D	F	G
151	to	280	B	C	D	E	E	G	H
281	to	500	B	C	D	E	F	H	J
501	to	1200	C	C	E	F	G	J	K
1201	to	3200	C	D	E	G	H	K	L
3201	to	10000	C	D	F	G	J	L	M
10001	to	35000	C	D	F	H	K	N	N
35001	to	150000	D	E	G	J	L	N	P
150001	to	500000	D	E	G	J	M	P	Q
500001	to	Over	D	E	H	K	N	Q	R

Table II-A - Single sampling plans for normal inspection (Master table).  
 (Higher AQLs truncated to fit on page)

Sample Size Code letter	Sample Size	Acceptance Quality Levels, AQLs, in Percent Nonconforming Items and Nonconformities per 100 Items (Normal Inspection)																
		0.010 Ac Re	0.015 Ac Re	0.025 Ac Re	0.040 Ac Re	0.065 Ac Re	0.10 Ac Re	0.15 Ac Re	0.25 Ac Re	0.40 Ac Re	0.65 Ac Re	1.0 Ac Re	1.5 Ac Re	2.5 Ac Re	4.0 Ac Re	6.5 Ac Re	10 Ac Re	15 Ac Re
A	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↓	↓	
B	3	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	
C	5	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	
D	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	
E	13	↓	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	
F	20	↓	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	
G	32	↓	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	
H	50	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	
J	80	↓	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22
K	125	↓	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑
L	200	↓	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑
M	315	↓	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑
N	500	↓	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑
P	800	↓	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑
Q	1250	0 1	↑	↓	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑
R	2000	↑	↑	1 2	2 3	3 4	5 6	7 8	10 11	14 15	21 22	↑	↑	↑	↑	↑	↑	↑

<p><b><u>National Interagency Support Cache</u></b></p> <p><b>NFES Refurbishment Standard Change, Add or Delete Proposal</b></p> <p>NFES Item Name/Number:</p>	<p>Date:</p> <p>Submitted by:</p> <p>Unit:</p> <p>Address:</p> <p>Phone:</p> <p>E-mail:</p>
--	---

**OVERALL PROBLEM/OBJECTIVE STATEMENT** (*Describe the problem, how the work is currently being done, and why improvement or change is needed.*):

**WHAT IS THE PROPOSED CHANGE TO THE REFURBISHMENT STANDARD** (*List item change and/or addition. Identify cost or cost of new item or equipment associated with change. Submit refurbishment process for item following format in Refurbishment Guide. Items for deletion should list caches that stock the item and be identified by NFES and item description.*):

**POTENTIAL BENEFITS** (*Describe how this project will reduce cost, save time, improve safety, increase efficiency, etc.*):




---

USDA Forest Service,  
National Interagency Fire Center  
3833 S. Development Avenue  
Boise, Idaho 83705-5354  
Phone: (208) 387-5277 FAX: (208) 387-5398  
E-mail completed form to: [menudde@fs.fed.us](mailto:menudde@fs.fed.us) or [eponder@fs.fed.us](mailto:eponder@fs.fed.us)

