

The Washing Process

1. Principles

The prime object of the washing process is to remove all soiling matter from the material being washed and in so doing to sterilize the garment. The process should be so designed as not to damage the fabric, and should be as economical as possible in the use of detergents. These requirements are met by:

(a) Removing the soiling matter in stages comprising a preliminary breakdown followed by a series of washes and rinses. The breakdown subjects the load to a thorough initial wetting; the loose surface dirt is also removed at this stage before the actual washing processes are begun. In view of the need to conserve fresh water, the breakdown is omitted from the revised washing formulae used in H.M. ships.

(b) Mechanically controlling the rubbing action on the clothing throughout the whole process by varying the "dip," or depth of water in the machine.

As the cage of the washing-machine revolves, the internal lifters constantly lift the clothes and drop them back into the water, producing agitation or mechanical rubbing of the fabrics. This action helps to loosen the dirt, but also subjects the clothing to wear and tear. With a low dip the clothes are subjected to a high lift and consequently more rubbing takes place. Low dips are only used therefore in the early stages of the wash to remove the initial heavy soiling. High dips are used in the rinsing stages.

(c) Varying the proportions of the soap and alkali content of the detergent throughout the process and adjusting the temperature of the water as necessary at each stage to obtain the best results from the detergent.

Soap is a good suspender, *i.e.*, as a washing medium it possesses the property, particularly at low temperatures, of holding in suspension the dirt removed from a fabric. Soap does not by itself, however, readily remove the more resistant dirt from a fabric.

Alkali possesses opposite properties, *i.e.*, it readily removes the dirt from a fabric, particularly at high temperatures, but it does not hold it in suspension so well.

In the early stages of the wash the dirt is comparatively easy to remove, and the washing liquor employed should therefore contain a high soap content to enable the dirt to be held in suspension without redeposition on the fabric.

As the wash progresses the more resistant soiling matter has to be dealt with, and the washing liquid should contain a higher alkali content.

2. Washing coloured goods

The washing of coloured cotton and linen goods introduces a new factor, namely, the possible effect of the wash liquor on the colouring matter. It is necessary, therefore, to control the process employed to prevent either fading or bleeding of the colours.

Coloured goods are as a whole satisfactory in respect of "fastness" under normal washing conditions. The greatest care must be exercised at all times, however, to take into account the possibly fugitive nature of some dyes which may be slightly soluble in the wash liquor, or even in water.

As far as possible the goods should be carefully sorted into classes, according to their quality. If any doubt exists regarding the fastness of dyes, a washing process to prevent or reduce the running of the colours should be used. The tendency of a dye to run can be reduced, considerably, and in some cases prevented altogether, by simply adding common salt to the wash liquor (about 2 oz. per load).

All coloured articles should be classified into light and dark groups. Whenever possible, blues and greys should be washed separately from reds, pinks, tans, etc.

Good temperature control is always essential.

Colours in shirts are generally fast, but printed shirts should be treated with caution. The collars of coloured shirts should *always* be washed with the shirt. Where necessary, starch should be removed from such collars before washing. In cases where cuffs and neckbands are heavily soiled, hand washing pre-treatment in the form of hard rubbing, or light scrubbing with a soapy solution, may be necessary.

3. Washing Woollens

When viewed under a microscope, raw wool appears as a fine hair with saw-like edges, which are in fact a series of minute overlapping scales. Wool possesses the property of elasticity, is a relatively poor conductor of heat, and is more easily damaged by heat than is cotton. It tends to yellow in contact with alkali but is more resistant than cotton to acid conditions.

The difficulties experienced in washing woollens are attributable to these characteristics, and necessitate a special washing process designed to preserve the structure of the fabric in its original form.

Coloured woollen articles can be processed in accordance with the general washing formula for this classification. The arrangements made in the normal woollen-washing process to control friction, temperature, alkalinity, and dips to minimise felting, automatically reduce the risk of alteration in colour. It is good practice, however, to classify and wash coloured woollens separately from white woollens.

(a) **YELLOWING.**—When immersed in an alkali solution, wool becomes yellow and the alkali absorbed cannot be readily rinsed out, as it penetrates the fibre. When subsequently heated during the drying process, the yellowing becomes intensified.

(b) **FELTING.**—Wool possesses the property of elasticity, *i.e.*, when stretched it returns to its original shape. If strongly alkaline detergents are used, softening and swelling of the fibres takes place, and this

damage is intensified at higher washing temperatures. The individual scales become matted together and lose their resiliency. The garment when dry loses the soft feel associated with wool and becomes hard. This hardening process is known as "felting." Each fibre becomes reduced in area with consequent overall shrinkage of the garment.

(c) **MANUFACTURING PROCESSES DESIGNED TO PREVENT SHRINKING.**—Many woollen garments are given an unshrinkable finish during manufacture. In this process the fabric construction is "set" or stabilised by the complete removal or bedding down of the scales, with resultant reduction in the liability to felting arising during washing. If the garment is not set under the correct conditions, the stabilisation is purely temporary and shrinkage occurs during washing. Shrinkage of the fabric resulting from incorrect manufacturing conditions is an entirely separate consideration from shrinkage caused by felting, and cannot be prevented during any washing process.

4. Washing Requirements for Woollens

In order to produce soft articles of good colour, and to reduce the possibility of felting and shrinking to a minimum, it is necessary:

(a) To wash at low temperatures—The temperature should never exceed 100°F. at any stage during the washing or rinsing process.

(b) To avoid friction, by reducing mechanical agitation to a minimum—by automatic or manual interruption of the washing cycle.

(c) To counteract the natural tendency of wool to absorb alkali—while some authorities state that a mild alkali has no harmful effect particularly in the case of heavily soiled articles such as blankets no alkalis are used in the Admiralty washing formulae for woollens. In this connection it should be borne in mind that the soap stock solution is in itself mildly alkaline.

5. Silks and Rayons

Pieces composed of silk rayon, and mixtures of these two fibres, should be washed by hand. White pieces should be separated from the coloured ones. Natural light coloured silk and rayon articles should be further separated from those of dark colour and handled at different times, even though the washing formula used may be the same. This practice is necessary to avoid any possible bleeding into light colours or white pieces.

As there is always a likelihood of encountering fugitive shades or tints as well as colours of reasonable fastness to washing, every attempt should be made to control the washing temperature to a maximum of 120°F. If rayon or silk articles are laundered by hand, they should never be twisted or wrung. Rubbing of any sort should be avoided and the washing done by a gentle squeezing action.

Mixtures of wool and rayon or silk should be handled as for woollens.

NOTE.—Bleach should never be used on silks and rayons.

6. Washing Processes

SIDE OPENING TYPE MACHINES

All formulae included are based on a standard 30 cu. ft., *i.e.*, 34 in. × 54 in.—100 lb. capacity washing machine of the side opening type.

For smaller capacity side opening type machines, *e.g.*, 50 lb., the quantities of stock solution should be reduced to one half the quantities specified in the formulae.

To obtain good results the machine should be loaded in accordance with the approved loading rate (a guide to appropriate loading is given in Table VIII):

(a) 3½ lbs. dryweight of clothing per cu. ft. cage capacity for cottons and linens.

(b) 2½ lb. dryweight of clothing per cu. ft. cage capacity for woollens.

(c) the approved washing formulae should be adhered to, and care exercised in the weighing of materials required for, and in the making up of, all stock solutions.

END OPENING MACHINES

(a) A number of ships are now fitted with 38 in. × 44 in. end opening type washing machines of cage capacity 28½ cu. ft. The loading rate for cottons and linens can be increased from 3½ to 4 lb./cu. ft., (114 lb. total) for this type of machine; and the formulae used as in the side opening machines. The quantities of stock solutions should, however, be increased by approximately one-seventh.

(b) 34 in. × 18 in. end opening type washing machines, loading capacity 40 lb. dryweight, have been introduced in certain A/S Frigates. Formulae as detailed should be used, but it may be found practicable to reduce dips for the process by 1 in. or 2 in., and so compensate for the reduction in output compared with the standard 50 lb. side opening type machine. The quantities of stock solution should of course be reduced to amounts directly proportional to those specified in the formulae for 100 lb. capacity machines.

WASHING FORMULAE

7. Formulae I to IV

The following formulae cover for the main classifications of work:

Important.—These formulae have been especially designed for use in H.M. ships, and are based on the minimum consumption of fresh water per washing cycle.

Formula I White cotton and linen work, lightly soiled (L)

Formula I White cotton and linen work heavily soiled (H)

Formula II Coloured cottons and linens

Formula III White woollens

Formula III Coloured woollens

Formula IV Engineers' overalls

NOTE.—For hard water conditions, which may be met during continued periods in harbour, or from ships tanks during the first few days at sea, the soda ash solution should be added in the washing cycle before the soap stock solution; *e.g.*, (a), interchange instructions (2) and (4).

FORMULA I

CLASSIFICATION

White work, cottons and linens comprising body linen, white shirts, collars, cooks gear, bath towels, sheets and pillow-slips, tropical rig, No. 10's Officers, No. 6's, Classes I and III etc., Table linen and napkins. Nature of soiling—Light (L); Heavy (H).

(a) FIRST WASH

- (1) Retain the last rinse water from the previous load to a standing dip of 8 in.
- (2) Add soap stock solution 6-8 pints
- (3) Load machine and start
- (4) Add soda ash solution (L) 4 pints
(H) 8 pints

(5) Run for a total time of 10 minutes warming to 140°F.; discharge the wash liquor.

(b) SECOND WASH

- (1) Add soap stock solution 1 pint
- (2) Add water at 140°F. to give a running dip of 3 in.
- (3) Add soda ash solution (L) 4 pints
(H) 8 pints
- (4) Raise temperature to above 200°F. over a period of 7 to 8 minutes and maintain at this temperature for a further 7 to 8 minutes *i.e.*, 15 minutes in all. If necessary add soap stock solution to maintain lather. Discharge the wash liquor.

(c) FIRST RINSE

- (1) Add water at 150°F. to a running dip 9 in.
- (2) Run for a total time of 4 minutes; discharge

(d) SECOND RINSE

- (1) Add water at 110°F. to a running dip of 14 in.
- (2) Run for a total time of 4 mins.; discharge.

(e) THIRD RINSE

- (1) Add cold water to a running dip of 14 in.
- (2) After 4 minutes running unload the machine and retain water for the first wash process of the next load.

(f) NOTES

(i) Bleach may be added at the first wash stage but is only to be used if considered essential. The procedure regarding the limitations and conditions for bleach (*see paras. 19-22*) is to be rigidly adhered to.

(ii) Starching of No. 10's (Officers); No. 6's (Classes I and III) tropical rig and shirts: During the last rinse, decrease dip to 2 in.; cream 1 lb. of National Blended Starch, add to the machine and run the machine for 5 minutes.

For collars see special starching formula.

(SO 7546)

FORMULA II

CLASSIFICATION:

Coloured cottons and linens.

(a) FIRST WASH

- (1) Retain the last rinse water from the previous load to a standing dip of 8 in.
- (2) Add soap stock solution 4 to 6 pints
- (3) Load the machine and start.
- (4) Raise the temperature slowly to 120°F.
- (5) Run for 10 minutes; discharge the wash liquor.

(b) SECOND WASH

- (1) Add water at 120°F. to give a running dip of 4 in.
- (2) Add soap stock solution to maintain a good lather 2 to 3 pints
- (3) Raise temperature slowly to 140°F.
- (4) Run for 10 minutes and discharge the wash liquor.

(c) FIRST RINSE

- (1) Add water at 120°F. to a running dip of 9 in.
- (2) Run for 4 minutes; discharge.

(d) SECOND RINSE

- (1) Add water at 100°F. to a running dip of 14 in.
- (2) Run for 4 minutes; discharge.

(e) THIRD RINSE

- (1) Add cold water to a running dip of 14 in.
- (2) Run for 4 minutes and unload.

(f) NOTES

(i) If "marking off" occurs a fourth rinse will be necessary.

(ii) Retain the water from the last rinse if a further load of coloured work is to be processed. If changing over to white work the whole of the water from the last rinse should be discharged.

(iii) The temperature must not exceed 140°F.

(iv) Soda ash (alkali) must not be used.

(v) Bleach must not be used.

(vi) Wash light colours first, ending with dark colours.

(vii) The tendency of a dye to run (bleeding) can be largely minimized by the addition of 2 oz. of common salt to the load at the commencement of the first wash.

FORMULA III

CLASSIFICATION:

Woollens. Loading rate 2 ½ lbs. per cu. ft. of cage capacity.

(a) INITIAL PROCEDURE

- (1) Add water at 100°F. to a dip of 10 in.
- (2) Add soap stock solution 6 to 8 pints
- (3) Run the machine to build up a good lather.

(b) FIRST WASH

(1) Load the machine (loading rate 2 ½ lb. per cu. ft. of cage capacity).

(2) Process by running the machine for 1 minute then idling for 2 minutes.

(3) Repeat (2) a further three times then discharge the wash liquor.

(c) SECOND WASH

(1) Add water at 100°F. to a dip of 10 in.

(2) Add soap stock solution 6 to 8 pints

(3) Repeat action as at (b) (2) and (3).

(d) FIRST RINSE

(1) Add water at 100°F. to a dip of 12 in.

(2) Each rinse to be of 2 minutes duration the machine being run for ½ minute and stopped for 1 minute then run again for ½ minute and stopped before discharging the wash liquor.

(e) SECOND RINSE

Repeat as (d) above.

(f) THIRD RINSE

Repeat as (d) above, retaining the rinse water except if changing from coloured to white work.

(g) NOTES

(i) White woollens and coloured woollens should be washed separately.

(ii) Temperature must not exceed 100°F. for any stage of the washing cycle.

(iii) Mechanical agitation to be reduced to a minimum. This is normally catered for automatically by mechanical or electrical interruption of the cycle or by a slow-speed gearing. Where such facilities are not provided the machine must be stopped periodically by hand as described above.

FORMULA IV**CLASSIFICATION:**

Engineers overalls: 100 lb. dryweight = approximately 50 overalls.

(a) FIRST WASH

(1) Retain the last rinse water from the previous load to a standing dip of 8 in.

(2) Add soda ash solution 5 gal.

(3) Raise temperature to 180°F. and run the machine for 15 minutes maintaining at 180°F. Discharge the wash liquor.

(b) SECOND WASH

(1) Add water at 180°F. to a running dip of 8 in.

(2) Add soap stock solution 1 gal.

(3) Add soda ash solution 5 gal.

(4) Run for 15 minutes maintaining temperature at 180°F. and adding soap stock solution to maintain lather.

(c) FIRST RINSE

(1) Add water at 180°F. to a running dip of 9 in.

(2) Run for 4 minutes; discharge.

(d) SECOND RINSE

(1) Add water at 140°F. to a running dip of 9 in.

(2) Run for 4 minutes; discharge.

(e) THIRD RINSE

(1) Add cold water to a running dip of 9 in.

(2) Run for 4 minutes and retain the wash liquor if a further load of overalls is to be processed.

(f) NOTES

(i) The addition of 2 oz. of common salt to the load at the beginning of the first wash, will largely minimize the tendency of the colours to run.

(ii) If necessary, soda ash should be added to the last rinse water, and the machine boiled out to remove possible internal contamination before commencing to process normal work.

8. Conservation of fresh water

The supply of fresh water available for all purposes in H.M. ships is limited and every possible precaution should be taken to avoid waste.

As an illustration, the following quantity of water is used in the complete cycle of operations for washing heavily soiled linen to Formula I in a typical 30 cu. ft. capacity washing machine loaded to 3 ½ lb. per cu. ft.

PROCESS	DIP	ACTUAL WATER ADDED TO THE MACHINE IN GALLS.
Wash 1	8 in. static (last rinse water retained)	
" 2	3 in. running	32
Rinse 1	9 in. running	49
" 2	14 in. running	63
" 3	14 in. running	63
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In arriving at the above figures the undermentioned factors have been taken into account:

Water from the final rinse is retained for the first wash.

2 ½ lb. of water are retained in each 1 lb. of clothing, *i.e.*, 25 gall. in the case of a 100 lb. capacity machine, at each washing and rinsing process.

The figure for a commercial shore laundry operating on a recommended formula for similar work and using comparable washing materials is 350 to 375 gall. Adequate water supplies are normally available at shore laundries but the consumption figure is included as an indication of the extent to which attempts have been made and are still progressing to reduce fresh water consumption in laundries in H.M. ships to a minimum. The following are important points in the exercise of economy in fresh water:

(a) Operators must exercise a rigid control on the use of water at each stage of the process; a 4 in. dip means 4 in. and not 5 in. Heavy water consumption occurs particularly at the higher dips.

(b) Machines must not be operated with leaky discharge valves.

(c) Starched work must be dealt with in bulk, as the starching procedure, necessitating a reduction in dip, precludes the saving of the "last rinse" water.

9. Alternative formulae for use

Important.—The following formulae (Nos. V to X) are only to be used if adequate supplies of shore water are available.

FORMULA V

Fresh-water washing process using standard stock solutions of hard soap, Teepol and soda ash.

CLASSIFICATION:

White work, cottons and linens comprising body linen, white shirts, collars, cooks gear, bath towels, sheets and pillow-slips, tropical rig, No. 10's Officers, No. 6's Class I and III, etc.

Nature of soiling—Light (L); Heavy (H).

(a) BREAKDOWN

(1) Retain last rinse water from previous load, (white wash), to a running dip 8 in.

(2) Load machine.

(3) Start machine and run for 5 minutes.

(b) FIRST WASH

(1) Run out breakdown water until a running dip is reached of 4 in.

(2) Add soda ash solution $\begin{cases} (L) \frac{1}{2} \text{ lb. (4 pints)} \\ (H) 1 \text{ lb. (8 pints)} \end{cases}$

(3) Add soap stock solution to maintain a heavy lather 6-8 pints

(4) Run for a total time of 10 minutes warming to 140°F. then discharge the wash liquor.

(c) SECOND WASH

(1) Add hot water at 140°F. to give a running dip of 3 in.

(2) Add soap stock solution to maintain a lather 3 to 4 pints

(3) Add soda ash solution $\begin{cases} (L) \frac{1}{2} \text{ lb. (4 pints)} \\ (H) 1 \text{ lb. (8 pints)} \end{cases}$

(4) Run for total time of 15 minutes warming to 200-212°F., adding soap stock solution if necessary to maintain lather. Then discharge the wash liquor.

(d) THIRD WASH

(1) Add water at 180°F. to give a running dip 3 in.

(2) Add soap stock solution to maintain lather 1-3 pints Nil

(3) Add soda ash solution $\begin{cases} (L) \\ (H) \frac{1}{2} \text{ lb. (4 pints)} \end{cases}$

(4) Run for total time of 15 minutes warming to 200°F. in 8 minutes. Maintain at 200-212°F. for a further 7 minutes, adding soap stock solution if necessary to maintain lather. Then discharge the wash liquor.

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(e) FIRST RINSE

(1) Add water at 180°F. to give running dip of 6 in.

(2) Run for total time of 5 minutes then discharge the water.

(f) SECOND RINSE

(1) Add water at 150°F. to give running dip of 9 in.

(2) Run for total time of 5 minutes, then discharge the water.

(g) THIRD RINSE

(1) Add water at 120°F. to give a running dip of 14 in.

(2) Run for total time of 4 minutes, then discharge the water.

(h) FOURTH RINSE

(1) Add cold water to a running dip of 14 in.

(2) Run for a total time of 4 minutes.

(j) UNLOAD

Unload machine and retain water for the breakdown process of the next load.

(k) NOTES

(i) If essential bleach liquor may be added to the second wash maintaining the temperature at 140°F.

(ii) Where the load is not too heavily soiled the third wash may be omitted.

(iii) Starching of No. 10's (Officers), No. 6's Class I and III, tropical rig, and shirts:— During the last rinse, decrease the dip to 2 in.; cream 1 lb. of National Blended Starch, add to the machine, and run the machine for 5 minutes.

(iv) For collars see special formula.

FORMULA VI

Fresh water washing process using standard stock solutions of hard soap, Teepol and soda ash.

CLASSIFICATION:

Hammocks and bed covers.

Use Formula I with the following variations:

(a) BREAKDOWN

Add soda ash solution $\begin{cases} (L) 4 \text{ oz. (2 pints)} \\ (H) 8 \text{ oz. (4 pints)} \end{cases}$

(b) FIRST WASH

Increase soda ash solution to $\begin{cases} (L) 1 \text{ lb. (8 pints)} \\ (H) 2 \text{ lbs. (16 pints)} \end{cases}$

FORMULA VII

Fresh water washing process using standard stock solution of hard soap, Teepol and soda ash.

CLASSIFICATION:

Table linen and napkins.

(a) BREAKDOWN

(1) Use the last rinse water from the previous load (white wash). Dip 8 in.

(2) Load the machine.

(3) Run for 5 minutes. Temperature 90–100°F.

(b) FIRST WASH

(1) Add soda ash solution 3 pints, and soap stock solution 6 pints.

(2) Lower the dip to 6 in.

(3) Raise temperature, slowly, up to 140°F.

(4) Run for 10 minutes.

(5) Discharge wash liquor.

(c) SECOND WASH

(1) Add hot water at a temperature of 140°F.

(2) Add 5 pints soda ash solution, and 5 pints of soap stock solution

(3) Raise temperature slowly to 200°F., then shut off steam.

(4) Run for 10 minutes.

(5) Discharge wash liquor.

(d) FIRST RINSE

(1) Add hot water at 180°F. to give a running dip of

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(e) SECOND RINSE

(1) Add hot water at 140°F. to give a running dip of

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(f) THIRD RINSE

(1) Add warm water at 100°F. to give a running dip of

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(g) FOURTH RINSE

(1) Add cold water to a dip of

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(h) NOTES

(i) If essential, bleach may be added to the 1st wash, maintaining the temperature at 140°F.

(ii) Starch (see general notes Formula I) may be added the last rinse.

(b) FIRST WASH

(1) Add cold water dip

6 in.

(2) Add soap stock solution to form a good lather

4–6 pints
120°F

(3) Raise temperature slowly to

(4) Run for 10 minutes, then discharge the wash liquor.

(c) SECOND WASH

(1) Add water at 120°F. Dip

4 in.

(2) Add soap stock solution to maintain a good lather

2–3 pints

(3) Raise temperature slowly to 140°F.

(4) Run for 10 minutes, then discharge the wash liquor.

Note: DO NOT EXCEED 140°F.

(d) FIRST RINSE

(1) Add warm water at 140°F. to give a running dip of

9 in.

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(e) SECOND RINSE

(1) Add warm water at 120°F. to give a running dip of

12 in.

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(f) THIRD RINSE

(1) Add warm water at 100°F. to give a running dip of

14 in.

(2) Run the machine for 4 minutes.

(3) Discharge the water.

(g) FOURTH RINSE

(1) Add cold water to give a running dip of

14 in.

(2) Run the machine for 4 minutes.

(3) Retain the water if a further load of coloureds is to be dealt with next.

(h) NOTES

(i) Do not use last rinse water from coloured work when changing to white work.

(ii) Wash light colours first, ending with dark colours.

(iii) Remember that as the temperature of the wash is increased the greater will be the tendency for the colour to bleed.

(iv) Alkali (Soda Ash) should not be used.

(v) Bleach stock solution should *never* be used.

FORMULA VIII

Fresh water washing process using standard stock solution of hard soap and Teepol.

CLASSIFICATION:

Coloured work having average soiling.

(a) BREAKDOWN

(1) Retain the last rinse water from the previous load (if white wash) to a running dip of

8 in.

(2) Load machine.

(3) Run for 5 minutes, then discharge the water.

FORMULA IX

Fresh water washing process using standard stock solution of hard soap and Teepol and soda ash.

CLASSIFICATION:

Engineers' Overalls.

(a) BREAKDOWN

(1) Retain last rinse water from previous load to a running dip of

8 in.

(2) Load the machine.

(3) Run for 5 minutes then discharge the water.

- (b) FIRST WASH
 (1) Hot water at 180°F. —Dip 8 in.
 (2) Add soda ash in solution 5 lbs. (5 galls.)
 (3) Run for 15 minutes keeping temperature at 180°F., then discharge the wash liquor.
- (c) PRELIMINARY RINSE
 (1) Hot water at 180°F. Dip 10 in.
 (2) Run for 4 minutes, then discharge the water.
- (d) SECOND WASH
 As for First wash but add soap stock to produce a good lather 1 gall.
- SECOND PRELIMINARY RINSE
 As for First preliminary rinse above.
- (e) THIRD WASH
 (1) Hot water at 180°F. Dip 6 in.
 (2) Add soda ash 1 lb. (8 pints)
 (3) Add soap stock solution 1 gall.
 (4) Run for 15 minutes keeping at 180°F. then discharge the wash liquor.
- RINSES
 Four, each to run 4 minutes after the water is in.
- (f) 1st Hot water at 180°F. Dip 9 in.
 (g) 2nd „ „ „ Dip 9 in.
 (h) 3rd warm water at 120°F. Dip 14 in.
 (j) 4th cold water. Full.

(k) NOTE.
 The second wash and succeeding rinse may be omitted if the load is not very greasy.

FORMULA X

Fresh water washing process using standard stock solution of hard soap and Teepol.

CLASSIFICATION:

Woollens.

- (a) FIRST WASH
 (1) Fill the machine to 10 in. with water, at a temperature of 100°F. add the required soap stock solution (6-8 pints) and run the machine to build up a lather.
 (2) Stop the machine and place in the load.
 (3) Start the machine and run for ONE MINUTE. Stop the machine for a period of TWO MINUTES. Repeat this process three times, then stop the machine. This action ensures that the machine is running for 4 minutes only and resting for 6 minutes during a ten minute cycle, thus reducing friction in the washing process to a minimum.
 (4) Discharge the water from the machine.
- (b) SECOND WASH
 The load should remain in the machine and the process at 1, 3 and 4 above be repeated.
- (c) FIRST RINSE
 With the machine stationary, add water at 100°F. to a dip of 12 in.
 Run the machine for $\frac{1}{2}$ minute
 Stop the machine for 1 minute
 Run the machine for $\frac{1}{2}$ minute } Total time 2 minutes
 Stop the machine and run out the water.
- (d) SECOND RINSE
 Repeat as for first rinse.
- (e) THIRD RINSE
 Repeat as for first rinse, but retaining water for use with the next load.
- (f) NOTE
 A reduced loading rate of $2\frac{1}{2}$ lb. per cu. ft. cage capacity must be used. Where mechanical interrupter gear is not fitted, the necessary interruptions must be obtained by the manual interruption of the washing cycle.