Note	This technical manual was consolidated for publication as one document as part of the transition to Fire and Emergency New Zealand.

Hoses Technical Manual

HOS-tc

Version 1

Status of this Document

This document is issued by the New Zealand Fire Service pursuant to the Fire Service Act 1975 S27(A) – Operational Instructions and Gazette Notice 84/2004 Operational Instructions.

What this means:
This document has the status of an Operational Instruction. It is written to comply with:

- Other Operational Instructions
- New Zealand Fire Service policies
- Fire Service Act 1975
- Health and Safety and other relevant legislation

Recommendations for Change:

Recommendations for changes to this material should be sent to Operations.

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Hoses Technical Manual			
Amendment Record			
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New Issue			
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7	October 2012	Amendments to Appliance pressure testing and Hose tester pages	
8	December 2015	Changed footer and status page to Operations	
9	December 2015	Added safety note to page 21 – finger injury danger, disconnecting hoses	

Contents

Foreword

In compiling this manual, it has been recognised that there is variation between regions in hose numbering procedures, repair locations, and hose management systems.

Local variations to record management are permitted, provided that the requirements of AMIS are met.

Local variations that meet AMIS requirements are also acceptable to ways of marking or identifying hose for testing or repair. However, where practical, regions should adopt a standard system within the whole region and over time, move to reduce the number of variations in non-critical areas.

1: Introduction

Purpose and overview

Purpose and overview

The *Hoses Technical Manual* provides essential information about the use of hoses within the New Zealand Fire Service (NZFS).

The manual is a reference document for information on hoses. It includes:

- record keeping
- testing
- maintenance and repairs
- decommissioning and disposal
- user requirements for hoses within the NZFS.

Hoses

2: Hose Records

Hose commissioning

Acceptance testing

All new hoses must undergo an acceptance test before going into service. Acceptance testing is to be carried out in accordance with *Section 6: User Requirements.*

Note: The 2011 hose supply contract requires the supplier to provide a test certificate for all new, coupled hoses. This certificate is in the form of a tag attached to the hose itself. This tag may be accepted as evidence of acceptance testing by the supplier.

NZFS acceptance testing

Hoses that fail acceptance testing, where carried out by NZFS, due to faulty manufacture (not couplings leaking) are set aside. The hose store manager is to be notified; the manager will then advise the person in charge of hose procurement.

Manufacturer's number

Once a lay-flat hose passes the acceptance test, the manufacturer's number may become the hose's identification number.

> **Note:** A manufacturer's number is only found on lay-flat hoses. Hose reel tubing and double jacketed hoses may not have a manufacturer's number.

Where the manufacturer's number is not used (i.e., hose reel tubing, double jacketed, etc.), new numbers will be allocated in accordance with local procedures. These numbers will be written on both ends of the hose with permanent marker (see *Hose Numbering*).

AMIS

New hoses will have their details entered into the Asset Management and Information System (AMIS) and an asset number will be automatically allocated. The details entered into AMIS will include:

- a description (e.g., forestry, percolating/non-percolating, hose reel tubing, double jacketed)
- the manufacturer's identification/serial number
- the NZFS identification/unit number (if used)
- the diameter (e.g., 25mm, 41mm, 45mm, 70mm, 90mm, etc.)
- the date of purchase by NZFS
- the business unit where the hose is located (e.g., station, region, logistics)
- the maintenance department where the hose is to be tested annually
- the hose brand (Crusader, Fireline, etc.)
- the date for annual testing
- the expected date of decommissioning.

Hose numbers will not be reallocated once a hose has been decommissioned.

Hose numbering

Local procedures

All hoses are numbered with a unique identifier, in accordance with local procedures.

For example, a unique identifier could start with the first two letters of the region (e.g., AK: Auckland), then an area cost centre number; followed by either the manufacturer's number or a unique serial number. E.g., AK/1234/10.

Notes:

- Always record the full number to identify the hose.
- Regions may need to coordinate hose purchases and numbering
- If the unique asset identifier number is used, no other number needs to be used.

Hose stock and replacement strategy

Recommended hose stocks

Situation	Recommended stock
Appliances that attend 30 fires or less, or out-stations of a main hose service centre	Minimum hoses as per the appliance's standard stowage, plus 25% replacements
Appliances that attend 31 fires or more	Minimum hoses as per the appliance's standard stowage, plus 50% replacements
Isolated stations, irrespective of number of fires	Minimum hoses as per the appliance's standard stowage, plus 100% replacements
Specialist appliances	100% replacement for specialist hoses
Hose service centres	As per regional policy

A hose replacement strategy should be based on the information gathered and kept on the AMIS. AMIS records include information about hose testing and repairs (i.e., the number of patches and the length of hose).

Hoses will be considered for replacement based on the criteria detailed in *Section 5: Decommissioning and Disposal*.

The annual hose replacement strategy should be based on:

- the total number of hoses in service
- the number of hoses decommissioned each year
- the number of aged hoses that come in for repair from outlying stations and remain at the service centre due to poor overall condition.

Testing schedule

Annual testing of hoses should be conducted as outlined in this manual.

Regions may publish specific procedures for use in their areas.

Local procedures may assign a specific location for hose testing; otherwise, each brigade is responsible for acting in accordance with this manual.

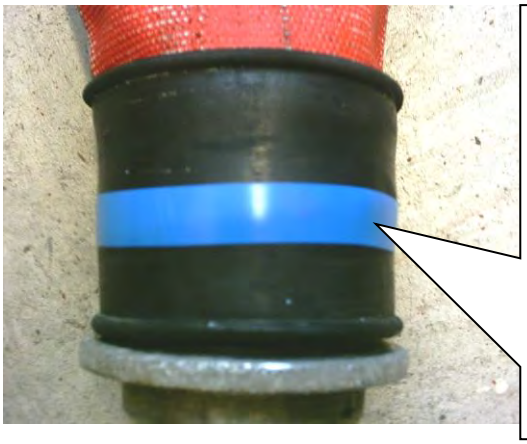
All hoses must be tested annually, and after use or repair.

Hose testing schedule marks

There are several methods used to identify hose testing schedules. One method is described here.

Colour coded insulation tape, wrapped twice around the male coupling rubber sleeve, identifies when the next annual test is due (see below).

Using this method, hoses due for testing can be easily identified without referring to specific hose numbers (similar to BA cylinder testing ID tags).



Electrical tape is overlapped twice around **male** protective rubber to indicate the quarter in which the annual test is due.

Note: On forestry hose, tape is located around the aluminium ferrule on the **female** coupling.

Forestry packs

All three 41mm hoses that are flaked into a forestry pack together should be of the same test period.

Forestry packs may contain the following identification:

- A hotel key tag attached on the straps of the pack flag.
- A completed hose numbering card. This card shows the hose numbers of all three hose lengths in the pack. The length first into the pack is written on the bottom line.
- A piece of coloured tape, indicating when the next test date is due, is attached to the card. The card is slipped into the hotel key tag. A plastic tie is used to hold the key tag in place.

Hose rotation

Regions should develop a local procedure for rotating hoses to ensure that the use of each hose is spread as evenly as possibly.

Testing should be scheduled in a manner so as not to deplete hose stocks excessively.

3: Testing Non-Percolating Lay-flat Hoses

The 2011 supply contract for non-percolating lay-flat hoses (45mm, 70mm and 90mm) requires the supplier to provide acceptance test certificates for new hose assemblies. These certificates should be retained in accordance with the regional procedure. Acceptance tests for 45mm70mm and 90mm hoses will be in accordance with *BS 6391:2009*

Note: for the purposes of this guideline, 89mm hose will be recorded as 90mm.

In-service test types

There are three hose tests:

- Visual testing (includes couplings).
- Length measurement.
- Pressure testing.

Frequency

In-service tests are completed:

- on all hoses supplied uncoupled and then coupled by NZFS staff
- after use at incidents
- after repair
- annually for 45mm, 70mm and 90mm lay-flat hoses
- biannually for 25mm and 41mm lay-flat hoses (NRFA specification)

Note: Any full in-service test will restart the count for the next annual/biannual test date (if used at test pressure, and accurately recorded).

Tested hoses

If a hose is washed and tested after use at an incident then it should have the old tape (or other scheduling mark) removed and the new mark (as per the identification schedule) applied to the male coupling thus extending the test schedule for another 12 months.

Following test or repair, hose records must be updated.

General procedure for hose testing

Washing

Prior to testing, dirty hoses must be washed thoroughly in the hose washer. Any excess dirt may have to be scrubbed off with a soft broom (ensure that no damage occurs to the external covering of the hose).

> **Note:** Refer to any local authority requirements regarding disposal of hose washing water.

Testing

Conduct tests as directed by the following subsections of this manual.

If the hose fails the test, it is repaired (see *Section 4: Maintenance and Repair*) and retested.

If the hose can not be repaired it must be decommissioned (see *Section 5: Decommissioning and Disposal*).

Once a test has been passed the appropriate details are recorded.

Required records are:

- the date
- who tested
- hose number
- hose size
- pass or fail
- comments and repairs made or required.

Drying

Dry the hose and store in accordance with local procedure.

Type 1 and type 2 (as described in *BS6391:2009)* hoses must be drained and dried before being rolled and placed in service or storage. Type 3 hoses can be drained and placed in service or stored whilst wet.

Visual and length tests

Hoses

Examine all hoses for:

- cuts and abrasions
- length less than 20m (for operational hoses, excludes short filling lengths)
- more than five patches.

Hoses that do not pass the visual test should be withdrawn for operational service, and sent for assessment. The assessment determines whether to retain, repair or to decommission the hose.

Couplings

Examine all couplings for:

- significant damage to, or deformation of castings. Couplings with significant damage are to be withdrawn from operational service, and sent for assessment to be repaired or decommissioned.
- defective or missing washers; these are to be replaced before returning the hose to operational use.
- adjustment clearances; adjust as required and apply light lubrication to lugs if necessary.

Note: The contract supplier can supply coupling catch-pin clearance gauges to assist in checking clearances if required.

Refurbishing and repairing couplings

Couplings should be adjusted by trained staff only.

Dismantle.
Clean, adjust and lubricate catch-pins.
Replace washers if necessary.

Check for deformities.

Pressure testing

Hose diameter (mm)	Working pressure (kPa)	Test pressure (kPa) All hoses, including recoupled hoses (applied for 1-5 minutes)	Acceptance test pressure (kPa) (for new hose assemblies)
25	1400 (1050 rural)	2100	2100
41	1400 (1050 rural)	2100	2100
45	1050	1575	2250
70	1050	1575	2250
90	1050	1575	2250
38 mm double jacketed hoses (water dragon hoses)	3200-3500	3200-3500 **Note:** Appliances do not have ability to test at higher pressures. Use high pressure outlet with caution.	3200-3500 **Note:** Appliances do not have ability to test at higher pressures. Use high pressure outlet with caution.

The standard working pressure for NZFS appliances is 1050kPa. *BS 6391:2009* allows for different working pressures provided that the test pressure is 50% greater than the working pressure.

Appliance pressure testing

note:

ance's low pressure delivery valves are
n the fully open position, the large volume of water can result in a highly hazardous hose burst. For this reason, manufacturers recommend that NZFS appliance pumps should not be used to test lay-flat hoses.

note:

riate PPE to be worn at all times when
hoses (helmet, safety shoes/fire boots, and general purpose gloves).

Appliance pump manufacturers do not recommend the use of low pressure, high volume appliance pumps for testing lay-flat delivery hoses.

Alternate pressure testing arrangements, such as the use of the hose testing manifold (hose tester), or a similar device, need to be put in place at all locations that are required to repair and/or test hoses.

If a fire appliance is to be used, the testing procedure when using the low pressure pump is as follows:

Step one

Connect the lay-flat hose/s to be tested to the off-side pump outlet/s, if using a mid-mounted pump.

Step two

Connect a controlled branch to the final length (if testing multiple lengths in series) of the hose/s under test and attach to a fixed branch holder. In some cases, a blank coupling (with a small hole to allow air to escape and maintain a small water flow) or similar device, may be used instead of a branch.

Note: If a fixed branch holder is not available, the branch must be firmly fastened to a secure fitting throughout the test.

Step three

Ensure that the branch/es are cracked open to enable air to be expelled and to maintain water flow through the pump.

Safety note:

All staff must be clear of the length/s of hose under test. The pump operator must remain at the pump controls and immediately reduce pressure and close off the water supply should any major leaks become obvious, or if a hose bursts.

Step four

Build up the pressure gradually (not more than 700kPa/minute). This will allow time for the hose to take the strain.

Ensure that all hoses are monitored throughout test.

Step five

Maintain the test pressure for at least one minute. Mark the locations of any holes or other damage (see *Section 4: Maintenance and Repair*). Do not increase the pressure on damaged lengths.

Step six

Reduce pressure.

Step seven

Hoses that do not pass the pressure test should be withdrawn from operational service, and sent for assessment. Assessment determines whether to repair or decommission the hose.

Hose tester

Overview

The hose tester makes the testing of lay-flat hoses safer, more effective and more efficient. The hose tester uses the appliance hose reel pump, or other pressure device, to pressurise the hose/s under test (instead of the low pressure pump output used previously).

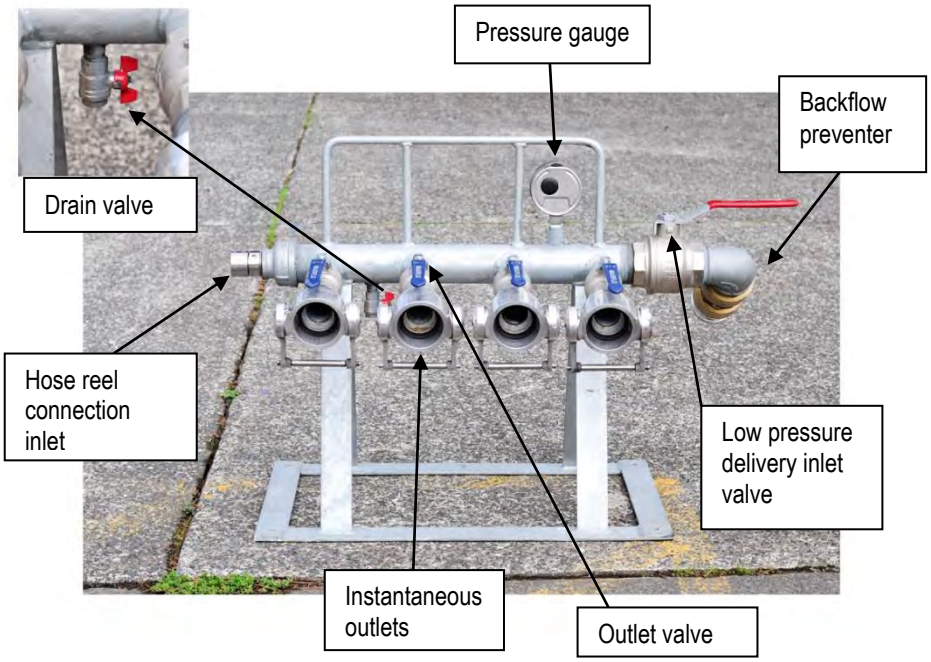
The hose tester:

- enables firefighters to simultaneously test multiple lay-flat hoses of varying sizes with pressurised water using a standard NZFS appliance hose reel
- uses less water
- enables the pumping appliance to operate at a lower power level
- minimises the crew's exposure to hazards when operating at test pressure.

Backflow prevention

All hose testing devices that connect to water mains are required to have backflow prevention between the device and the water main.

Description



The hose tester is a manifold consisting of four outlets fitted with instantaneous couplings. Hose lines may be connected in series to each outlet. When connecting hose lines in series, care must be taken to ensure there are no kinks or sharp bends in each line of hose (refer to fire ground hose line layout). The total number of lengths in each hose line should not crowd the space available for testing. The hose tester has a hose reel inlet fitting at one end and an instantaneous coupling inlet at the other, a drain valve, and a pressure gauge.

The unit is constructed of galvanised steel and is mounted on a steel frame that may be bolted down as a permanent fixture.

Note: A smaller version of the hose testing manifold is now available. Although the operation using the low pressure pump to fill the hose lines and the hose reel pump for pressure testing is the same, there are some other differences:

- only two instantaneous outlets, instead of four
- no return valve; the tester is designed to be filled from an appliance tank and delivery, rather than via a standpipe (the appliance can be connected to the main via a standpipe and feeder if available)
- when the hose line under test is filled, shut off the delivery and pressurise using the hose reel pump
- there is no drain valve, pressure should be released via the connected delivery.

Set up

Setting up the hose tester is a simple process:

1. Connect the hoses to be tested to the instantaneous outlets, either directly into the instantaneous coupling, or for hoses with screw-type coupling, using adaptors.

Safety note:

1. When disconnecting hoses, keep fingers clear of the space between the outlet coupling lug ends.
2. Always push the lever away from the hose coupling.

2. Remove the nozzle from the hose reel of a standard NZFS pumping appliance. Connect the hose reel tubing to the hose reel inlet on the hose tester.

3. It is recommended that a low pressure delivery hose (from either a stand pipe or the low pressure pump outlet) is connected to the low pressure delivery inlet to fill the hose/s under test.

Note: The use of low pressure delivery hose can significantly speed up the testing process, particularly when there are a large number of hoses to be tested.

note:
se tester must be firmly secured, particularly
g a single length.

Low pressure testing process

Couplings

Both visual and pressure tests must be carried out.
All couplings must be examined for:

- distortion
- damage
- defective or missing washers.

Couplings with distortion or damage must be either withdrawn from service or approved for continuing use.

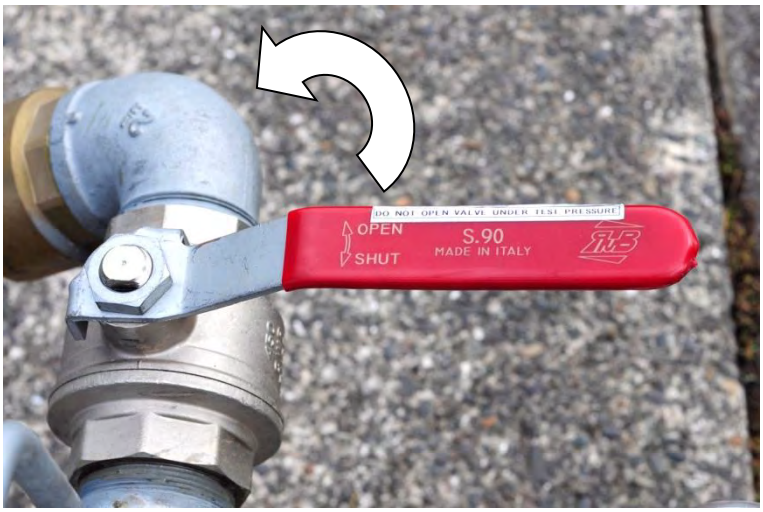
Defective or missing washers are to be replaced.

Adjustments and light lubrication of instantaneous coupling lugs (when necessary) is to be carried out by competent hose store staff. Refer to *NZS PAS 4505* for help with adjustments.

Step one Set up the hose tester.

Step two Connect the hose/s that are to be tested.

Step three Open feeder inlet valve.



Step four

Open the outlet valves that are being used (ensure unused outlets are closed).

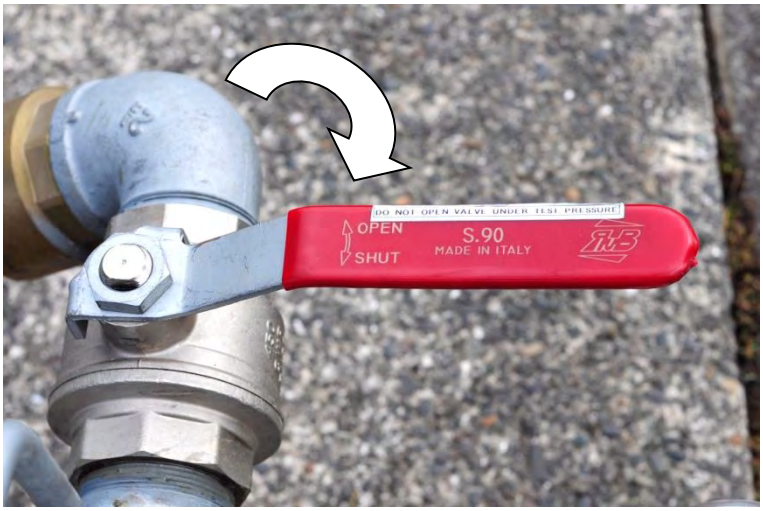
Step five

Close the drain valve.

Step six Fit branches (or similar devices, such as a blank coupling with a small hole) to the end of the hose/s under test.

Step seven Fill test hose/s to expel air slowly closing branches (or other valved fittings).

Step eight Close low pressure delivery inlet valve.

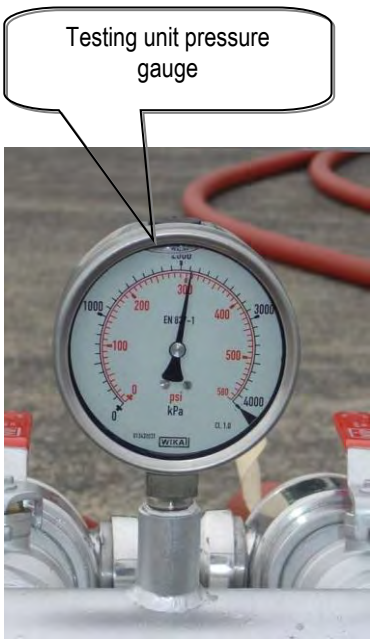


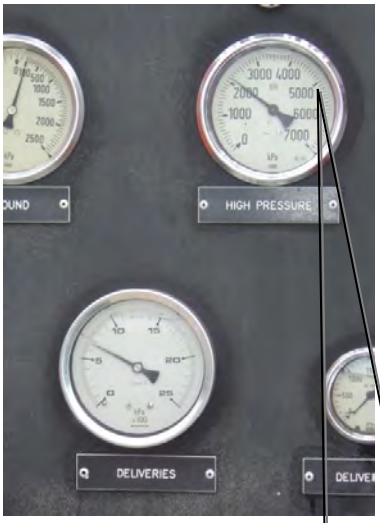
note:

v pressure delivery inlet valve must be before starting to raise the test pressure. Failure to do so may result in the failure of the backflow prevention and/or the delivery hose.

Step nine

Slowly raise the pressure and test hose/s until the appropriate pressure is reached. Pressurising should take 2-3 minutes.





Note: It is useful to compare the hose reel gauge with the pressure gauge on the hose tester to check for accuracy.

Step ten Carefully release pressure and open drain valve.

Step eleven Follow standard NZFS procedures for recording, repairing, etc.

High pressure testing process

Testing high pressure lay-flat hoses (Sno hoses [Water Dragon], and forestry hoses) involves a slightly different process due to their higher working pressure.

Pressures differ for Sno hose (Water Dragon) and forestry (41mm) hoses.

Note: Do not attempt to test high pressure lay-flat hoses at the same time as standard lay-flat hoses.

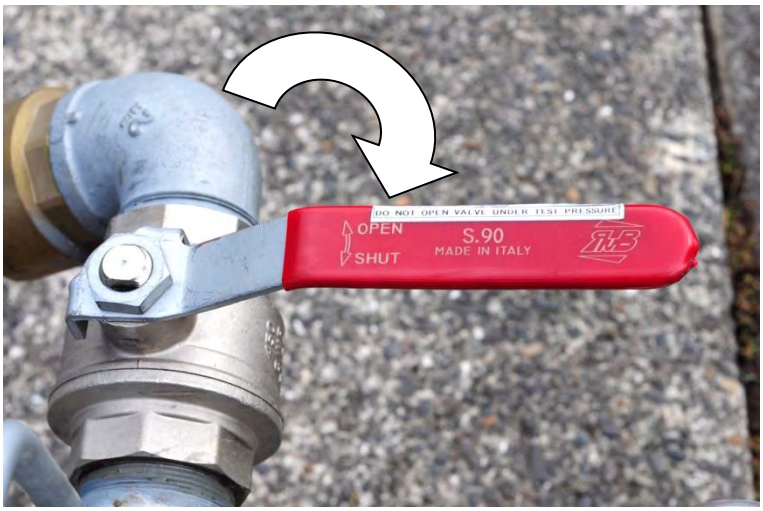
Step one At the open end of the hose/s under test, connect a controlled branch (using a branch with a compatible thread or suitable adaptor) or a suitable valved waterway fitting.

Step two Secure the branch to a fixed object to prevent uncontrolled movement.

Step three Make sure the branch/fitting valve is shut off.

Step four Connect the hose/s to the testing unit using the supplied instantaneous-to-screw thread adaptor.

Step five Close off the low pressure inlet valve on the hose tester.



Step six Fill test hose/s to expel air before slowly closing branches (or other valved fitting).

Step seven Slowly increase the hose reel pressure to the required test pressure.

note:

Close the inlet valve before pressurizing the system.

- Raise pressure SLOWLY (allow 2-3 minutes to do this).
- High pressure lay-flat hoses must be tested separately from standard pressure hoses.

Failed pressure tests

Process for failed test

Hoses that do not pass the pressure test should be withdrawn from operational service, and sent for assessment. Assessment determines whether to repair or decommission the hose.

Test records

Passed hoses

On completion of the annual test: follow local procedure, dry hoses and record results. (See *Section 2: Hose Records*)

Refer to user requirements for specific instructions on certain hose types. (See *Section 6: User Requirements*).

4: Maintenance and Repair

Identifying defects

Precise marking and recording of faults and/or defects is critical to ensure the speedy repair and return of hoses back into service. Therefore the labelling, numbering and naming of all hoses must be consistent and clear.

Below are some examples of hose fault identification procedures.

Re-couples

1. Cut the hose 2/3 of the way through just above the rubber sleeve.
2. Complete the test/repair form and enter details to the hose records.
3. Drain and dry the hose so that repairs can be completed.

Shows the correct method of indicating that a hose requires re-coupling. Cut 2/3 of the way through.

Holes

Introduction

Hoses requiring repair or replacement should be forwarded to the district hose station in the following condition:

- Clean and dry.
- Correctly labelled and marked.

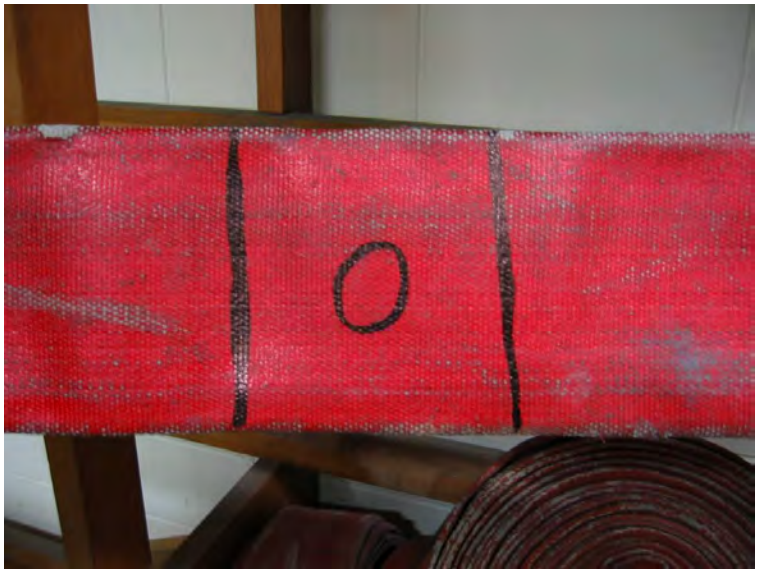
There are various methods for identifying holes that require patching. Two methods are described below.

1: Indicator wire

1. Place the hole indicator wire into the hole and tie three half hitches with the attached string around the hose to hold the wire in place.
2. Complete the test/repair form.
3. Drain and dry the hose ready for repair.

2: Marking

1. Draw a circle around the hole with indelible pencil approximately 5 cm in diameter.
2. Draw two rings around the circumference of the hose, approximately 5 cm either side of the circle indicating the hole.



Defect label

Labelling is done by completing a defect label and inserting that label into the waterproof pocket of the hose repair tag. Attach the pocket to the hose using Velcro straps.

Repairs

Note: Before patching hoses must be thoroughly dried.

Types of repairs

Types of repairs include:

- hole, cut and abrasion patching (cold patching, hot patching, internal patching)
- tying couplings
- maintenance of couplings
- garter/sleeve/defender replacement.

Hose movements

Details of hose transfers in or out of stations should be recorded.

Details to record include:

- hose number
- size
- brigade
- in or out.

Hose store staff will regularly update records to reflect the current whereabouts of hoses.

note:

s and eye protection are to be worn at all
/hilst working in the hose department.

Cold patching

Materials

Refer to the manufacturer's specifications for maintenance and repair.

Materials include:

- Desmodur RFE (hardener)
- Bostik Unigrip 999 (glue)
- Bostik No 4 (solvent)
- Gloves, rags, cling wrap
- Rip-stop Tuffcover (patching material)

To repair hoses using this method, it is necessary to have floor space available, as the hose must be left for 12 hours before coiling and **a further 12 hours** before testing.

Method

Step one

Locate hole and, **wearing gloves**, apply solvent at area of patch (solvent dries very quickly)

Step two

Cut rip-stop to size (round patches preferable).

Step three

USE GLOVES: Mix small quantity of glue and hardener in proportion: 10:1 (10 parts Unigrip 999 glue: one part Desmodur RFE hardener).

Step four

Apply mixture to the hose and patch, leave to become tacky.

Step five

Apply patch to the hose, cover with cling wrap and clamp together. Use F clamps provided or Stenor vulcaniser patching unit: **DO NOT USE ANY HEAT.**

Step six

Leave for 12 hours in clamp, do not coil the hose. The hose can be tested after **another** 12 hours.

Note: Desmodur RFE curing agent is a straw coloured material when in good condition, it must be kept tightly sealed when not in use. It turns to a whitish colour when exposed to air, when this happens, another container must be purchased.

Do not use when in this white condition. Purchase only in small quantities (20-50ml).

note:

good ventilation is available.

Hot patching

/ notes:

r vulcaniser machine: Only authorized nnel should alter the settings on the Stenor vulcaniser machine. Ensure that the machine is not left under tension after completing repairs. Close the vulcaniser using one hand only.

Burn danger: The temperatures reached using the Stenor vulcaniser machine will cause burns to the skin. Avoid contact with heated pads.

Step one

The hose must be clean and dry. Trim any loose fibres from the damaged area. If necessary enlarge the hole to allow entry of the talc nozzle (step 3).

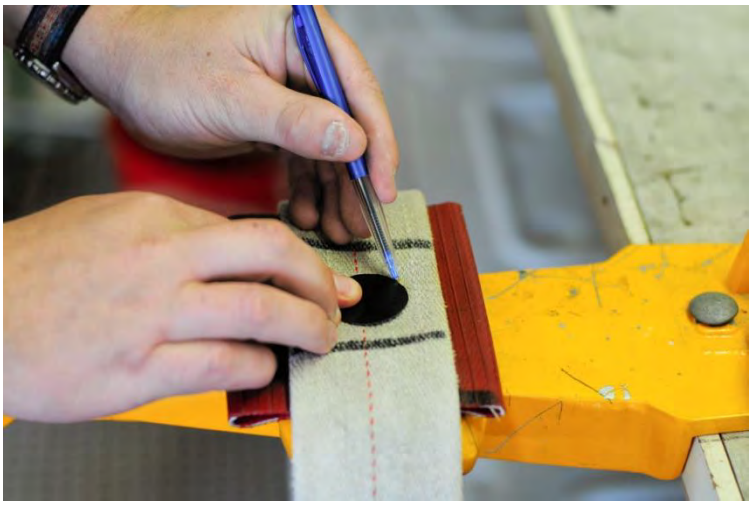
While completing this step, turn on the vulcaniser and preheat it to the required temperature (150°C)

Note: The damaged area must be slightly scuffed for the patch to adhere.

Step two

Select a patch of the appropriate size and place it centrally over the damaged area.

Mark around the patch with a pen or marker.



Step three

Insert the talc nozzle and inject the powder liberally in both directions, and below the hole.

> **Note:** Failure to adequately protect the hose interior with talc powder will result in extensive damage to the hose.

Step four

Pinch the hose at the damaged area to expose the edges of the hole, and to form a small valley beneath it.

Fill the valley with vulcanite 2000 and release the hose so that it returns to its lay-flat profile.

> **Note:** A bead of Vulcanite 2000 should remain raised over the cut or hole.

Step five

Using a knife blade or spatula spread a thin even coat of Vulcanite 2000 within the marked patch area.

Take care not to disturb the bead formed over the hole.

Step six

Position the hose on the vulcaniser. Place the patch on the marked patch area and cover with cellophane.

Ensure the patch does not move out of the marked area.

Step seven

Close the vulcaniser with moderate pressure (using one hand only) and activate the heat cycle.

Step eight

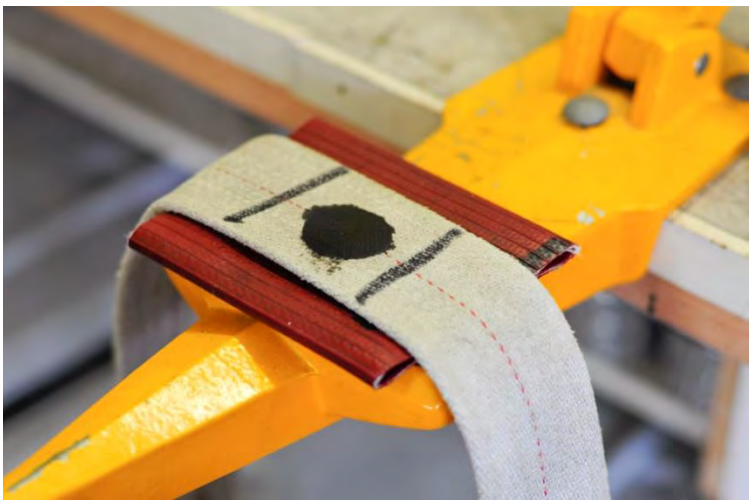
Ensure that the vulcaniser is preheated and set to 150°C.

> **Note:** The temperature switch is RED, and the timer switch is BLACK.

Step nine

After heating the patch for approximately 10 minutes at 150°C, allow the vulcaniser to cool to 55°C and release the clamp.

The patch can be tested immediately.



Internal patching

/ note:

r vulcaniser machine: Only authorized nnel can alter the settings on the Stenor vulcaniser machine. Ensure that the machine is not left under tension after completing repairs. Close the vulcaniser using one hand only.

Burn danger: The temperatures reached using the Stenor vulcaniser machine will cause burns to the skin. Avoid contact with heated pads.

Cuts or holes larger than 4mm require an internal patch.

Step one

File the hose around the cut/hole to smooth ribbing and indentations.

Preheat the vulcaniser.

Step two

Insert the scourer into the cut/hole. Push down on the round handle and pull the steel handle up.

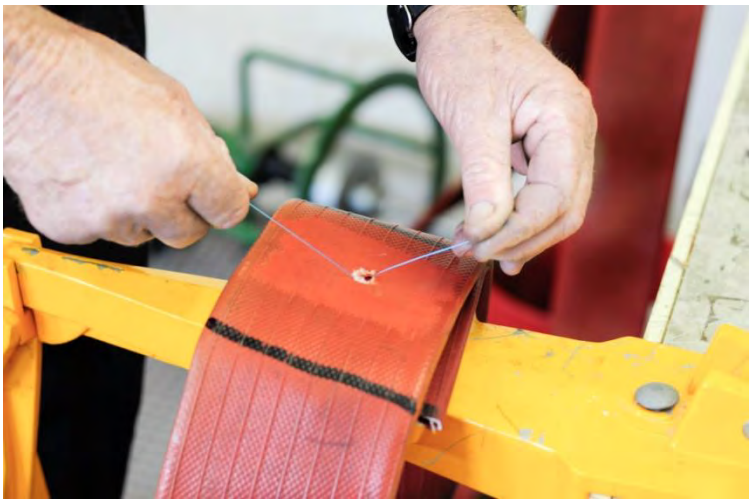
Twist the steel handle around to scour and smooth the internal surface of the hose.

Step three

Insert the internal patch to run lengthways along the cut/hole.

Step four

Carefully remove the nylon thread ensuring the internal patch does not move out of position.



Place cellophane over the damaged area. Place the hose onto vulcaniser and close using one hand. Heat the area at 165°C for 10 minutes.

Step five

When the 10 minute buzzer sounds, open the vulcaniser and remove the cellophane.

Peel the protective coating from the back of the external patch. Place the external patch on the damaged area in the direction of the cut/hole.

Step six

Re-cover with cellophane and close the vulcaniser. Heat for a further 10 minutes.

Allow to cool for 20 minutes.

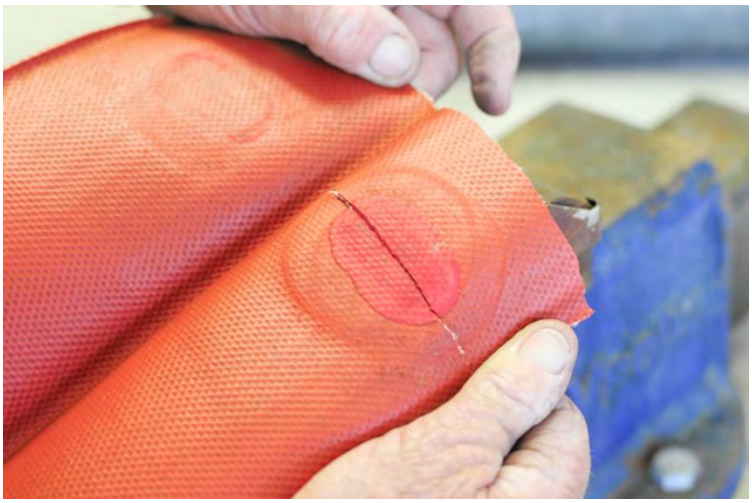
Step seven

After the 20 minutes cooling time has elapsed, remove the hose from the vulcaniser.

DO NOT remove the cellophane.

Roll the hose up and allow the patch to cure undisturbed for 24 hours.

This example shows an internal patch from a cut-away section of the hose.



Screw couplings

Step one

Trim the end of the hose square.

Step two

Place the ferrule onto the mandrel.

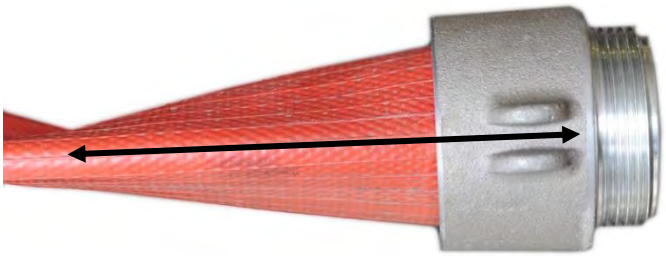
Step three

Push the hose into a forestry coupling (couplings with an O-ring are to be used only on extruded hoses).

Example showing O-ring inside the coupling.

Step four

The seam of the hose should be in line with the lugs of the male forestry coupling.



Step five

Place the hose onto the mandrel as far as it will go. Mark the hose at the coupling with a pen.

Step six Move the expand/release lever to the expand position.

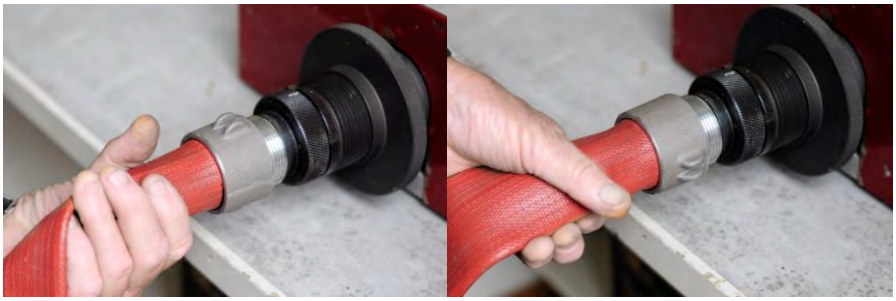
Step seven Increase the pressure to 1000 psi then release.

Remove the coupling and check to see that the ferrule is in the correct position.

Step eight

Place the hose back onto the mandrel and increase the pressure to 2100 psi and then release.

Rotate the coupling 90° on the mandrel.



Again increase the pressure to 2100 psi. Hold for 10 seconds and ensure the pressure does not drop.

Instantaneous couplings

note:

ensile wire: Be aware that this type of wire mely dangerous due to its inherent strength. Care must be exercised when removing the wire from the couplings.

Standards

Hose assemblies shall be fitted with delivery hose couplings conforming to *NZS4505.*

The couplings shall be tied in by binding (“bound in”) with galvanised mild steel wire 1.6 mm in diameter, conforming to *BS1052.*

Multi-serrated type couplings shall be secured by 20 continuous turns of wire. Ribbed type couplings shall be secured by ties of at least eight continuous turns on both sides of the rib. The ends of the wire shall be secured by twisting them together and folding over.

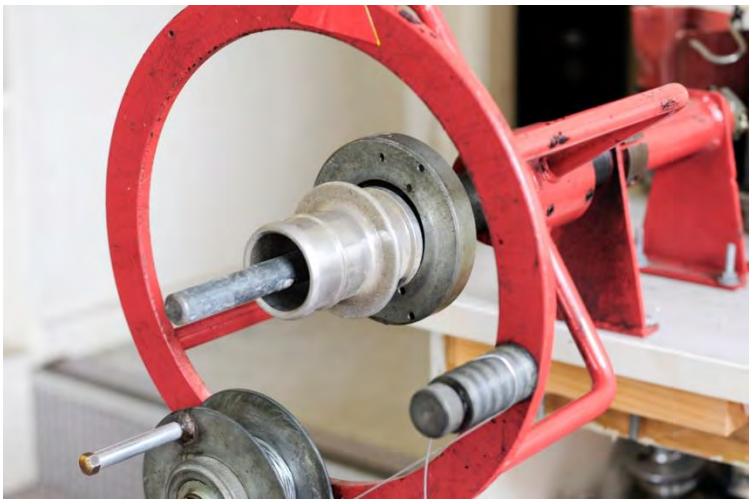
Process

Step one

Cut the end of the hose square.

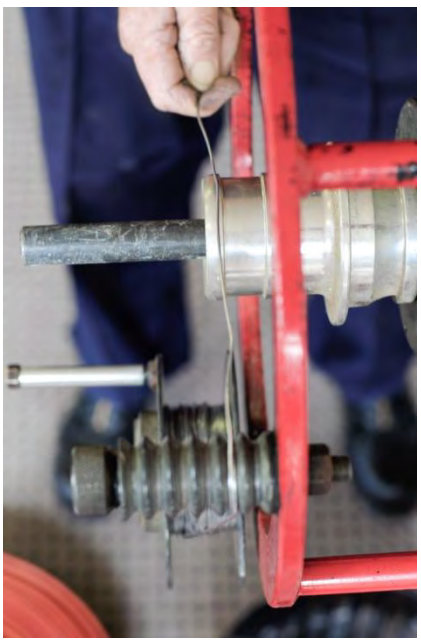
Step two

Place the coupling onto the hose tying machine, flush against the face plate and tighten the expander.



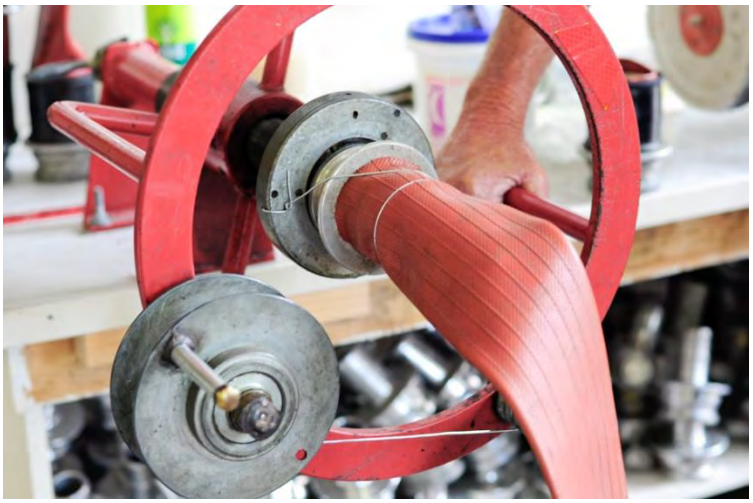
Step three

Wind the hose tying machine out so that the hose is in line with the first lip of the coupling.



Step four

Wrap the wire one and a half times around the guide and fasten the wire to the face plate.

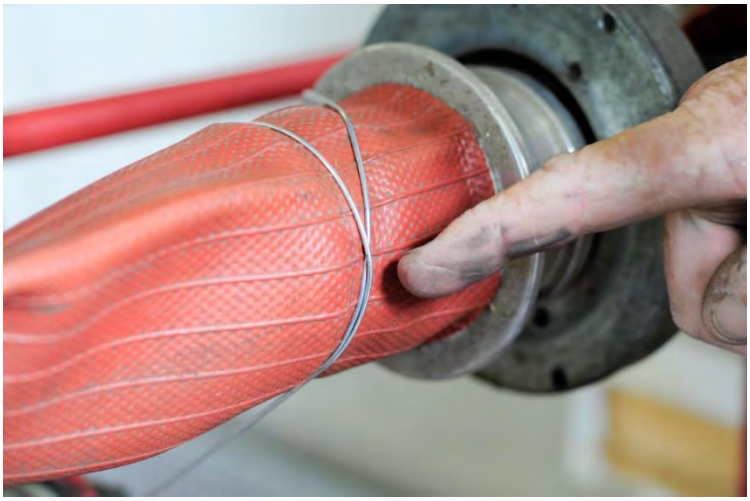


Step five

Place the black garter onto the hose, move it down the length, out of the way.
Push the hose onto the coupling.
For the female coupling ensure that the seam or fold of the hose is in line with the lugs.

Step six

After the first turn push the wire over the top of the previous turn. Do not loosen the tension while you do this.



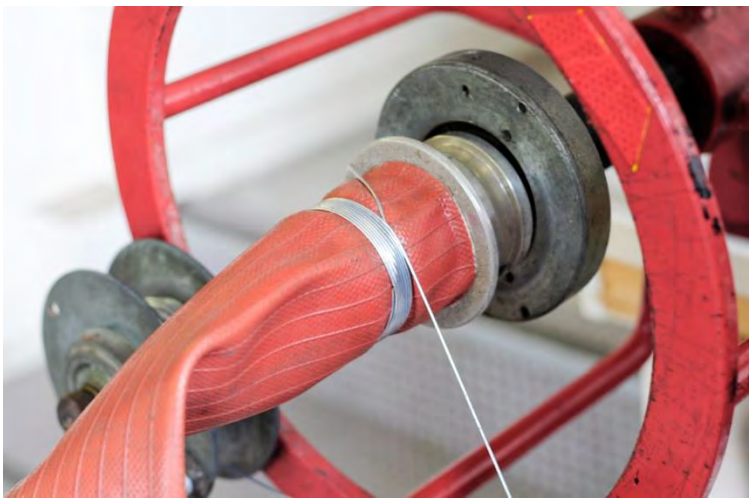
Note: There must not be any gaps between each wind.

Step seven

Ensure that the hose tying machine is set at 22kg (222 Newtons).

Step eight

Continue winding for a minimum of eight turns on each side of the rib (ribbed type couplings), or 20 turns for serrated type couplings.



Step nine

Cut the top wire, bend it over the windings and tap it down with pliers.

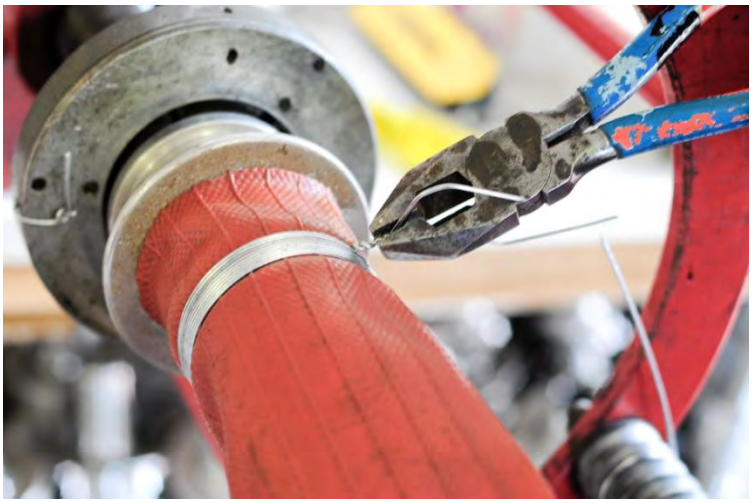
Step ten

Keep downwards tension on the wire with the pliers when you cut the bottom wire.

Note: If the tension is lost then you must start the process again.

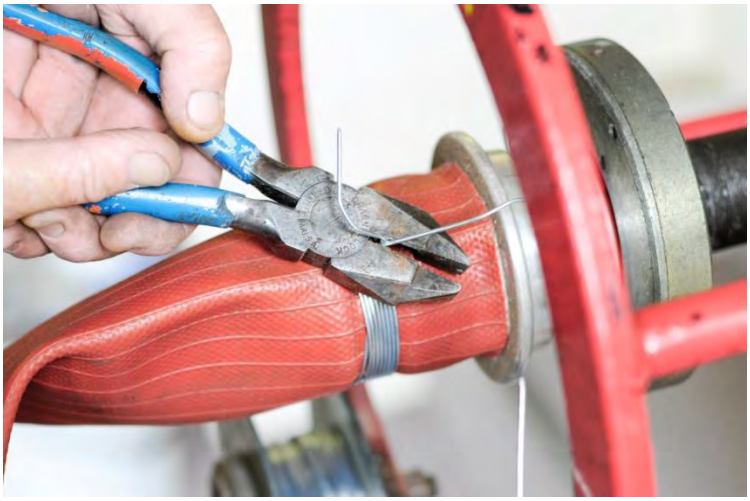
Step eleven

Twist the wires together with pliers to secure the tie.



Step twelve

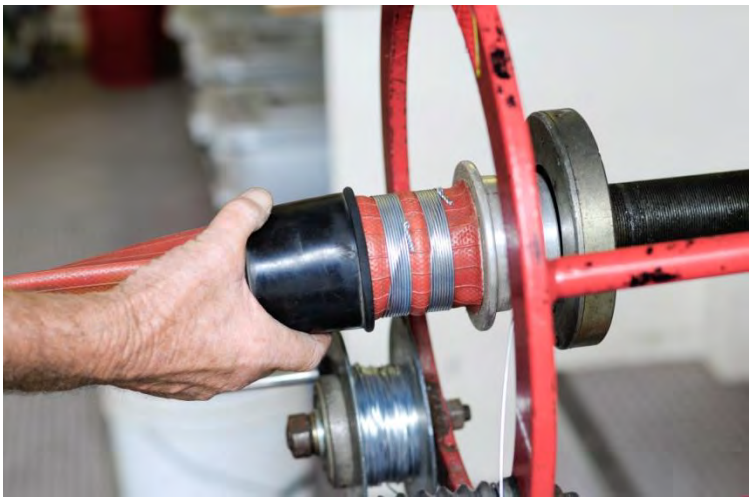
Cut the excess wire off using pliers with the cutting side facing away from the hose.



Step thirteen Tap the twist of wire down so that it is flush with the tie.

Step fourteen Repeat the process for the second tie, keeping in line with the second lip on the coupling.

Step fifteen Slide the black garter back up over the tied hose to the coupling face plate.



Note: The Phillips and Smith website (http:/www.firemaster.co.nz) has a demonstration media clip that shows how to tie couplings.

PSL automatic tying technique

Introduction

The current NZFS suppliers, Phillips and Smith Ltd. (PSL) use a more stringent, automated method of hose tying when the hose is coupled for the first time.

The following steps demonstrate the difference between the NZFS method, and the PSL method.

General

The wire is wound with an automatic machine that is controlled with an electronic foot pedal.

Step one

The tension is set to between 35 kg and 40 kg.

Step two

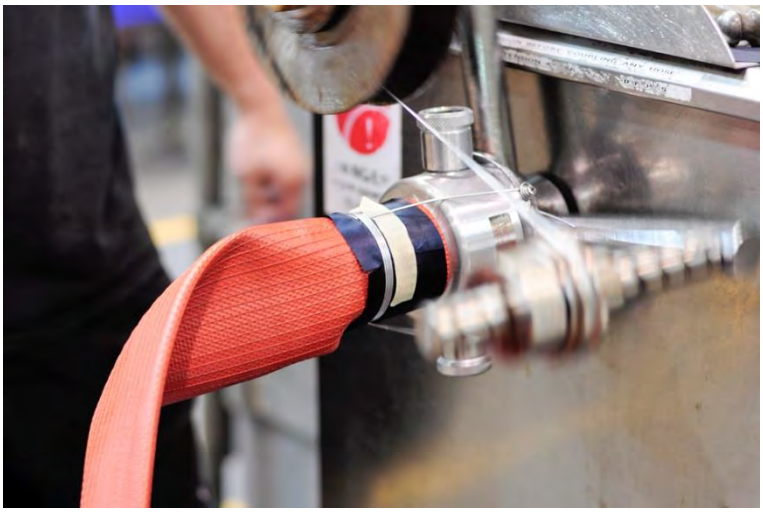
The coupling is placed onto the mandrel and an expanding rubber holds it firmly in place. The hose is pushed onto the coupling.

Step three

A piece of fabric is affixed to protect the hose from damage caused by the wire.
The first revolution is hand wound. A right angled kink is made, and tucked under the wind. The end of the wire is then fastened to the machine.

Step four

The wire is wound around the hose eight times by the automated machine. The winds are tighter and closer together than those made by a manual hose tying machine.



Step five

When the winding is completed, the wires are carefully cut (retaining the tension), twisted together and tapped down. The process is repeated for the second tie.

Step six

Fibre glass tape is wrapped over the ties. The hose is lubricated with dishwashing liquid, and the black garter is slipped up over the ties.

Barway couplings

Introduction

The installation of barway couplings is to be done by trained staff only. Barway couplings are fitted to boston booster hoses.
The following steps are provided by PSL.

Process

Step one

Using a craft knife, trim the end of the hose square.

Step two

Bevel the inner edge of the black hose lining.

Step three

Screw shell onto hose. It should be difficult and may require bar-lube lubrication. Insert until the hose bottoms, then back out 1/8” to allow for expansion.

Step four

Mark the position of the bottom edge of the shell on the hose.

Step five

Place the clamp over the shell and secure in vise. The pins on the clamp should fit into the holes on the shell.

Step six

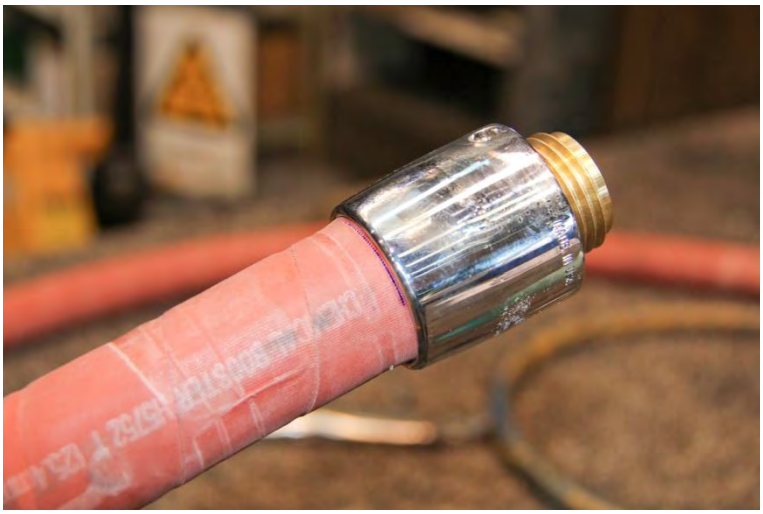
Lubricate the expander and the hose with bar-lube.

Step seven Insert the key through the expander, and position both into the shell.

Step eight Using an air ratchet screw the expander into the shell.

Step nine

Remove from the clamp and check the mark to ensure the hose has not pushed out during installation.



5: Decommissioning and Disposal

Assessment for decommissioning and disposal

Assessment

The table below identifies the criteria to be used when assessing hoses for decommissioning and disposal. The length of hoses meeting any of the criteria below **does not** automatically mean that it should be decommissioned; rather, that it should be assessed for continued use by an experienced person.

	25 mm	25 mm (Percolating)	41 mm	41 mm (Percolating)	45 mm	70 mm	90 mm
Age	>15 Years	>15 Years	>15 Years	>15 Years	>15 Years	>15 Years	>15 Years
No. of patches	> 5	> 5	> 5	> 5	> 5	> 5	> 5
Length	< 25 m	< 25 m	< 25 m	< 25 m	< 20 m	< 20 m	< 25 m
Weepage	Multiple pinholes	N/A	Multiple pinholes	N/A	Multiple pinholes	Multiple pinholes	Multiple pinholes

Hoses that are older than 20 years should be considered for decommissioning. Hoses that are withdrawn from service at this point will assist in programmed replacement and national funding based on maximum useable life.

Hose decommissioning

Decommissioning process

Hoses that are recommended for decommissioning are to be set aside. The manager of the hose store should be notified. The manager assesses the hose and approves decommissioning, or returns the hose for retesting.

Hoses approved for decommissioning should have their couplings and NZFS identifier removed before disposal.

The hose store manager will arrange for the Fixed Asset Disposal (FAD) form (see Appendix) to be completed using relevant information from the database, and for the AMIS records to be amended.

The completed FAD form is to be copied, the original is to be sent to the NHQ Finance Department and the copy is to be placed into FAD folders (arranged by hose size).

Couplings

Couplings that are no longer fit for use must be rendered unusable.

6: User Requirements

Introduction

The requirements of this specification are to be regarded as minima, (or maxima as the case may be) and nothing herein is to be construed as preventing either the manufacturer from providing stricter or additional performance criteria in either part or whole of this specification.

The testing information in this section is for initial procurement purposes only. Fire Service testing specifications for in-service testing can be found in *Section 3: Testing Non-percolating Lay-flat Hoses*.

Key documents

Key documents that work alongside this technical manual are:

- *British Standard Specification for Non-percolating Lay-flat Delivery Hoses and Hose Assemblies for Firefighting Purposes BS 6391:2009* This is available on loan from the New Zealand Fire Service Information & Library Services.
- *Australian Standard for Fire Hoses – Delivery Lay-flat AS 2792-1992.* This is available on loan from the New Zealand Fire Service Information & Library Services.
- *Standard New Zealand Specification for Firefighting Waterway Equipment NZS PAS 4505.* This is available through the Information Centre, NHQ.

Non-percolating lay-flat delivery hoses

25mm non-percolating or impregnated lay-flat hoses

General

These hoses are required for predominantly vegetation firefighting, and are normally carried in hosepacks containing a minimum of three lengths to each pack (total 90m). The hoses are to be lightweight, low in friction loss and have the ability to withstand high operating pressures.

To ensure that the hoses remain in satisfactory condition they will be subjected to a biannual pressure test at 2100kPa maintained for one minute.

To cover these general requirements it is essential that the hoses are constructed uniformly throughout, and that the most suitable materials are used.

Hose construction

Lay-flat hoses are made up of the following:

- Jacket: this can be constructed of either synthetic or vegetable fibre, or both.
- Lining: the material used can be of any form of acceptable composition but should give elasticity, flexibility and durability.
- Adhesion: The lining must adhere to the jacket in accordance with *BS 6391:2009 – Methods of Test for Adhesion.*

The manufacturer is to provide verification of the materials used and the construction method.

Note: In normal use and while flaked into hosepacks for periods of up to two years, the internal surfaces of the lining must not adhere together to such an extent that the touching surfaces are damaged when they are separated by water being pumped through the hose.

Size

Lay-flat hose dimensions are as follows:

- internal diameter: 25.5 mm
- external diameter: 29.5 mm
- tolerance: +/- 0.5 mm
- coupling reference: *ND43 & ND44/3 NZS PAS 4505.*

The hose is to fit the internal tailpiece of the coupling with the standard internal expansion copper ferrule method of fitting.

Length

To be supplied in rolls of 30 m (+/- 300 mm).

Weight

The hose should be as light as possible, but it is essential that durability is not sacrificed thereby.

Total weight including couplings = 6.5 kg.

Working pressure

The working pressure is to be 1400 kPa.

To the working pressure test the hose must withstand to a pressure of 2100 kPa built up at a rate of 700 kPa per minute and maintained for a period of one minute. During this test the hose must not show signs of ‘pinholes’.

Bursting pressure

The minimum bursting pressure is to be 4200 kPa.

For the bursting pressure test a 900 mm length is to be subjected to a pressure of 4200 kPa for a minimum period of one minute.

Change in size

The construction of the hose must be such that it does not increase beyond the following limits when the test hose is held at 2100 kPa for a minimum or two minutes:

- diameter: maximum diameter increase of 4 mm
- length: maximum length increase of 5% (1.4 m)
- twist: shall not exceed 10 turns per 30 m length.

Flexibility

When dry, the hose must be capable of being laid into a hosepack in flakes of less than 440 mm in length without any permanent deformation appearing when the hosepack is kept in this manner for a period of 24 months.

The hose should also be capable of being rolled from the centre into a roll not exceeding 460 mm in diameter.

Durability

This is to be as high as possible, but to a minimum of 500 strokes on the standard NRFA hose abrasion test.

For the abrasion test a 900 mm length of hose with a pressure of 1050 kPa and a flow rate using a 7 mm nozzle is used. The weight of the abrasion file shall exert a downward force of 2 kg at the point of contact with the hose.

The test hose must withstand a minimum of 500 strokes from the abrasion file.

Mildew resistance

The material from which the hose is constructed should be as resistant as possible to mildew. If the material is a vegetable fibre origin it must be given appropriate treatment. Such treatment must not adversely affect the hose's strength, durability or flexibility in any way.

The manufacturer is to provide verification of the method of treatment and chemical/s used.

Full length kink test

The hose is to conform to the requirements of *AS 2792: 1992 – Full length Kink Resistance Test.*

The manufacturer is to provide verification of compliance.

Ozone resistance

The hose is to conform to the requirement of *BS 6391:2009 – Method of Test for Ozone Resistance.*

The manufacturer is to provide verification of compliance.

Pressure/flow loss due to friction

The internal surface of the hose should be such to minimise pressure and/or flow loss.

The manufacturer is to provide data on pressure and flow loss per 30 m.

Heat resistance

This is to be as high as possible, but to a minimum of the standard NRFA heat resistance test.

For the heat resistance test, a 500 mm length of hose under a pressure of 1050 kPa and flow rate using a 7 mm nozzle is subjected to a heated bar element.

The 8 mm straight bar element, operated a temperature of 450°C is set against the hose surface.

The hose must not show water leakage over the five minutes of this heat resistance test.

Repairs

It is preferable that the hose is easily repairable by simple means.

The manufacturer is to provide information on reparability.

Acceptance tests

NRFA acceptance testing will be made at the NRFA testing agent's test facility or at another independent test facility elsewhere as may be agreed between the NRFA and the hose manufacturer.

All testing for NRFA acceptance is to comply with requirements of this specification.

The manufacturer/agent seeking their product's acceptance to this NRFA hose specification will need to provide the testing agent with the following:

- two 30 m lengths of hose for tests
- verification of materials used and construction standard
- verification of jacket/lining adhesion
- external and internal diameters
- average overall length
- weight of average length
- working pressure
- bursting pressure
- change in dimensions under pressure
- flexibility, and diameter when rolled
- durability
- verification if mildew treated and chemical/s used
- verification of kink test
- verification of ozone resistance
- water flow/pressure loss
- heat resistance
- suitability/methods of repairing hoses
- availability of deliveries to and within New Zealand.

Recognition of compliance

A test report will be supplied to the manufacturer/agent submitting the hose for testing and a nominal fee will be charged for the acceptance testing.

The contents of the test report will remain confidential to the manufacturer/agent submitting the hose, the testing agent and the NRFA.

A list showing hoses approved to the NRFA specification will be available to fire authorities, hose manufacturers and suppliers.

> **Note:** Hoses that have been approved to the Department of Conservation Standards for 25 mm non-percolating lined or impregnated lay-flat hoses will be accepted under this NRFA specification.

25 mm non-percolating extruded hoses

General

These hoses are required for predominantly vegetation firefighting and are normally carried in hosepacks containing three lengths to each pack (total 90 m). The hoses are to be lightweight, low in friction loss and have the ability to withstand high operating pressures.

In working conditions hoses may be required to have a working pressure of up to 2100 kPa. To ensure that the hose remains in satisfactory condition to withstand this working pressure it will be subjected to a biannual pressure test at 2100 kPa maintained for one minute.

To cover these general requirements it is essential that the hoses are constructed uniformly throughout, and that the most suitable materials are used.

Hose jacket construction

The material use can be of any form of acceptable composition, but it should give elasticity, flexibility and durability.

For composite type construction the inner and outer jackets are to conform to *BS 6391:2009 Method of Test for Adhesion.*

The manufacturer is to provide verification of the materials used and the construction method.

> **Note:** In normal use and while flaked into hosepacks for periods of up to two years the internal surfaces of the hose must not adhere together to such an extent that the touching surfaces are damaged when they are separated by water pumped through the hose.

Size

Internal diameter: 25.5 mm
External diameter: 29.5 mm
Tolerance: +/- 0.5 mm
Coupling reference: *ND43 & ND44/3*
The hose is to fit the internal tailpiece of the coupling with the standard internal expansion copper ferrule (*ND45 & ND14*) method of fitting.

Length

To be supplied in rolls of 30 m (+/- 300 mm).

Weight

The hose should be as light as possible, but it is essential that durability is not sacrificed thereby.

Total weight including couplings = 6.5 kg.

Working pressure

The working pressure is to be up to 1400 kPa.

To pass the working pressure test the hose must withstand a pressure of 2100 kPa, built up at a rate of 700 kPa per minute and maintained for a period of one minute. During this test the hose must not show signs of 'pinholes'.

Bursting pressure

The minimum bursting pressure is to be 4200 kPa.

For the bursting pressure test a 900 mm length is to be subjected to a pressure of 4200 kPa built up slowly for a minimum period of one minute.

Change in size

The construction of the hose must be such that it does not increase beyond the following limits when the test hose is held at 2100 kPa for a minimum of two minutes:

Diameter: maximum diameter increase of 4 mm
Length: maximum length increase of 5% (1.4 m)
Twist: shall not exceed 10 turns per 30 m.

Flexibility

When dry, the hose must be capable of being laid into a hosepack in flakes of less than 440 mm in length without any permanent deformation appearing when the hose is kept in this manner for a period of 24 months.

It should also be capable of being rolled from the centre, into a roll not exceeding 460 mm in diameter.

Durability

This is to be as high as possible, but to a minimum of 500 strokes on the NRFA hose abrasion test.

For the abrasion test a 900 mm length of hose with a pressure of 1050 kPa and flow rate using a 7 mm nozzle is used. The weight of the abrasion file shall exert a downward force of 2 kg at the point of contact with the hose.

The test hose must withstand a minimum of 500 strokes from the abrasion file.

Chemical resistance

The hose is to conform to the requirements of *AS 2792:1992 - Chemical Resistance Test.*

The reagents to be used for this test are:

- Forestry firefighting foams
- Forestry firefighting retardants
- Petrol and diesel fuels

The manufacturer is to provide verification of compliance.

Full length kink resistance test

The hose is to conform to the requirements of *AS 2792:1992 – Full Length Kink Resistance Test.*

The manufacturer is to provide verification of compliance.

Ozone resistance

The hose is to conform to the requirements of *BS 6391: 2009 – Method of Test for Ozone Resistance.*

The manufacturer is to provide verification of compliance.

Pressure/flow loss due to friction

The internal surface of the hose should be such to minimise pressure and/or flow loss.

Manufacturer to provide data on pressure and flow loss per 30 m.

Heat resistance

This is to be as high as possible, but to a minimum of the NRFA heat resistance test.

For the heat resistance test use a 500 mm length of hose under a pressure of 1050 kPa and a flow rate using a 7 mm nozzle.

The 8 mm straight bar element, operated at a temperature of 450°C is set against the hose surface.

The hose must not show water leakage over the five minutes of this heat resistance test.

Repairs

It is preferable that the hose is repairable by simple means.

The manufacturer is to provide information on reparability
.

Acceptance tests

NRFA acceptance testing will be made at the NRFA testing agent's test facility or at another independent test facility elsewhere as may be agreed between the NRFA and the hose manufacturer.

All testing for NRFA acceptance is to comply with requirements of this specification.

The manufacturer/agent seeking their products' acceptance to this NRFA hose specification will need to provide the testing agent with the following:

- two 30 m lengths of hose for tests
- verification of jacket/lining adhesion
- verification of materials used and construction standard
- external and internal diameters
- average overall length
- weight of average length
- working pressure
- bursting pressure
- change in dimensions under pressure
- flexibility, and diameter when rolled
- durability
- verification of chemical resistance
- verification of kink test
- verification of ozone resistance
- water flow/pressure loss
- heat resistance
- suitability/methods of repairing hose
- availability of deliveries to and within New Zealand.

Recognition of compliance

A test report will be supplied to the manufacturer/agent submitting the hose for testing and a nominal fee will be charged for the acceptance testing.

The contents of the test report will remain confidential to the manufacturer/agent submitting the hose, the testing agent and the NRFA.

A list showing hoses approved to the NRFA specification will be available to fire authorities, hose manufacturers and suppliers.

Note: Hoses that have been approved to the Department of Conservation Standards for 25 mm non-percolating extruded lay-flat hose will be accepted under this NRFA specification.

41 mm non-percolating lined or impregnated hoses

General

These hoses are required for predominantly vegetation firefighting and are normally carried in hosepacks containing three lengths to each pack (total 90 m). The hoses are to be lightweight, low in friction loss and have the ability to withstand high operating pressures.

In working conditions hoses may be required to have a working pressure of up to 2100 kPa.

To ensure that the hose remains in satisfactory condition to withstand this working pressure it will be subjected to a biannual pressure test at 2100 kPa maintained for one minute.

To cover these general requirements is it essential that the hoses are constructed uniformly throughout, and that the most suitable materials are used.

Hose construction

- Jacket: this can be constructed of either synthetic or vegetable fibre, or both.
- Lining: the material used can be of any form of acceptable composition but should give elasticity, flexibility and durability.
- Adhesion: the lining must adhere to the jacket in accordance with *BS 6391: 2009 – Method of Test for Adhesion.*

The manufacturer is to provide verification of the materials used and the construction method.

> **Note:** In normal use and while flaked into hosepacks for periods of up to two years, the internal surfaces of the lining must not adhere together to such an extent that the touching surfaces are damaged when they are separated by water being pumped through the hose.

Size

Internal diameter: 41 mm
External diameter: 44 mm
Tolerance: +/- 0.5 mm
Coupling reference: *ND13* & *ND20/3*
The hose is to fit the internal tailpiece of the coupling with the standard internal expansion copper ferrule method of fitting.

Length

To be supplied in rolls of 30 m (+/- 300 mm).

Weight

The hose should be as light as possible, but it is essential that durability is not sacrificed thereby.

Total weight including couplings = 8.5 kg

Working pressure

The working pressure is to be 1400 kPa

To pass the working pressure test the hose must withstand a pressure of 2100 kPa built up at a rate of 700 kPa per minute and maintained for a period of one minute.
During this test the hose must not show signs of ‘pinholes’.

Change in size

The construction of the hose must be such that it does not increase beyond the following limits when the test hose is held at 2100 kPa for a minimum for two minutes.

Diameter: maximum diameter increase of 4 mm
Length: maximum length increase of 5% (1.4 m)
Twist: shall not exceed 10 turns per 30 m.

Flexibility

When dry, the hose must be capable of being laid into a hosepack in flakes of less than 440 mm in length without any permanent deformation appearing when the hosepack is kept in this manner for a period of 24 months.

It should also be capable of being rolled from the centre into a roll not exceeding 460 mm in diameter.

Durability

This is to be as high as possible, but be to a minimum of 500 strokes on the standard NRFA hose abrasion test.

For the abrasion test a 900 mm length of hose with a pressure of 1050 kPa and a flow rate using a 7 mm nozzle is used. The weight of the abrasion file shall exert a downward force of 2 kg at the point of contact with the hose.

The test hose must withstand a minimum of 500 strokes from the abrasion file.

Mildew resistance

The material from which the hose is constructed should be as resistant as possible to mildew. If the material is a vegetable fibre origin it must be given appropriate treatment, provided that such treatment does not adversely affect the hose in strength, durability or flexibility in anyway.

The manufacturer is to provide verification of the method of treatment and chemical/s used.

Full length kink test

The hose is to conform to the requirements of *AS 2792:1992 - Full length Kink Resistance Test.*

The manufacturer is to provide verification of compliance.

Ozone resistance

The hose is to conform to the requirements of *BS 6391: 2009 – Method of Test for Ozone Resistance.*

The manufacturer is to provide verification of compliance.

Pressure/flow loss due to friction

The internal surface of the hose should be such to minimise pressure and/or flow loss.

The manufacturer is to provide data on pressure and flow loss per 30 m.

Heat resistance

This is to be as high as possible, but to a minimum of the NRFA heat resistance test requirements.

For the heat resistance test use a 500 mm length of hose under a pressure of 1050 kPa and flow rate using a 7 mm nozzle.

The 8mm straight bar element, operated at a temperature of 450°C is set against the hose surface.

The hose must not show water leakage over the five minutes of this heat resistance test.

Repairs

It is preferable that the hose is easily repairable by simple means.

The manufacturer is to provide information on reparability.

Acceptance tests

NRFA acceptance testing will be made at the NRFA testing agent's test facility or at another independent test facility as agreed between the NRFA and the hose manufacturer.

All testing for NRFA acceptance is to comply with the requirements of this specification.

Manufacturer/agents seeking their products' acceptance to this NRFA hose specification will need to provide the testing agent with the following:

- two 30 m lengths of hose for tests
- verification of materials used and construction standard
- verification of jacket/lining adhesion
- external and internal diameters
- average overall length
- weight of average length
- working pressure
- bursting pressure
- change in dimensions under pressure
- flexibility, and diameter when rolled
- durability
- verification if mildew treated and chemical/s used
- verification of kink test
- verification of ozone resistance
- water flow/pressure loss
- heat resistance
- suitability/methods of repairing hose
- availability of deliveries to and within New Zealand.

Recognition of compliance

A test report will be supplied to the manufacturer/agent submitting the hose for testing and a nominal fee will be charged for the acceptance testing.

The contents of the test report will remain confidential to the manufacturer/agent submitting the hose, the testing agent and the NRFA.

A list showing hoses approved to the NRFA specifications will be available to fire authorities, hose manufacturers and suppliers.

> **Note:** Hoses that have been approved to the Department of Conservation Standards for 41 mm non-percolating lined or impregnated lay-flat hoses will be accepted under this NRFA specification.

41 mm non-percolating extruded lay-flat hoses

General

These hoses are required predominantly for vegetation firefighting and are normally carried in hosepacks containing three lengths to each pack (total 90 m). The hoses are to be lightweight, low in friction low and have the ability to withstand high operating pressures.

In working conditions hoses may be required to operate at a working pressure of up o 2100 kPa. To ensure that the hose remains in satisfactory condition to withstand this working pressure it will be subjected to a pressure test at 2100 kPa maintained for one minute.

To cover these general requirements it is essential that the hoses are constructed uniformly throughout, and that the most suitable materials are used.

Hose jacket construction

The material used can be of any form of acceptable composition, but should give elasticity, flexibility and durability.

For composite type construction the inner and outer jackets are to conform to *BS 6391: 2009 - Method of Test for Adhesion.*

The manufacturer is to provide verification of the materials used and the construction method.

> **Note:** In normal use and while flaked into hosepacks for periods of up to two years the internal surfaces of the hose must not adhere together to such an extent that the touching surfaces are damaged when they are separated by water being pumped through the hose.

Size

Internal diameter: 41 mm
External diameter: 44 mm
Tolerance: +/- 0.5 mm
Coupling reference: *ND13* or *ND13W* & *ND20/2* or *ND20w*
The hose is to fit the internal tailpiece of the coupling with the standard internal expansion copper ferrule (*ND45* & *ND14*) method of fitting.

Length

To be supplied in rolls of 30 m (+/- 300 mm).

Weight

The hose should be as light as possible, but it is essential that durability is not sacrificed thereby.

Total weight including couplings = 8.5 kg.

Working pressure

The working pressure is up to 1400 kPa.

For the working pressure test the hose must be subjected to a pressure of 2100 kPa, built up at a rate 700 kPa per minute and maintained for a period of one minute. During this test the hose must not show signs of ‘pinholes’.

Bursting pressure

The minimum bursting pressure is to be 4200 kPa.
For the bursting pressure test a 900 mm length of hose is to be subjected to a pressure of 4200 kPa for a minimum period of one minute.

Change in size

The construction of the hose must be such that it does not increase beyond the following limits when the test hose is held at 2100 kPa for a minimum of two minutes.

Diameter: maximum diameter increase of 4 mm
Length: maximum length increase of 5% (1.4 m)
Twist: shall not exceed 10 turns per 30 m.

Flexibility

When dry, the hose must be capable of being laid into a hosepack in flakes of less than 440 mm in length without any permanent deformation appearing when the hose is kept in this manner for a period of 24 months.

It should also be capable of being rolled from the centre, into a roll not exceeding 460 mm in diameter.

Durability

This is to be as high as possible, but to a minimum of 500 strokes on the standard NFRA hose abrasion test.

For the abrasion test a 900 mm length of hose with a pressure of 1050 kPa and flow rate using a 7 mm nozzle is used. The weight of the abrasion file shall exert a downward force of 2 kg at the point of contact with the hose.

The test hose must withstand a minimum of 500 strokes of the abrasion file.

Chemical resistance

The hose is to conform to the requirements of *AS 2792:1992 - Chemical Resistance Test.*

The reagents to be used for this test are:

- Forestry firefighting foams
- Forestry firefighting retardants
- Petrol and diesel fuels

The manufacturer is to provide verification of compliance.

Full length kink resistance test

The hose is to conform to the requirements of *Australian Standard AS2792:1992 – Full Length Kink Resistance Test.*

The manufacturer is to provide verification of compliance.

Ozone resistance

The hose is to conform to the requirement of *British Standard BS 6391: 2009 – Method of Test for Ozone Resistance.*

The manufacturer to provide verification of compliance.

Pressure/flow loss due to friction

The internal surface of the hose should be such to minimise pressure and/or flow loss.

The manufacturer is to provide data on pressure and flow loss per 30 m.

Heat resistance

This is to be as high as possible, but to a minimum of the NRFA heat resistance test.

For the heat resistance test a 500 mm length of hose under a pressure of 1050 kPa and flow rate using a 7 mm nozzle is subjected to a heated bar element.

The 8 mm straight bar element, operated in temperature of 450°C is set against the hose surface.

The hose must not show water leakage over the five minutes of this heat resistance test.

Repairs

It is preferable that the hose is easily reparable by simple means.

The manufacturer is to provide information on reparability.

Acceptance tests

NRFA acceptance testing will be made at the NRFA testing agent's test facility or at another independent test facility elsewhere as may be agreed between the NRFA and the hose manufacturer.

All testing for NRFA acceptance is to comply with requirements of this specification.

The manufacturer/agent seeking their products' acceptance to this NRFA hose specification will need to provide the testing agent with the following:

- two 30 m lengths of hose for tests
- verification of materials used and construction standard
- verification of jacket/lining adhesion
- external and internal diameters
- average overall length
- weight of average length
- working pressure
- bursting pressure
- change in dimensions under pressure
- flexibility, and diameter when rolled
- durability
- verification if mildew treated and chemical/s used
- verification of chemical resistance
- verification of kink test
- verification of ozone resistance
- water flow/pressure loss
- heat resistance
- suitability/methods of repairing hose
- availability of deliveries to and within New Zealand

Recognition of compliance

A test report will be supplied to the manufacturer/agent submitting the hose for testing and a nominal fee will be charged for the acceptance testing.

The contents of the test report will remain confidential to the manufacturer/agent submitting the hose, the testing agent and the NRFA.

A list showing hoses approved to the NRFA specification will be available to fire authorities, hose manufacturers and suppliers.

Note: Hoses that have been approved to the Department of Conservation Standards for 41 mm non-percolating extruded lay-flat hoses will be accepted under this NRFA specification.

45 mm, 70 mm & 90 mm non-percolating lay-flat hoses

Policy

Lay-flat hoses and hose assemblies must meet the minimum requirements described in this document.

Features additional to those described are acceptable, provided that the intention of the requirements is not altered.

Length

45 mm and 70 mm hoses are to be supplied in rolls of 25 m (+/- 300 mm), 90 mm hoses are to be supplied in rolls of 30 m (+/- 300 mm).

Compliance requirements

Non-percolating 45 mm, 70 mm & 90 mm hoses must comply in all respects with the *BS 6391: 2009,* to Type 2 or Type 3 hoses, and any subsequent amendments.
BS 6391:2009 can be sourced through the NZFS Information Centre.

Wet Storage

All non-percolating hoses must be capable of wet storage.

Pressure testing

Each length of coupled hose (hose assembly) must be identified and certified that it has been pressure tested in accordance with the Test Pressures and Unique Identifier.

Couplings must be tied in accordance with *BS 6391:2009.*

Test pressures

***BS 6391:2009* Hose**	**Intended Working Pressure**	**Acceptance Test (Certification) Pressure**
45 mm	1050 kPa	2250 kPa (22.5 bar)
70 mm	1050 kPa	2250 kPa (22.5 bar)
90 mm	1050 kPa	2250 kPa (22.5 bar)

Unique Identifier

A unique identifier is required for each length of hose and should be obviously displayed.

Hose couplings

Hose couplings may be purchased with or separately from hoses and recycled, provided that they meet the approved standards.

Instantaneous hose couplings for use with 45 mm, 70 mm & 90 mm hoses must comply with *NZS PAS 4505 Specifications for Firefighting Waterway Equipment,* (available from Standards New Zealand) and any subsequent amendments.

Certification requirements

Independent certification of compliance with relevant standards must be supplied with completed tender documents, addressing both hoses and couplings.

Percolating lay-flat hoses

41 mm percolating lay-flat hoses

General

These hoses are required for predominantly vegetation firefighting, and are normally carried in hosepacks containing three lengths to each pack (total 90 m). The hoses are to be lightweight, low in friction loss and have the ability to withstand high operating pressures.

In working conditions hoses may be required to have a working pressure of up to 2100 kPa.

To ensure that the hose remains in satisfactory condition to withstand this working pressure it will be subjected to a biannual pressure test at 2100 kPa maintained for one minute.

To cover these general requirements it is essential that the hoses are constructed uniformly throughout, and that the most suitable materials are used.

Hose construction

- Jacket: this can be constructed of either or both synthetic or vegetable fibre.
- Lining: the material used can be of any form of acceptable composition but should give elasticity, flexibility and durability.
- Adhesion: the lining must adhere to the jacket in accordance with *BS 6391: 2009 - Method of Test for Adhesion.*

The manufacturer is to provide verification of the materials used and the construction method.

Note: In normal use and while flaked into hosepacks for periods of up to two years the internal surfaces of the hose must not adhere together to such an extent that the touching surfaces are damaged when they are separated by water being pumped through the hose

Size

The dimensions of a percolating lay-flat hose are as follows:

- Internal diameter: 41 mm
- External: 44 mm
- Tolerance: +/- 0.5 mm
- Coupling reference: *ND13* or *ND13W* & *ND20/2* or *ND20W.*

The hose is to fit the internal tailpiece of the coupling with the standard internal expansion copper ferrule method of fitting. (See NRFA drawings *ND20/2* and *ND13*).

Length

To be supplied in rolls of 30 m (+/- 300 mm).

Weight

The hose should be as light as possible, but it is essential that durability is not sacrificed thereby.

Total weight including couplings = 7 kg.

Working pressure

The working pressure is up to 1400 kPa.

To pass the working pressure test the hose must withstand a pressure of 2100 kPa built up at a rate of 700 kPa per minute and maintained for a period of one minute. During this test the hose must not show signs of ‘pinholes’.

Bursting pressure

The minimum bursting pressure is to be 4200 kPa.

For the bursting pressure test, a 900 mm length is to be subjected to a pressure of 4200 kPa for a minimum period of one minute.

Change in size

The construction of the hose must be such that it does not increase beyond the following limits when the test hose is held at 2100 kPa for a minimum or two minutes:

- Diameter: maximum diameter increase of 4 mm
- Length: maximum length increase of 8% (2.4 m)
- Twist: shall not exceed 10 turns per 30 m.

Flexibility

When dry, the hose must be capable of being laid into a hosepack in flakes of less than 440 mm in length without any permanent deformation appearing when the hose is kept in this manner for a period of 24 months.

It should also be capable of being rolled from the centre into a roll not exceeding 460 mm in diameter.

Mildew resistance

The material from which the hose is constructed should be as resistant as possible to mildew. If the material is of vegetable fibre origin it must be given appropriate treatment. Such treatment must not adversely affect the hose's strength, durability or flexibility in any way.

The manufacturer is to provide verification of the method of treatment and chemical/s used.

Full length kink test

The hose is to conform to the requirements of *AS 2792: 1992 - Full Length Kink Resistance Test.*

The manufacturer is to provide verification of compliance.

Ozone resistance

The hose is to conform to the requirement of *BS 6391: 2009 – Method of Test for Ozone Resistance.*

The manufacturer is to provide verification of compliance.

Water flow and pressure loss due to friction

The internal surface of the hose should be such to minimise pressure and flow loss.

The manufacturer is to provide data on pressure loss per 30 m.

Heat resistance

This is to be as high as possible, but to a minimum of the NRFA heat resistance test.

For the heat resistance test, a 500 mm length of hose under a pressure of 1050 kPa and flow rate using a 7 mm nozzle is subjected to a heated bar element.

The 8 mm straight bar element, operated at a temperature of 450°C is set against the hose surface.

The test hose will be given five minutes to 'wet out' before the test.

The test hose must withstand a minimum of ten minutes under the heat resistance test without leaking.

Percolation

While it is important that the percolation be as low as possible to minimise wastage of water and pressure loss, it is also essential that the hose jacket ‘wets out’ evenly and consistently when in use.

The hose is to be given five minutes to ‘wet out’ with the test taken between the fourth and fifth minute.

For the percolation test, the percolation loss must not exceed one litre over a 30 m length of hose held at 1050 kPa for one minute.

Repairs

It is preferable that the hose is easily reparable by simple means.

The manufacturer is to provide information on reparability.

Acceptance tests

Acceptance tests will be made at the NRFA testing agent's test facility or at another independent test facility elsewhere as may be agreed between the NRFA and the hose manufacturer.

All acceptance testing is to comply with requirements of this specification.

The manufacturer/agent seeking their products' acceptance to this NRFA hose specification will need to provide the testing agent with the following:

- two 30 m lengths of hose for tests
- verification of materials used and construction standard
- verification or jacket/lining adhesion
- external and internal diameters
- average overall length
- weight of average length
- working pressure
- bursting pressure
- change in dimensions under pressure
- flexibility, and diameter when rolled
- durability
- verification if mildew treated and chemical/s used
- verification of kink test
- verification of ozone resistance
- water flow/pressure loss
- heat resistance
- suitability/methods of repairing hoses
- availability of deliveries to and within New Zealand.

Recognition of compliance

A test report will be supplied to the manufacturer/agent submitting the hose for testing and a nominal fee will be charged for the acceptance testing.

The contents for the test report will remain confidential to the manufacturer/agent submitting the hose, the testing agent and the NRFA.

A list showing hoses approved to the NRFA specification will be available to Fire Authorities, hose manufacturers and suppliers.

Note: Hoses that have been approved to the Department of Conservation Standards for 41 mm percolating lay-flat hoses will be accepted under this NRFA specification.

High pressure tubing & tubing accessories

General

This part covers the general requirements to be met by the manufacturer/supplier of high pressure hose reel tubing to the New Zealand Fire Service (NZFS).

It is the tenderer's responsibility to ensure that all component parts of the tubing comply with, or exceed the intention of these specifications.

Should any component part fail to comply in full with the requirement, the matter shall be referred to the NZFS for consideration.

A detailed specification must be submitted to and agreed by the NZFS prior to the commencement of manufacture/supply.

Nothing expressed in this requirement restricts the manufacturer/supplier from specifying more strict or additional requirements in any direction to meet special needs.

Tubing is to be offered either uncoupled, or with matching BAR-WAY or similar screw thread (1" NH Thread) couplings.

User requirements

The hose should be:

- Type: rubber
- Nominal internal bore: 25 mm
- Nominal length: 30 m.

The tubing shall:

- be suitable for the supply of high pressure water at an operating pressure of 3600 kPa
- be as light as flexible as possible while retaining its strength and shape at all times in so far as is reasonable
- be resistant to cuts and abrasion
- be capable of being wound onto a reel without flattening
- have a similar wall thickness and construction for the application of BAR-WAY or similar couplings
- be reinforced.

The manufacturer/supplier shall also supply data on:

- care and maintenance
- construction
- materials used
- tests carried out
- weight
- flexibility
- abrasion resistance
- and any other information relevant.

High pressure hose reel tubing shall comply with the following:

- *NFPA 1962 Standard for the Inspection, Care and Use of Fire Hoses, Couplings and Nozzles* and the *Service Test of Fire Hoses* 2003 edition.
- *NFPA 1961 Standard on Fire Hoses* 2007 edition relating to – burst test pressure, kink test pressure, proof test pressure and service test pressure.

Certification

The manufacturer/supplier shall provide a certificate that shows the minimum test requirements as specified have been met or exceeded.

Suction hoses

General

Suction hoses shall have good resistance to heat, weathering and ozone, abrasion resistance and helix free cuffs.

It shall be constructed of a smooth high grade synthetic rubber, the cover shall have a corrugated fabric finish with good resistance to abrasion and weathering.

The helix should be made of zinc plated steel wire and be flexible.

Dimensions and pressure requirements

Suctions hoses generally have a nominal length of 2.4 m.

Internal diameter (mm)	Wall thickness (mm)	Vacuum (MPa)	Working Pressure (MPa)
75	6	.004	0.3
102	7	.004	0.3
127	8	.004	0.3
152	9	.004	0.3

Double jacketed hoses (Water Dragon) & couplings – equipment requirements

General

The hoses shall be of double jacket construction:

- Minimum in-service test pressure of 2800 kPa (400 psi)
- Minimum acceptance test pressure of 5600 kPa (800 psi)
- Minimum burst pressure of 9800 kPa (1400 psi)
- Meets or exceeds *NFPA 1961* specifications or equivalent
- Standard lengths: 15 m and 30 m (50 ft and 100 ft)
- Hose size 38 mm (1.5”) diameter.

Couplings

Heavy duty aluminium couplings rated to water pressure (WP) of 5600 kPa (800 psi) with ribbed tails, 1.5” male and female couplings with stainless steel ball race swivel, lug cap and tail for grip or spanner.

7: Appendix

FIXED ASSET DISPOSAL VOUCHER [FAD]

To be completed by Region or Business Unit	
Asset Number	
Asset Description (Full Details)	
Unit Number (e.g. Registration Number)	
Serial Number (e.g. Business Unit Serial Number)	
Reference (e.g. Receipt, Claim, Journal Number)	
Proceeds (Excluding GST)	

Type of Disposal					
Write-Off	☐	Without Proceeds	☐	With proceeds/Trade In	☐
Asset Disposed / Destroyed / not in working condition				☐ **(DEAD)**	
Asset not on Station / whereabouts unknown				☐ **(GONE)**	

Reason for Write-Off					
Cannibalised	☐	**Gifted to Charity**	☐	**Obsolete**	☐
Lost/Stolen	☐	**Insurance Claim**	☐	**Uneconomic to Repair**	☐
Comments					
Person Authorising				**Date**	

To be completed by NHQ Finance Only				
Asset Number				
Child Asset Number(s)				
Disposal Method		**Disposal Code**		
Type of Disposal		**Gross Proceeds Received**	$	
Date Received		**Entered by**		

To be completed by NHQ Fleet Only			
Fleet Database Updated	Yes ☐	**Name of Person Updating**	
Fuel-Card Updated	Yes ☐	**Lease Company Notified**	Yes ☐
Fuel-Card Updated	Yes ☐	**Date Actioned**	

Note:

1. Fire Region Managers and Business Managers must approve all assets for disposal or write-offs. Write-off occurs where the asset has become obsolete, surplus to requirements and cannot be re-deployed, or uneconomic to repair.
2. Vehicle disposals must be notified on FSC290 'Vehicle Disposal Declaration'.
3. All proceeds from a Fixed Assets are to be forwarded to NHQ for banking.
4. Any Gain/Loss on disposal will be charged to the Cost Centre/Business Unit where the asset resides.