



## DRAFT HOSE COMPARISON STUDY

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### INTRODUCTION

Suction hose is designed to draft water in wildland firefighting operations from an open water source, such as a lake, stream, pond, or creek. It is also used to siphon water from one portable tank to another. Draft hose is used on all engines and with all portable pumps. Suction hose is constructed to the United States Department of Agriculture (USDA) Forest Service specification and procured through the General Services Administration (GSA) as semirigid construction. It consists of a natural or synthetic rubberized jacket with wire reinforcement capable of holding a vacuum of 25 in of mercury and a proof pressure of 100 psig.

Draft hose technology now includes a lighter construction with comparable performance, capable of holding a vacuum of 25 in of mercury and a proof pressure higher than the 600 psig. This lightweight suction hose has a woven fabric jacket, a plastic helical reinforcement component, and a coating to improve abrasion resistance. This publication summarizes the evaluation of the construction of DRAFTEX® and REELTEX®, both manufactured by Niedner Fire Hose Company, and USDA Forest Service Specification 184 semirigid rubber-braided wire-reinforced suction hose.

An initial evaluation of this new lightweight hose by field personnel generated concern regarding durability and abrasion resistance compared to the USDA Forest Service semirigid rubber-braided, wire-reinforced draft hose (figure 1).

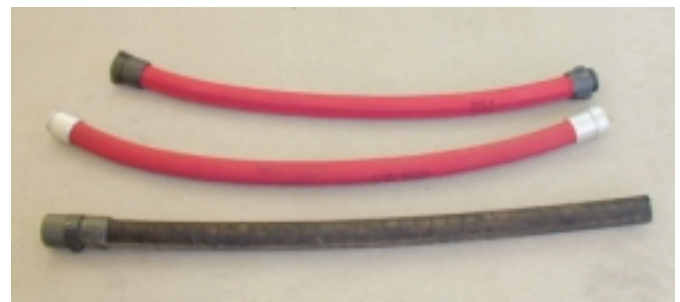


Figure 1—DRAFTEX®, REELTEX®, and semirigid rubber-braided, wire-reinforced draft hose.

### SEMIRIGID RUBBER-BRAIDED WIRE-REINFORCED SUCTION HOSE

The semirigid rubber-braided, wire-reinforced suction hose is constructed in accordance with the minimum requirements of USDA Forest Service Specification 5100-184, Specification for Suction Hose. See table 1 for hose diameter and commercially available hose lengths. Semirigid rubber-braided, wire-reinforced suction hose is capable of withstanding a vacuum of up to 25 in of mercury and a proof pressure of 100 psig. This type of suction hose is designed with a helix of wire, positioned between the plies of reinforcement and completely embedded in natural or synthetic fiber.

Table 1—Semirigid rubber-braided, wire-reinforced suction hose sizes and weights.

Hose size (in) and thread series designation	Hose size nominal internal diameter (in)	Maximum weight with couplings		Minimum hose bend radius (in)	Proof pressure (psig)
		8-ft hose (lb)	10-ft hose (lb)		
1 1 1/2 NPSH	1.00 + 0.03/0	8.38	10.38	6.00	100
1 1/2 9 NH	1.50 + 0.03/-0	10.48	12.88	9.00	100
2 1/2 7 1/2 NH	2.50 ± 0.06	20.40	25.00	15.00	100
4 4 NH	4.00 ± 0.06	33.90	41.50	24.00	100

#### DRAFTEX® WOVEN FABRIC SUCTION HOSE

DRAFTEX® suction hose consists of a lightweight woven fabric of spun polyester warp yarns. A plastic helical reinforced rigid durable covering with elastomer extruded tubing form a rigid draft hose. It is capable of holding a vacuum of 25 in of mercury and a proof pressure of 600 psig. The manufacturer claims that an encapsulation treatment called DRAFTKOTE™ is abrasion-resistant and increases resistance to acids, oils, chemicals, and saltwater. The extruded tubing is an ozone- and age-resistant ethylene propylene diene monomer (EPDM) elastomer. DRAFTEX® is available in 1 1/2-in- , 2-in- , and 2 1/2-in-diameter hose. It is available in lengths of up to 20 ft in red, orange, or dark blue.

Table 2—DRAFTEX® performance.

Hose size (in)	Coil diameter (in)	Weight of 50 ft of coupled hose	Percent elongation (%)	Service test pressure (psig)	Kink burst pressure (psig)	Proof pressure (psig)
1 1/2 9 NH	24	4.5	6	300	500	600
2 8 NH or 1 1/2 NPSH	34	5	6	300	500	600

## REELTEX® WOVEN FABRIC SUCTION HOSE

REELTEX®, originally designed as a hardline hose, is manufactured in a 1½-in construction for use as draft hose. REELTEX® consists of a lightweight woven fabric of spun polyester warp yarns. A plastic helical reinforced rigid durable covering with elastomer extruded tubing form a rigid draft hose capable of holding a vacuum of 25 in of mercury and a proof pressure of 600 psig. REELTEX® is similar to DRAFTEX® in design, except REELTEX® has an ENCAP® encapsulation for abrasion resistance. The manufacturer claims this increases resistance to oil and chemicals, with improved water repellency. The extruded tubing is an ozone- and age-resistant EPDM extruded elastomer. It is available as a draft hose in 1½-in construction and as a hardline hose in ¾-in and 1-in construction.

REELTEX® is only available in lengths of 50 ft, necessitating recoupling for use in drafting operations of 8- or 10-ft lengths. Recoupling is time consuming and impractical, as the field does not have easy access to a manual expander or the preferred hydraulic expander. Consequently, it is impractical for the field to buy REELTEX® for use as a draft hose. See the San Dimas Technology and Development Center publication *Hardline Hose Comparison Study Tech Tip* regarding an evaluation of REELTEX® as a hardline hose for a ¾-in and 1-in reel hose application.

Table 3—REELTEX® performance.

Hose size (in)	Coil diameter (in)	Weight of 50 ft of coupled hose	Percent elongation (%)	Service test pressure (psig)	Kink burst pressure (psig)	Proof pressure (psig)
1½ 9 NH	24	16.0	6	300	1,000	600

## PERFORMANCE TESTING

Draft hose performance was tested for vacuum, coil diameter, bend radius, proof pressure, and abrasion characteristics. An evaluation regarding manufacturing workmanship was also conducted.

All suction hose in this study was capable of holding a vacuum of 25 in of mercury, without any signs of collapse or other failures. All draft hose was capable of withstanding a minimum 200 psig hydrostatic proof pressure with no leaks from the threaded connection, cracks, breaks, permanent deformation, mechanical damage, or structural failure.

The bend radius test showed no indication of collapse or failure in the construction of the draft hose. Each hose was flexed five times through a 180-degree arc, starting at one end of the hose. The radius of the arc was six times the inside diameter of the hose.

All draft hose rubber or plastic components were evenly, fully formed; uniformly thick; and circular throughout. There were no blisters, pinholes, pits, sink marks, crazing, wrinkles, voids, foreign material, or cracks. The surface of the material was tack free. The fabric or wire-reinforcement did not protrude through the outer or inner surfaces but was completely embedded in the rubber or plastic material.

Abrasion resistance testing was conducted using the Factory Mutual (FM) abrasion test machine and test method (figure 2). Abrasion testing was held after 40,000 cycles without failure, as was noted with the DRAFTEX® hose (figure 3).



Figure 2—Abrasion test samples for (a) DRAFTEX®, (b) REELTEX®, and (c) semirigid rubber-braided, wire-reinforced draft hose.



Figure 3—Closeup of an abrasion test sample for DRAFTEX® hose.

Performance data for semirigid rubber-braided, wire-reinforced; DRAFTEX®; and REELTEX® draft hose is shown in table 4.

Table 4—Draft hose performance data comparison table.

Draft hose type	Coupling size in	Material	Weight of uncoupled 10 ft of hose lb	Bend radius	Proof pressure psig	FM abrasion resistance average # cycles
Specification 5100-184, suction hose	1½ 9 NH	rubber wire	8.0	pass	100	30,323
DRAFTEX®	1½ 9 NH	polyester with DRAFTKOTE™	2.6	pass	600	40,000 (never failed)
REELTEX®	1½ 11½ NPSH	polyester with ENCAP®	2.2	pass	600	16,808

**Note:** Manufacturer states that DRAFTEX® is capable of withstanding a minimum of 65,000 cycles on the FM abrasion test stand.

## FIELD EVALUATION

The strongest comments, provided during a field evaluation of the various constructions of draft hoses, focused on the reduction in weight provided by DRAFTEX® and REELTEX®. The lightweight technology improves the transport of draft hose and the setup of drafting operations. Dirt and debris are more likely to accumulate on DRAFTEX® and REELTEX®, especially “stickers,” due to the rough fabric surface. This serves as a reminder to wear required personal protective equipment at all times.

## COST

Pricing for all lengths is provided in table 5. DRAFTEX® is a little less expensive than semirigid rubber-braided, wire-reinforced draft hose. REELTEX® is available in 50-ft sections only, necessitating recoupling, which is impractical in the field. REELTEX® is more expensive than semirigid rubber-braided, wire-reinforced and DRAFTEX® when labor to recouple and the cost of additional couplings is included.

Table 5—Draft hose cost comparison table.

Draft hose type	Coupling size (in) NH or NPSH	Material	Length (ft)	Cost (dollars)
Specification 5100-184, suction hose	1½	rubber wire	8	66.15
	9 NH or		10	76.52
	11½ NPSH			
REELTEX®	1½ 9 NH or 11½ NPSH	polyester with ENCAP®	50	161.00
DRAFTEX®	1½	polyester with DRAFTKOTE™	8	55.97
	9 NH or		10	66.80
	11½ NPSH			
DRAFTEX®	2	polyester with DRAFTKOTE™	8	70.53
	8 NH or		10	83.33
	11½ NPSH			

## FINDINGS

The reduced weight of DRAFTEX® improves drafting operations in wildland firefighting. It is one-third the weight of semirigid rubber-braided, wire-reinforced draft hose and has more than 32 percent better abrasion resistance. The cost is competitive compared to semirigid rubber-braided, wire-reinforced draft hose. Consequently, it is recommended for use by the field in drafting operations.

REELTEX® draft hose is less than one-third the weight of semirigid rubber-braided, wire-reinforced draft hose. However, recoupling the hose in the field is impractical and makes it the most expensive draft hose in this study. Consequently, it is not recommended for use as a draft hose. Semirigid rubber-braided, wire-reinforced draft hose has 80 percent better abrasion resistance than REELTEX® and provides good support in drafting operations.

## PROCUREMENT INFORMATION

USDA Forest Service semirigid rubber-braided, wire-reinforced draft hose is available in 8- and 10-ft lengths in the GSA catalog as National Stock Number 4210-00-889-1775.

DRAFTEX® is available through Wildfire, a subsidiary of Tyco. For product inquiries contact Wildfire at 800-426-5207 or through <http://www.wildfire-equipment.com>. Wildfire is in the process of adding DRAFTEX® to the GSA Federal Supply Schedule 42, under GSA Contract Number GS-07F-5128A. The manufacturer of DRAFTEX®, Niedner Fire Hose, can be contacted at <http://www.niedner.com>.

For further information, please contact the SDTDC fire program leader at 909-599-1267.

### Approximate English to Metric System Conversion Factors

To Change	To	Multiply by
inch of mercury	kilopascal	3.386
inches	millimeters	25.4
feet	meters	0.305
pounds	kilograms	0.454
pounds/square inch	kilopascal	6.894

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