NABRICO

DF-356 Upfit Winch with FASST Winder™ Owner's Manual

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DF-356 Upfit Winch with FASST Winder™ Owner's Manual

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NABRICO
1250 GATEWAY DRIVE
GALLATIN, TN 37066
TEL: (615) 442-1300 FAX: (615) 442-1313
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SAFETY INFORMATION

CAUTION

Prior to installing and operating the winch, please read this manual thoroughly and carefully. Keep this manual and all other instructions accessible at all times.

The Occupational Safety and Health Act of 1970 states that it is the employer's responsibility to provide a workplace free of hazard. To this end, all equipment should be installed, operated and maintained in compliance with applicable trade, industrial, federal, state and local regulations. It is the equipment owner's responsibility to obtain copies of these regulations and to determine the suitability of the equipment for the equipment owner's intended use.

Although this manual will help you become familiar with the basic operation of the winch, it is by no means a substitute for proper training by your company in the safe use of winches, barge rigging and other marine equipment. This manual suggests methods of operation, but ultimately, the owners and operators of the equipment are responsible for determining whether a particular method of operation is safe and appropriate for the equipment being operated. Only individuals trained in the proper use of winches, barge rigging and other marine equipment should operate these winches.

The typical operating environment of barge and towboat winches often includes very high forces, and the potential hazards associated with these high forces should not be underestimated. Improper installation or incorrect or unsafe use could result in injury or death to persons or cause equipment failure or damage.

Recommended Information for Safe Operation:

CAUTION

- Check lubrication before use.
- Do not apply tension to the winch unless there are 4 complete wraps of rope on the drum.
- Do not operate the equipment unless you have a firm stance on a non-slippery surface.
- Do not wrap the wire rope around the load. This will damage the wire rope and could cause the load to escape. Rigging connectors are strongly recommended to secure the wire rope to the load.
- Keep fingers, loose clothing and any foreign objects away while operating the equipment.
- Do not divert attention away while operating the equipment. Stay alert to the possibility of accidents and try to prevent them from happening.
- Always remain to the side of the equipment while in operation.
- Never operate the equipment from the front or when bystanders are in front of it.
- Operators and bystanders should stay clear of any load and the wire rope while the equipment is operating.
- Avoid shock loads by starting and stopping the equipment smoothly. Shock loads can over load the equipment which may cause damage.
- Under no circumstances should any equipment be used to move, raise or lower a person(s) or equipment.

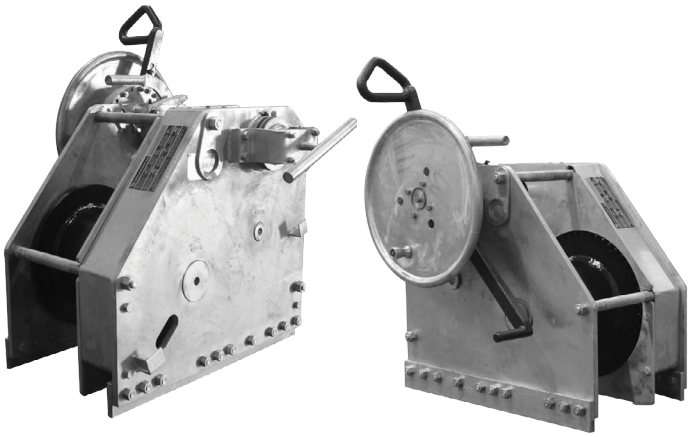
NOTICE
Inspect the equipment carefully at least once a month for loose fasteners, worn gears and pawls, cracked welds and other damaged parts. If any worn, cracked or damaged parts are found, stop use immediately and remove equipment from service until all appropriate repairs are completely made.

1.1 GENERAL INFORMATION

DF-356 FASST WINDER WINCH

Features & Specifications

- Hot-dipped Galvanized coating.
- Patented high load release dog with secondary anti-backlash drag brake that is activated automatically with the release of the dog.
- High load release brake is a multi-disc system that incorporates all stainless steel moving parts.
- No hot work required: mounts to DF-3, DF-156 and some competitors models.
- Heaviest winch in its class at 1,650 lbs.
- Incorporates our powerful FASST Winder system.
- No ratchet or ratchet handle extension.
- Ergonomic height.
- Uses standard 40-ton winch drive train.



- 2 year warranty.
- Fully guarded gears.
- Fastest and easiest way to fully tighten a winch.

MODEL NO.	HOLDING DOG & OR BRAKE	LINE PULL @ FIRST LAYER WITH ONE MAN (LBS)		DRUM CAPACITIES (FT)					WEIGHT
DF-356-UFW	S. TONS	HAND WHEEL	RATCHET W/STD. EXT.	5/8"	3/4"	7/8"	1"	1-1/8"	LBS
40-11-M	40	8,000	17,800	340	219	132	115	60	1,650
40-18-M	40	8,000	17,800	563	363	224	198	107	1,875

nabrico-marine.com 615.442.1300

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1.2 INSTALLATION OF EQUIPMENT

NOTICE
It is the responsibility of the customer, not the winch manufacturer, to properly locate and install the winch with regard to the safety of those operating the machinery.

CAUTION
Install the equipment in an area where there is ample room to operate the unit without the operator becoming entangled in the cable, lines, chains, winch mechanisms or other nearby equipment.

1.2.1 All winches must be installed on a flat, rigid and non-slippery surface. Deck and structure must be strong enough to withstand the weight and holding capacity of the winch and ultimate capacity of the wire, and the forces likely to occur during operation. A qualified professional should inspect or design the foundation to insure that it will provide adequate support.

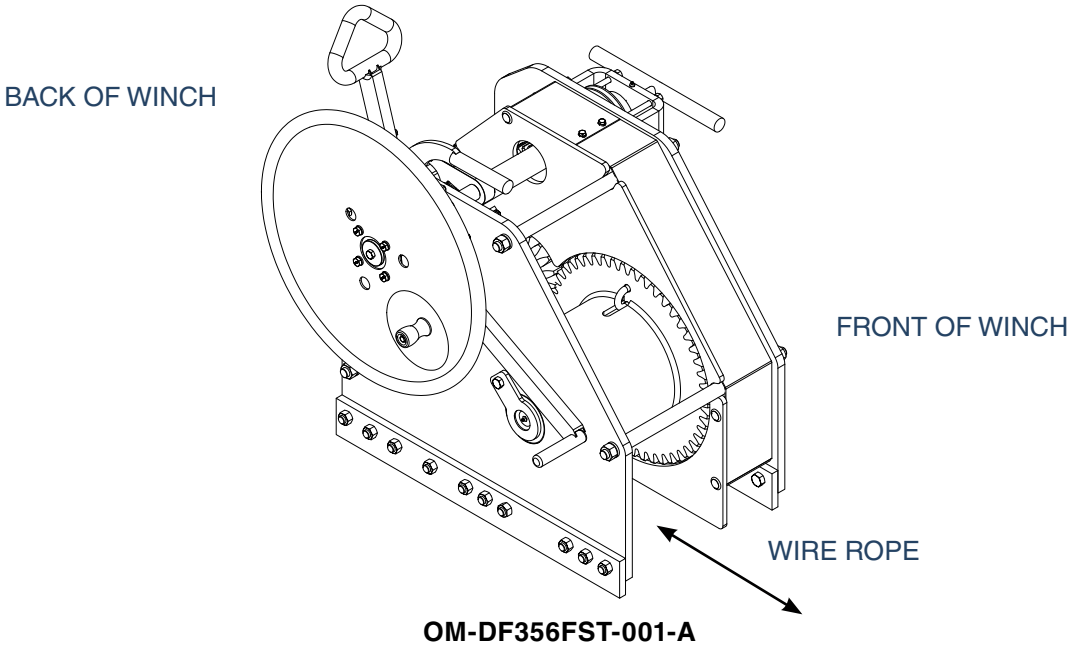
1.2.2 Locate the winch in a suitable area free of traffic and obstacles. The winch should also be visible during entire operation. Keep in mind that the winch needs to be accessible for proper lubrication, maintenance and operation.

1.2.3 The DF-356 winch is made to mount with no hot work required when replacing a DF-3 or DF-156 winch. This winch also comes with its own set of base bars if the base bars from the DF-3 or DF-156 winch are no longer usable.

1.2.3.1 When mounting the DF-356 winch to the base bars from a DF-3 or DF-156 winch, not all of the bolt holes will be filled (see appendix 2).

1.2.4 Mounting direction must be in line with the desired direction of cable pull. The front of the winch must face in the direction from which the cable is reeled (see fig. #1). The winch drum, when properly used, will reel the wire rope onto the bottom of the drum.

FIGURE #1 - MOUNTING POSITION



1.2.4.1 If the direction of the wire rope is not indicated on the winch, determine as follows: Engage the locking pawl and disengage the brake system. Rotate the winch drum using either the handwheel or hand ratchet. The only allowable direction for the drum to rotate is to reel in the wire rope onto the drum at the bottom.

1.2.5 Check to ensure that there is enough clearance between winch drum and mounting surface. Check to make sure there is enough clearance for proper operation of the handwheel and FASST Winder™. Rotate the FASST Winder™ back and forth checking for clearance issues (see fig. #2).

1.2.6 Maintain a fleet angle no greater than 1-1/2 degrees from winch drum to lead sheave (see appendix 5). The proper fleet angle helps to minimize wire rope damage by assisting the wire rope to wind uniformly onto the drum.

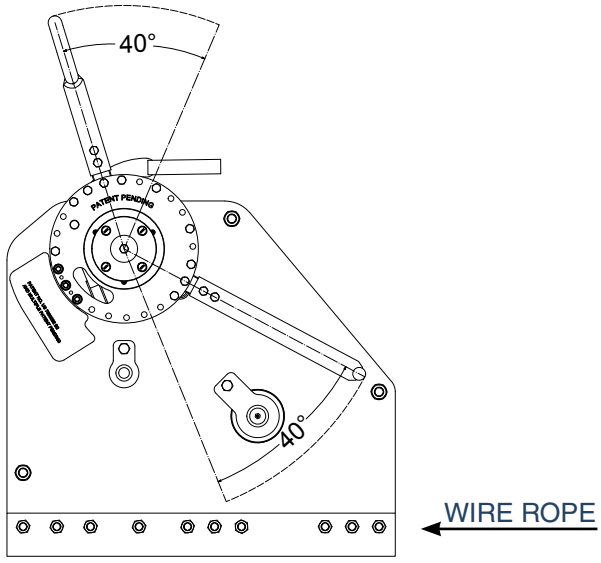
1.2.7 Using sufficient tack welds, secure the base bars to the deck or doubler plate. This will prevent the winch from becoming misaligned from heat distortion during the application of the seal weld.

1.2.8 Next apply a seal weld to the mounting fixture to permanently secure it to the deck. The seal weld will prevent corrosion from occurring between the mounting fixture and mounting surface.

1.2.9 Inspect the winch immediately following installation. This inspection will give a good starting record of the winch condition so that future inspections can be compared.

CAUTION
Remember that the weld has to be strong enough to withstand loads equal to or greater than the capacity of the winch and ultimate capacity of the wire.

FIGURE #2 - FASST WINDER™ CLEARANCE



WINCH HANDWHEEL NOT SHOWN FOR CLARITY

1.3 INSTALLATION OF WIRE ROPE

1.3.1 To install wire rope, rotate the drum of the winch so that the U-bolt nuts are easily accessed through the round cut out located on the side of the winch (see fig. 3a).

1.3.2 Using a standard socket wrench with an extension, loosen the nuts.

1.3.3 If installing wire rope on a new winch, remove and discard the u-bolt spacer pipe. If replacing worn out wire rope, remove the wire rope from the U-bolt and dispose of properly.

CAUTION
Remember to always wear the proper protective equipment when handling the wire rope.

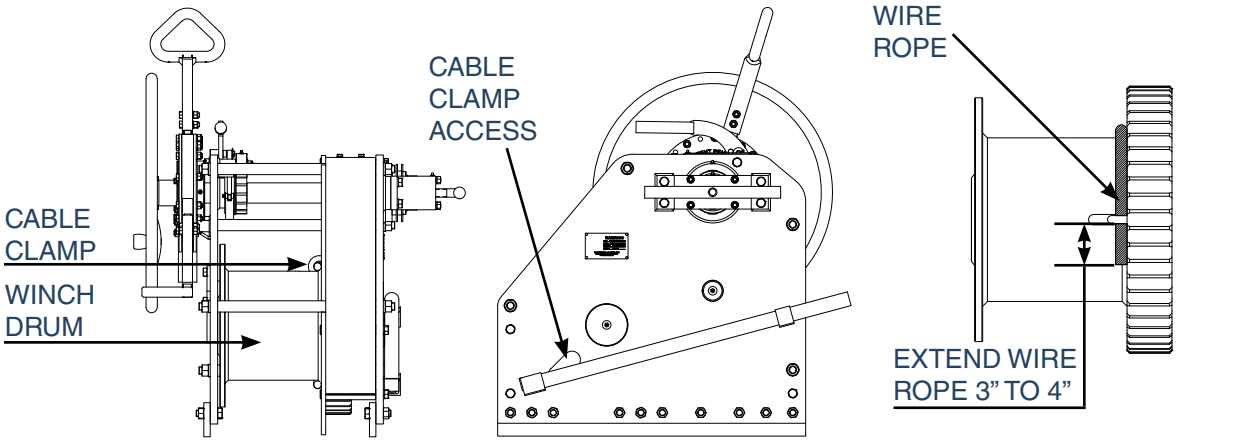
1.3.4 Insert the new wire rope end under the winch drum and through the U-bolt from the front of the winch so that approximately 3 to 4 inches extend through the U-bolt (see fig. 4b).

NOTICE
Breaking strength of new wire rope should be a least 3 times greater than the largest load placed on the winch. This minimum value may be greater depending on type of load and the method of moving the load.

1.3.5 Tighten the U-bolt nuts evenly to secure the wire rope to the winch drum. The U-bolt will act as a vise keeping the wire rope in place as the rest of the rope is reeled onto the winch. Retighten the U-bolt after 24 hours.

CAUTION
The U-bolt nuts must be retightened periodically to insure that the wire rope end is held in place snugly against the drum flange. Over time and usage the rope will "crush" down at the U-bolt creating the possibility that the rope end will escape.

FIGURE #3 - INSTALLING THE WIRE ROPE



A) LOCATING THE CABLE CLAMP

B) INSTALLING THE WIRE ROPE

1.3.6 Wind the wire rope onto the drum by operating the winch. Maintain tension on the wire rope to insure that the first coil lays snugly against the drum flange and each successive coil is snug against the previous coil. Make sure that the wire rope is being reeled in from the bottom on the winch drum.

1.3.7 Continue wrapping the wire rope until there are at least 3 to 4 complete wraps on the winch drum. These wraps serve as an anchor and must remain on the drum at all times.

WARNING
In order for the winch to attain its full holding capacity, 3 to 4 complete wraps of the wire rope must be on the winch drum at all times. Also, make sure the rope is installed securely to the drum. A poorly secured wire rope could come loose from its anchor and allow the load to escape.

NOTICE
Drum capacity depends on how tightly and evenly the wire rope is wound on the drum. Actual drum capacities are usually 25% to 30% less than values given in performance tables when the wire rope is loosely wound and overlapping. Also, line speed will increase with each additional layer of wire rope that is wound onto the drum.

2.1 OPERATING THE WINCH

The DF-356 Upfit Winch with FASST Winder™ is operated by using either the hand wheel or FASST Winder™ System. The winch is also equipped with a disc braking system, locking dog and anti-backlash friction band. The following operating instructions will help you become familiar with these basic operating components of the winch. These instructions are not a substitute for proper training by your company in the safe use of winches, barge rigging and other marine equipment.

2.1.1 Handwheel Operation

2.1.1.1 Normally the winch is shipped with the handwheel mounted to the winch. If the handwheel is not installed, upon receiving the winch, attach the handwheel to the handwheel hub using the 4 bolts and lock washers that are included. Refer to the parts breakdown drawings located in the appendix for location of the winch components.

2.1.1.2 After installing the handwheel, use it to turn the winch drum in either a clockwise or counter-clockwise motion. The drum rotation, which is the same as the handwheel rotation, will spool wire rope onto or off the bottom of the winch drum. If the winch drum will not rotate freely refer to operation instructions for the brake and dog systems to ensure that nothing is locked down.

WARNING
Do not use the handwheel as a brake or anchor for a load.

2.1.1.3 Prior to tightening the winch, engage the locking pawl per instructions 2.1.3.1.

2.1.1.4 The handwheel assembly is equipped with a speed handle that can be used for faster operation.

2.1.1.5 When operating the winch, always maintain tension on the wire rope to keep it tightly and evenly wound on the winch drum.

NOTICE
Breaking-in the winch occurs during the first 10 hours of normal operation. During break-in, mating surfaces become polished and clearances increase. This is desired for efficient operation of the bearings and gears.

2.1.2 FASST Winder™ Operation

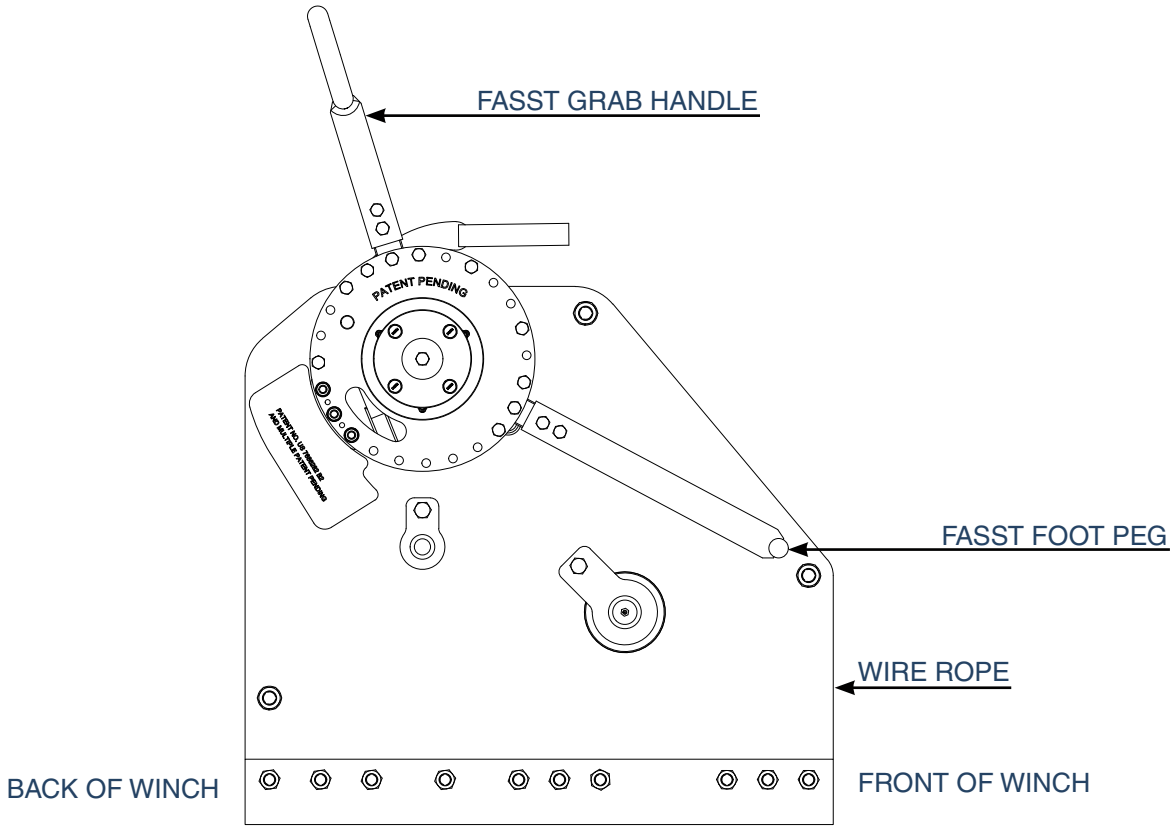
2.1.2.1 The winch is equipped with a FASST Winder™ system for use when additional wire rope tightening is needed. The FASST Winder™ should be placed in rest position when not being used (see fig. #4).

2.1.2.2 To use the FASST Winder™, firmly place both hands on the FASST Grab Handle and place foot closest to winch on the FASST Foot Peg (see fig. #5). While keeping your opposite foot firmly planted on the deck, pull on the FASST Grab Handle with both hands and push on the FASST Foot Peg with your foot (see fig. #6). After the FASST Winder™ has traveled fully to the engaged position, reverse this process to bring it back to the rest position. Continue this motion until full tension has been acheived.

WARNING
Do not engage the FASST Winder™ while the winch gears are turning. Do not stand on or within the travel area of the FASST Winder™. Serious injury or even death may result.

2.1.2.3 Upon completion of using the FASST Winder™ system, return it to its resting position with the handle positioned to the back of the winch.

FIGURE #4 - FASST WINDER™ MECHANISM



WINCH HANDWHEEL NOT SHOWN FOR CLARITY

FIGURE #5 - FASST WINDER™ Rest Position

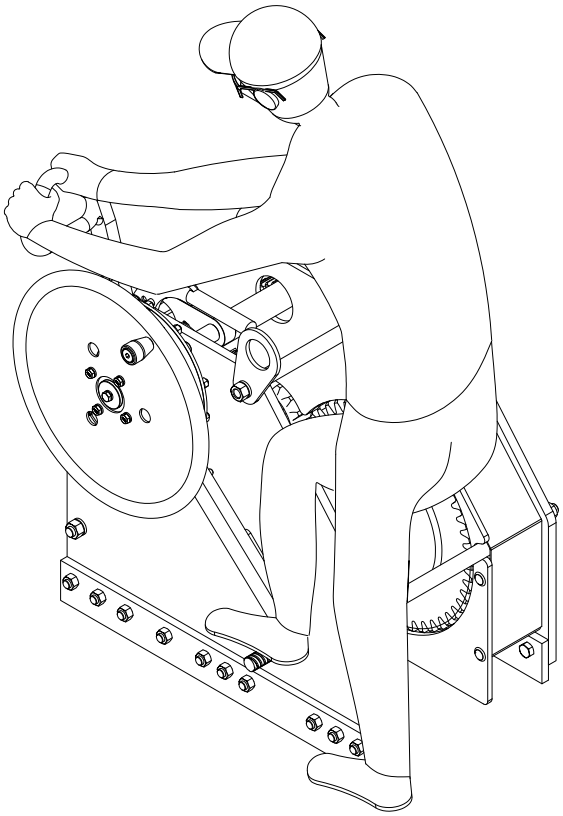
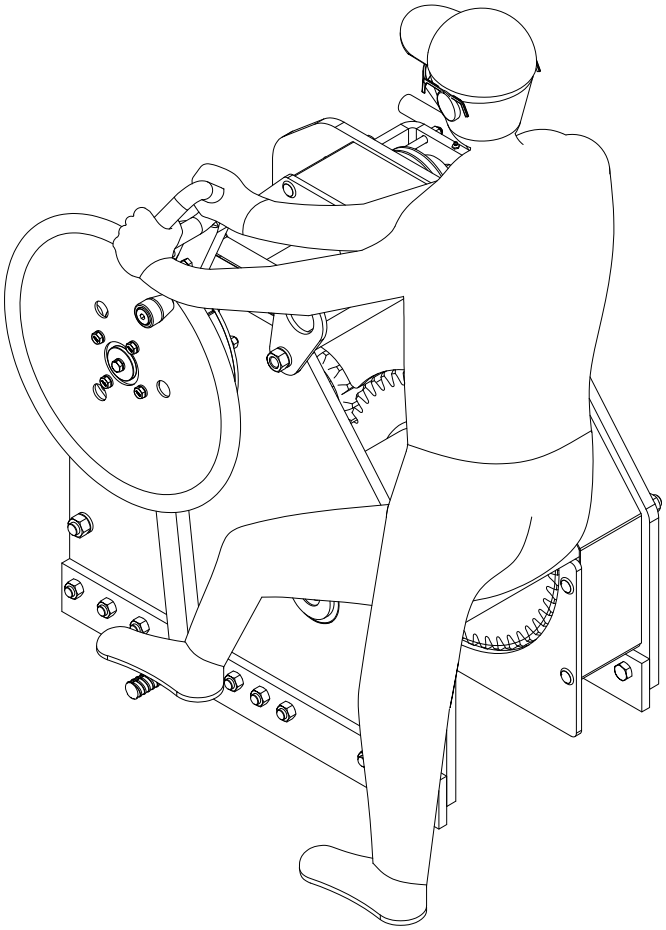


FIGURE #6 - FASST WINDER™ Forward Position



2.1.3 Locking Pawl and Anti-Backlash Friction Band Operation

The manual winch uses a combination locking pawl and anti-backlash friction band assembly to secure the wire rope that is either being loaded or unloaded under tension. The locking pawl prevents the load from releasing while tension is being applied to the wire rope. The anti-backlash friction band is used to control the release of the rope under tension. This controlled release is necessary to avoid excessive payout speeds that could result in line backlashing or rope fouling on the drum.

2.1.3.1 To engage the locking pawl, position the pawl release handle in the forward position (see fig. #7a). While the handle is in this position the locking pawl is free to interact with the pawl gear. This position of the handle also disengages the anti-backlash friction band.

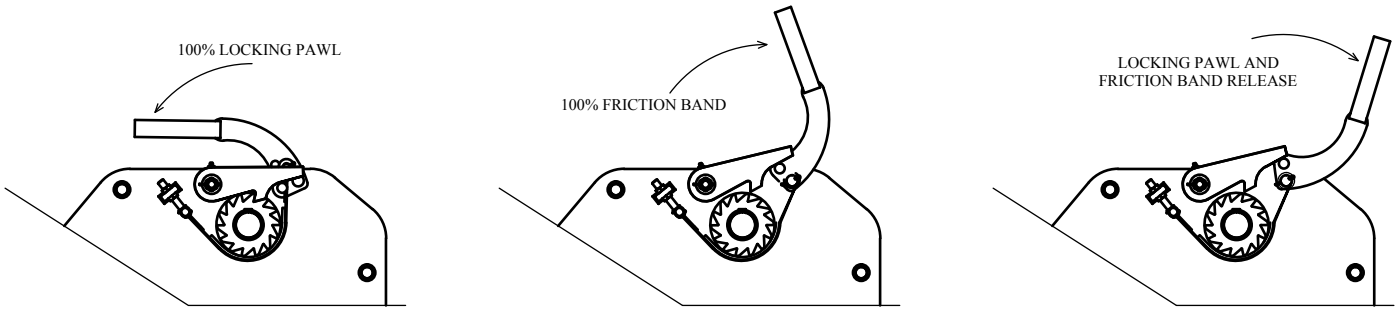
2.1.3.2 To disengage the locking pawl, pull the pawl release handle towards the back of the winch (see fig. #7b). As the locking pawl is lifted out of the pawl gear, the release handle will engage the anti-backlash friction band.

2.1.3.3 Using the pawl release handle, the operator can now safely control the wire rope pay out speed and relieve tension.

2.1.3.4 The pawl release handle can also be positioned so that both the locking pawl and friction band are disengaged completely. This is accomplished by pulling the release handle as far back as possible (see fig. #7c).

CAUTION
The anti-backlash friction band is not a substitute for securing a load. It is to only be used to assist the operator in disengaging the locking dog and controlling wire rope pay out speeds.

FIGURE #7 - LOCKING DOG & ANTI-BACKLASH FRICTION BRAKE



a) Forward Position
locking pawl engaged and friction band disengaged

b) Drag Position
locking pawl disengaged and friction band engaged

c) Back Position
locking pawl and friction band disengaged

2.1.4 Disc Brake Operation

The winch uses a multi-disc braking system to secure the loads placed on it. The brake system is designed to hold loads equal to that of the winch capacity.

CAUTION
Under no circumstances should loads of greater value than winch capacity be placed on the brake system or winch. To do so could cause equipment failure and damage or personal injury.

2.1.4.1 To engage the disc braking system, simply turn the brake handle clockwise. This allows the handle shaft to screw into the brake housing thus clamping down the brake components. Continue turning the handle until it becomes snug. The brake should now be set and ready to maintain tension.

2.1.4.2 To disengage the disc braking system, simply turn the brake handle counter-clockwise. The handle can be turned until it is in the fully open position. The brake should now be off and the winch is ready to be loaded or unloaded.

3.1 EQUIPMENT INSPECTION

NOTICE
An inspection program should be started as soon as any equipment is put into service. A qualified person should be appointed the responsibility of regularly inspecting the equipment. Written records of inspections are recommended by the manufacturer.

3.1.1 Frequent Inspection

3.1.1.1 Visually inspect the equipment before each use. Check the equipment for cracks, bending, wear, rust, corrosion and any other damage. If any problems are discovered, stop use immediately and remove the equipment from service until all appropriate repairs are completely performed.

3.1.1.2 **ENSURE THAT EQUIPMENT IS PROPERLY LUBRICATED.**

3.1.1.3 Check to ensure that the foundation is in good condition. Make sure that mounting fasteners and other hardware are tightened securely.

3.1.1.4 Ensure that the wire rope is installed correctly and anchored securely to the drum. Also, check to make sure the wire rope is in good condition.

3.1.2 Periodic Inspection

3.1.2.1 Periodic inspections should occur whenever equipment is returned to service from storage, every six months in service, more frequently if an inspection discovers any damage or poor operation, or in any case where the winch may have been over loaded or operationally abused.

3.1.2.2 Visually inspect the equipment checking the finish for wear, flaking or other damage as listed in the frequent inspection plan. Disassembly is recommended in order to properly inspect individual components.

3.1.2.3 Check the winch drum by moving it with your hands. Check for excessive movement that may be the result of worn or loose gears, bearings or shafts. Some play is normal while excessive play may be the result of overloading.

3.1.3 Wire Rope Inspection

3.1.3.1 Wire rope inspection should be conducted according to the manufacturer's recommendations or accepted industry standards.

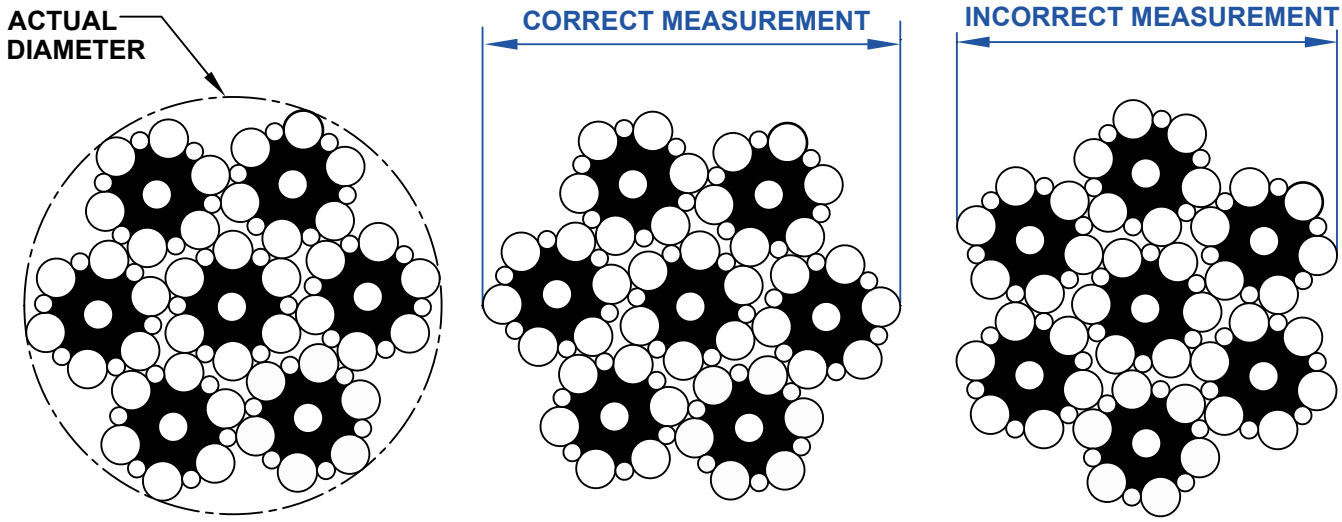
CAUTION
Remember to always wear the proper protective equipment when handling the wire rope.

3.1.3.2 Inspect the entire length of wire cable for bent or crushed areas, broken or cut wires, corrosion and other damage. If any defect or damage is found the cable must be replaced.

3.1.3.3 Inspect end connections and fittings for corrosion, kinking, crushing or other damage. If any corrosion or damage is found the cable must be replaced.

3.1.3.4 Check the wire rope diameter for signs of decreased area (see fig. #8). Diameter decrease may be signs of wear and internal degradation in the wire rope. Generally, wire ropes are manufactured larger than nominal diameter. When placed in service for the first time, diameter can reduce slightly. Minimum diameter specifications can be obtained from the rope manufacturer.

FIGURE #8 - WIRE ROPE DIAMETER



THE WIRE ROPE MUST BE REPLACED IF THE DIAMETER MEASURES LESS THAN THE MINIMUM DIAMETER GIVEN BY THE ROPE MANUFACTURER

EXAMPLE - A $\frac{3}{4}$" WIRE ROPE HAS A MINIMUM DIAMETER OF $\frac{45}{64}$" (0.7031")

3.2 EQUIPMENT LUBRICATION

3.2.1 All grease fittings and external gearing should be lubricated using NABRICO's suggested lubricants or similar.

3.2.2 Drive shaft and drum shaft grease fittings should be lubricated at least once a month under normal conditions and at least once a day under adverse conditions. Lubricate while gears are rotating slowly.

3.2.3 Drive gear teeth should be coated at least once a month. Application with an aerosol can is recommended for uniform coverage. Graphite or other dry type lubricant should be used instead of gear grease when the winch is subjected to large amounts of foreign material such as coal dust. Always keep gear teeth as free of foreign material as possible.

RECOMMENDED LUBRICANT FOR USE WITH NABRICO DECK MACHINERY	
HYDRAULIC OIL (OPEN LOOP)	ENVIROLOGIC 3032
SPUR, HELICAL GEARS	ENDURATEX EP220
ALL WORM GEARS	ENDURATEX EP220
OPEN GEARING (SPRAY CAN)	EUREKA FLUID FILM SPRAY MOBILTAC E LUBRIPLATE OPEN GEAR SHEILDING
GREASE FITTINGS	PEERLESS LLG #2
PRESERVATIVE TREATMENT	MOBILARMA 524
SUMITOMO, NORD AND SEW GEARBOXES	USE MANUFACTURER'S RECOMMENDATIONS
SLEWING BEARINGS / DF-559 WINCH	AQUA SHIELD
Note: Lubricant manufacturers shown are not exclusive recommendations. Consult your lubricant source for more detailed information about oil selection.	

3.3 CLEANING AND STORAGE

3.3.1 Cleaning the Equipment

3.3.1.1 The equipment should be regularly cleaned to remove dirt and to help prevent rust and corrosion.

3.3.1.2 When cleaning, be sure to leave a light film of oil on all surfaces to protect them against the elements of nature. Wipe off excessive amounts of oil to avoid the accumulation of dirt.

3.3.1.3 Remove all unnecessary objects from the area surrounding the equipment to prevent hazardous situations from occurring.

3.3.2 Storing the Equipment

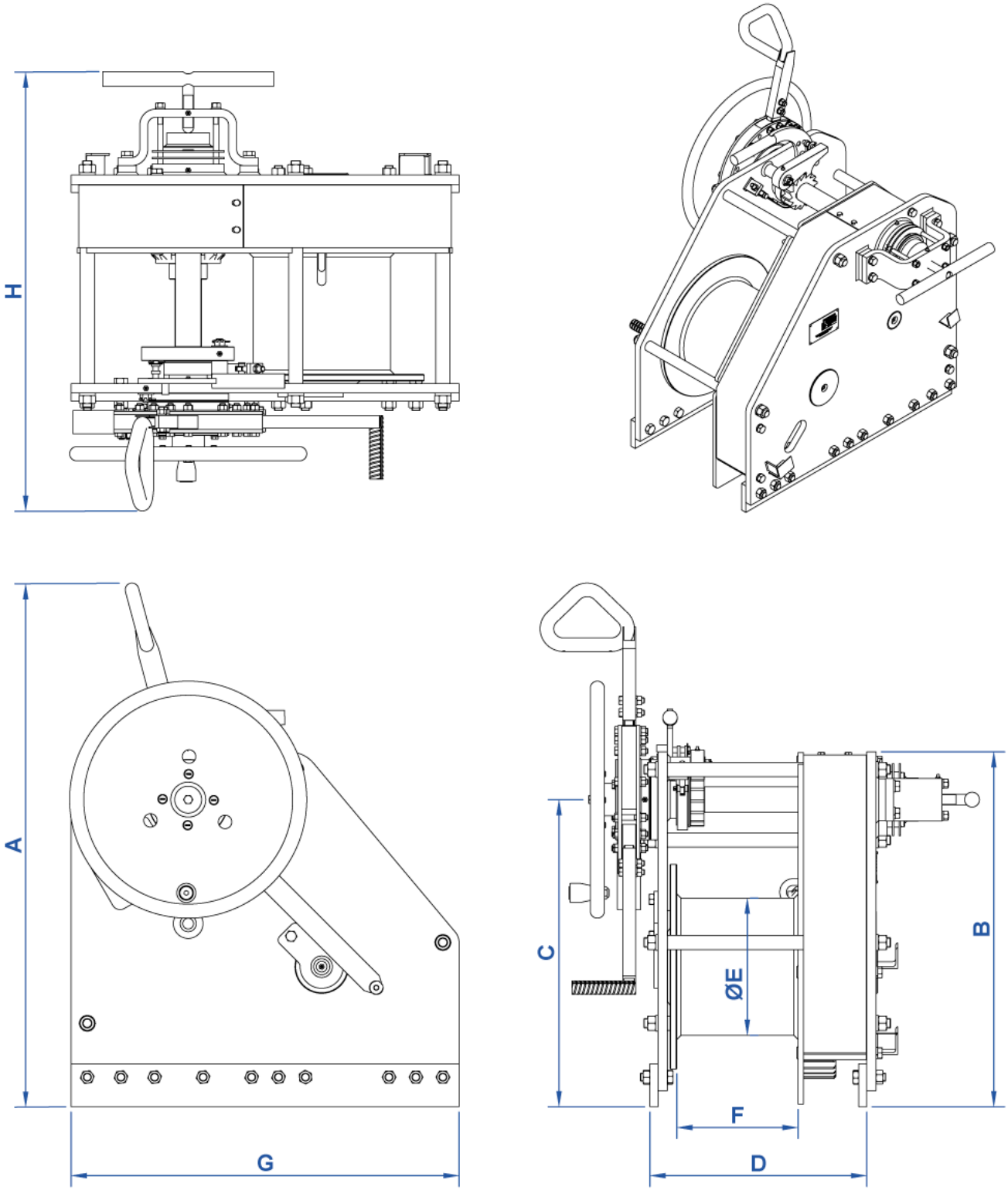
3.3.2.1 Lubricate the equipment as necessary to help prevent rust and corrosion during storage. Add a rust preventive for long term storage.

3.3.2.2 Seal the equipment in plastic, if possible, to help prevent rust, corrosion and other damage.

3.3.2.3 Store the equipment upright in a cool clean place away from corrosive chemicals and moisture.

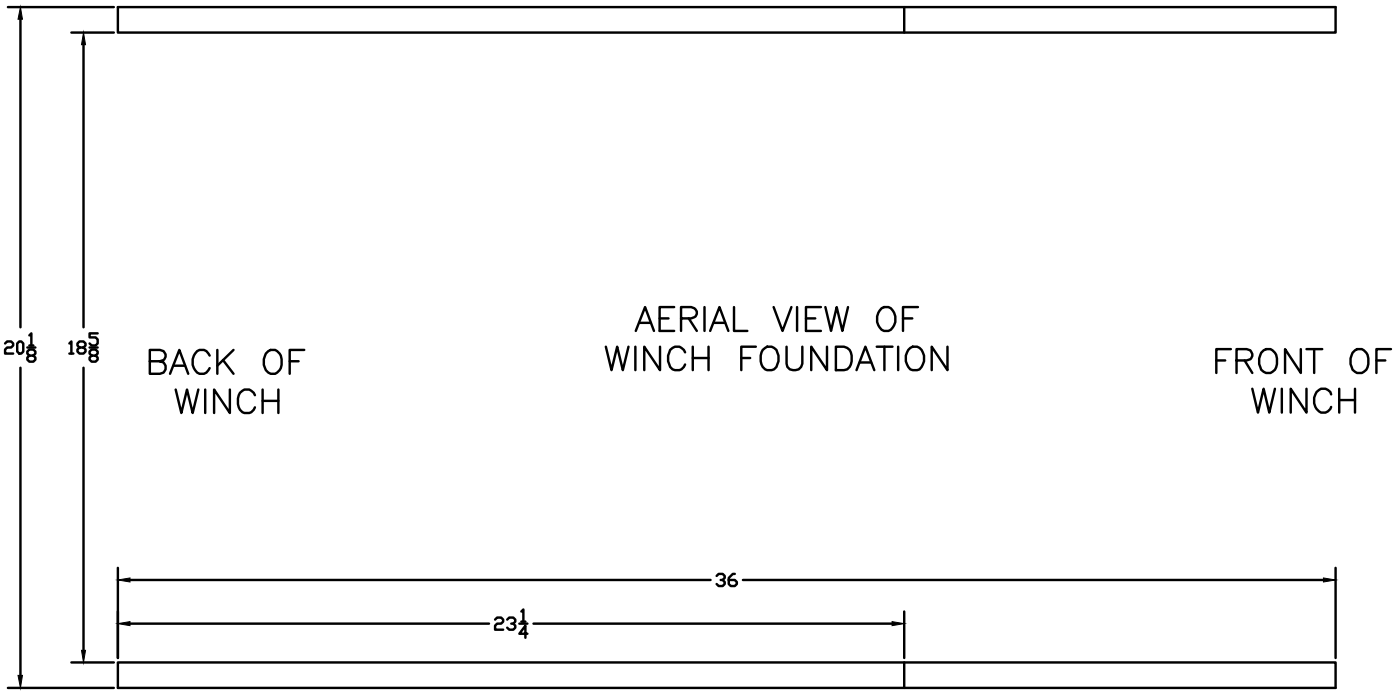
3.3.2.4 Rotate the drum periodically to keep bearing and gear surfaces from becoming lacquered.

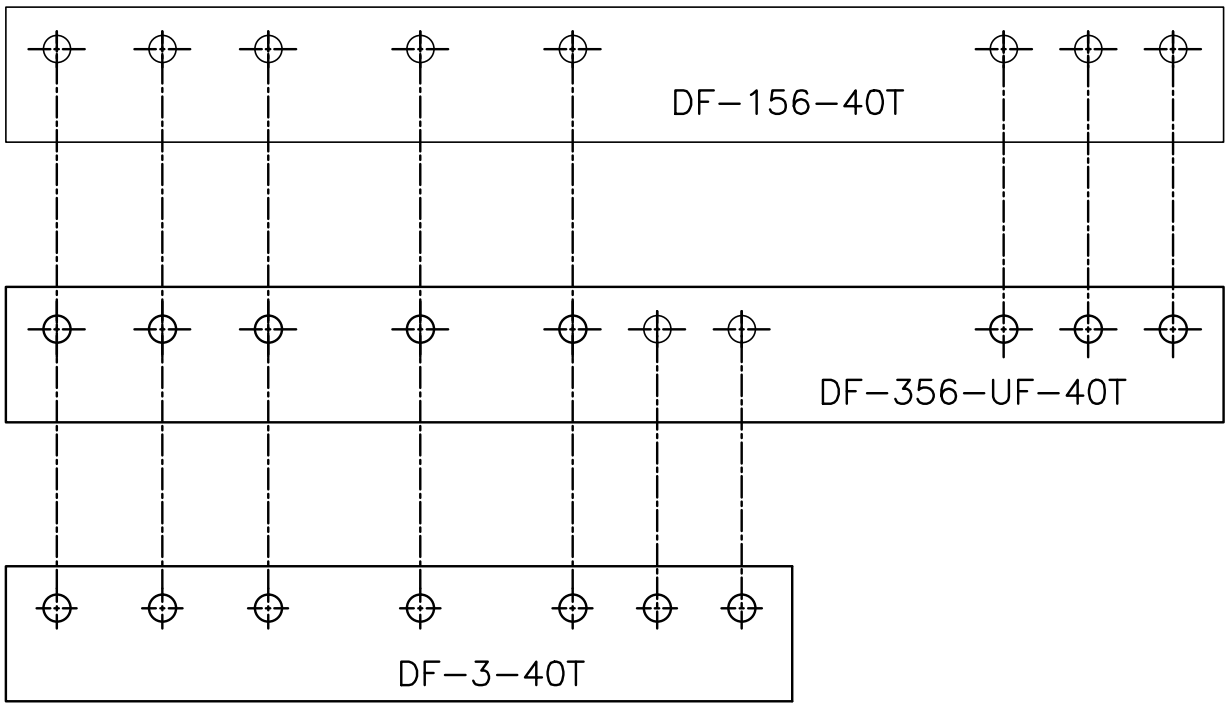
A.1 DIMENSIONAL



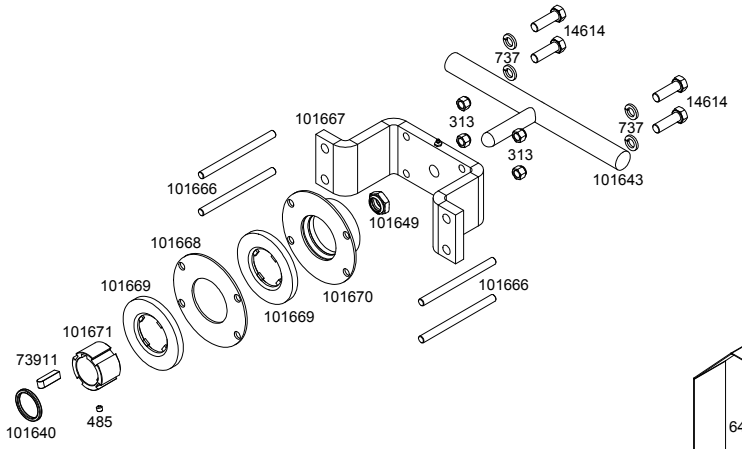
Model No.	A	B	C	D	E	F	G	H
DF-356-FST-40-11	48 9/16"	33"	28 1/2"	20 1/8"	12 3/4"	11 1/4"	36"	40 3/4"
DF-356-FST-40-18	48 9/16"	33"	28 1/2"	26 1/4"	12 3/4"	18 1/8"	36"	46 7/8"

A.2 BASE BAR COMPARISON

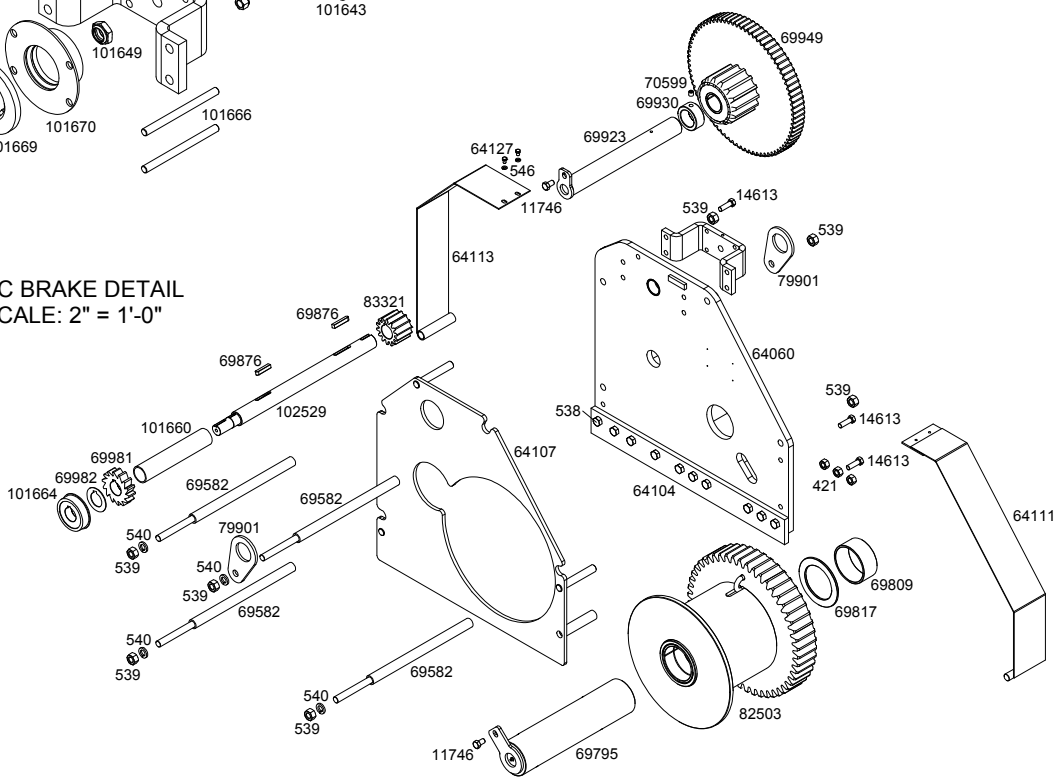




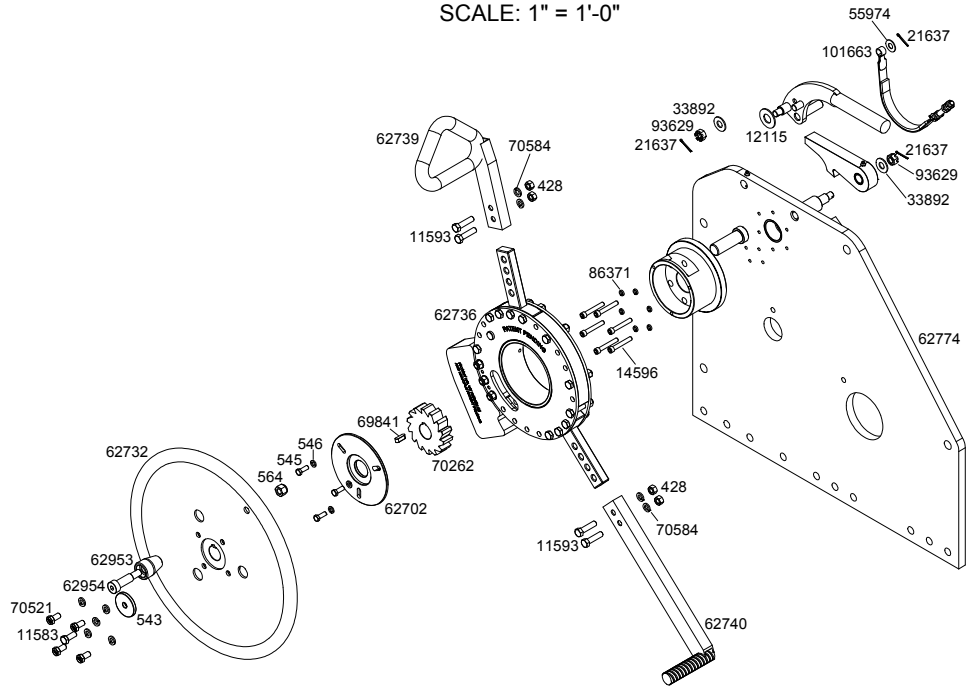
A.3 PARTS BREAKDOWN



DISC BRAKE DETAIL
SCALE: 2" = 1'-0"



MAIN ASSEMBLY DETAIL
SCALE: 1" = 1'-0"



HANDWHEEL & FASST DETAIL
SCALE: 1 3/8" = 1'-0"

A.4 PARTS LIST

DF-356-UF-40 FASST Winder™ Winch Parts List		
PART DESCRIPTION	**QTY**	**PART #'S**
22" Handwheel Assembly (Galv'd) 40 Ton Winch	1	062732N
Hand Grab Assembly, DF-356	1	062739N
Foot Grab Assembly, DF-356	1	062740N
Speed Handle Assembly, DF-629	1	062952N
Base Bar, DF-156-UpFit	2	064104N
Front Guard Assembly, 40T-UpFit Winch	1	064111N
Rear Guard Assembly, 40T-UpFit Winch	1	064113N
Pipe Separator (Galv'd) 40T-11 Winch	4	069582N
Drum Shaft Assembly, 40T-11 Winch	1	069795N
Drum Pipe Spacer (Galv'd) 40 Ton Winch	1	069809N
Drum Washer (Galv'd) 40 Ton Winch	1	069817N
Key (Steel) 3/8" x 3/8" X 1-3/4", Rounded One E	1	069833N
Key (Steel) 3/8" x 3/8" x 1-3/16", Rounded Both	1	069841N
Key (Steel) 1/2" x 1/2" x 2 3/4", Rounded One En	1	069876N
Intermediate Shaft Assembly (1045) 40T-11 Win	1	069923N
Intermediate Shaft Collar (Galv'd) 40 Ton Winch	1	069930N
Intermediate Gear Assembly, 40 Ton Winch	1	069949N
Locking Gear (2" ID)	1	069981N
Spacer Washer (304 SS) 40 Ton Winch	1	069982N
Ratchet Gear (Galv'd) DF-156	1	070262N
Lifting Lug (Galv'd) Manual Winch	2	079901N
Drum Assembly, 40T-11 Winch	1	082503N
Drive Pinion, 40 Ton Winch	1	083321N
Separator Rod (SS) 40T-11 Winch	4	084336N
Drive Shaft Pipe Spacer (Galv'd) 40T-11 Winch	1	101660N
Locking Pawl Assembly (Galv'd) HL Release	1	101662N
Band Brake Assembly, HL Release	1	101663N
Friction Drum (HL Winch)	1	101664N
Key (Steel) 1/2" x 1/2" x 2 1/2", Rounded One En	1	101684N
Drive Shaft, DF-156-40-HL-11-SPM	1	102529N

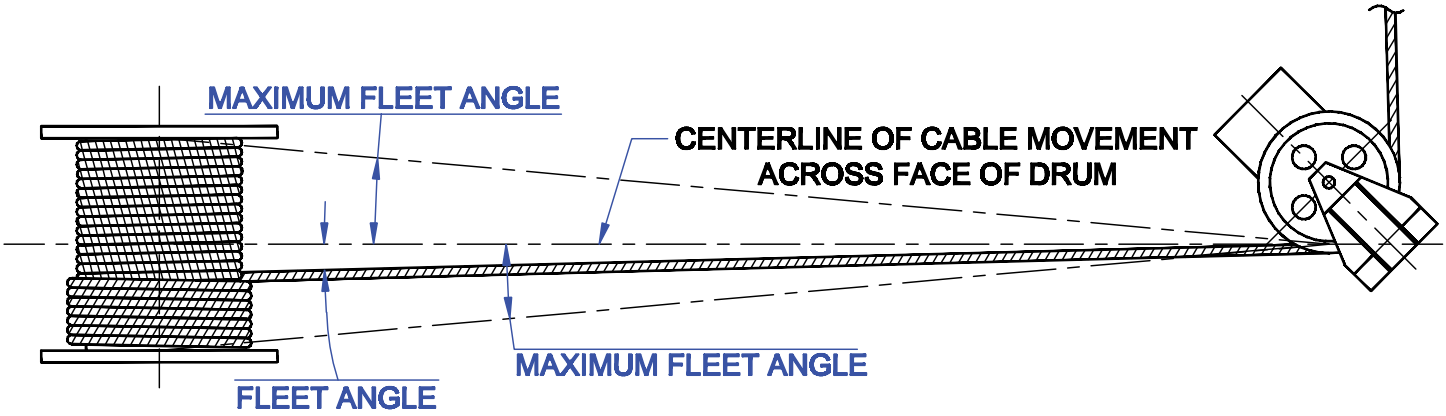
HAND SPECIFIC PARTS	QTY	PART #'S
Right Hand Winch		
FASST Winder Assembly (RH) DF-356	1	062736N
Handwheel Side Plate Assembly (RH) 40T-UpFit	1	062774N
FASST Winder Central Hub (RH) DF-356	1	062780N
Brake Side Plate Assembly (RH) 40T-Upfit Winch	1	064060N
Cable Guard Assembly (RH) 40T-UpFit	1	064107N
Pawl Handle Ass'y (HL Release, Right Side Mount	1	101696N
Left Hand Winch		
FASST Winder Assembly (LH) DF-356	1	062746N
FASST Winder Central Hub (LH) DF-356	1	062783N
Handwheel Side Plate Assembly (LH) 40T-UpFit H	1	062784N
Brake Side Plate Assembly (LH) 40T-Upfit Winch	1	064051N
Cable Guard Assembly (LH) 40T-UpFit	1	064103N
Pawl Handle Ass'y (HL Release, Right Side Moun	1	101661N

BUSHINGS	QTY	PART #'S
Drive Shaft Bushing (SAE 660) 2" ID x 2.38" OD x	2	069635N
Intermediate Gear Bushing (SAE 660) 2.44" ID x	1	069973N
Drum Bushing (SAE 660) 4.94" ID x 5.63" OD x 3.	2	082511N
Locking Pawl Bushing (SAE 841) 0.88" ID x 1.13"	1	102502N

Additional Parts List		
FASTENERS & ETC	**QTY**	**PART #'S**
Hex Lock Nut (304 SS) 1/2" - 13 UNC, Nylon Inse	4	000313N
Hex Head Bolt (304 SS) 1/2"-13 UNC x 2-1/2", Fu	3	000419N
Hex Head Nut (316 SS) 3/4"-10 UNC	20	000421N
HEX NUT (316 SS) 1/2"-13 UNC	18	000428N
Flat Washer (304 SS) 16mm [5/8"]	1	000453N
Flat Washer (304 SS) M10, Narrow	1	000474N
Socket Head Set Screw (304 SS) 3/8"-16 UNC x 5	1	000485N
Hex Head Bolt (304 SS) 1/2"-13 UNC x 2-3/4"	11	000529N
Hex Head Bolt (304 SS) 3/4-10 NC X 2-1/2"	20	000538N
Hex Head Nut (316 SS) 7/8"-9 UNC	8	000539N
Lock Washer (304 SS) 7/8", Medium Split	8	000540N
Flat Washer (304 SS) 9/16" ID x 2 1/2" OD x 5/16	1	000543N
Hex Head Bolt (304 SS) 3/8"-16 UNC x 1"	3	000545N
Lock Washer (SS) 3/8", Medium Split	5	000546N
Lock Washer (Zinc PL) 5/8", Medium Split	4	000736N
Lock Washer (304 SS) 5/8", Medium Split	4	000737N
Grease Fitting (SS) 1/8 NPT	9	009866N
Hex Head Bolt (304 SS) 1/2"-13 UNC x 1 1/4"	1	011583N
Hex Head Bolt (304 SS) 1/2"-13 UNC x 2", Fully T	4	011593N
Hex Head Bolt (Zinc PL) 5/8-11 UNC X 1"	2	011746N
Flat Washer (304 SS) 7/8"	1	012115N
Socket Head Cap Screw (304 SS) 3/8"-16 UNC x 2	6	014596N
Hex Head Bolt (Zinc PL) 5/8"-11 UNC x 2"	4	014613N
Hex Head Bolt (316 SS) 5/8"-11 UNC x 2"	4	014614N
Cotter Pin (304 SS) 1/8" x 1 1/4", Extended Pron	4	021637N
Flat Washer (Bronze) 5/8"	2	033892N
Flat Washer (304 SS) 1/2", Small OD	1	055974N
Grease Fitting (304 SS) 1/8"-27 NPT, 45 Deg.	1	062713N
Hex Head Bolt (304 SS) 3/8"-16 UNC x 1/2"	2	064127N
Hex Head Bolt (304 SS) 1/2"-13 UNC x 1"	4	070521N
Lock Washer (304 SS) 1/2" , Medium Split	23	070584N
Socket Set Screw (304 SS) 5/8"-11 UNC x 5/8"	1	070599N
Hex Jam Nut (Brass) 1/2"-13 UNC	2	073028N
Lock Washer (304 SS) 3/8", High Collar Split	6	086371N
Clevis Pin (304 SS) 5/8" x 2-1/2"	1	092768N
Slotted Hex Nut (Bronze) 5/8"-11 UNC	2	093629N
Cotter Pin (304 SS) 3/32" x 3/4", Extended Prong	1	093965N

DISC BRAKE PARTS	QTY	PART #'S
Key (Steel) 1/2" x 1/2" x 1-3/4", Rounded One En	1	073911N
Quad Ring Seal (2" Shaft)	1	101640N
Hex Jam Lock Nut (304 SS) 1"-8 UNC, Nylon Inse	1	101649N
Brake Handle Assembly	1	101665N
Threaded Rod (304 SS) 1/2-13 UNC x 6-3/4"	4	101666N
Brake Housing, Disc Brake	1	101667N
Engaging Plate	1	101668N
Brake Disc	2	101669N
Engaging Cap Assembly	1	101670N
Disc Brake Sleeve (304 SS) 2" ID	1	101671N

A.5 FLEET ANGLE



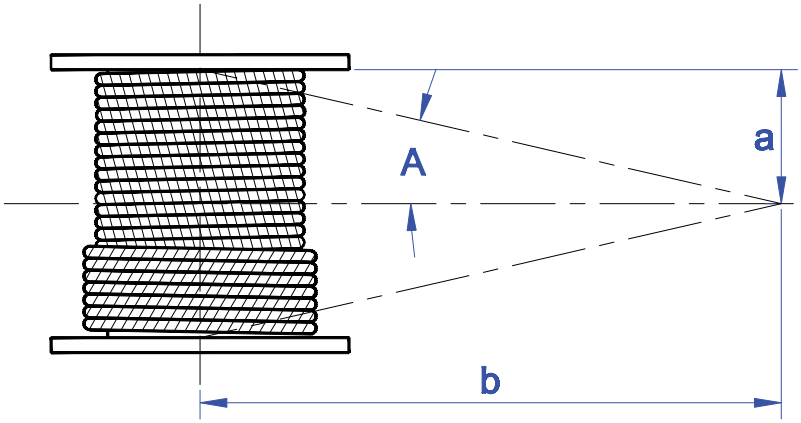
Fleet Angle:

In order to insure proper wrapping on the drum and no undue wear of the wire rope, the fleet angle should be kept as small as practical. This is important to consider during the planning of a winch installation. Sheaves and drums should be placed so that the fleet angle will be equal on each side of the centerline of rope travel.

For a smooth drum a maximum fleet angle of 1-1/2 degrees is recommended. When the drum is grooved to suit the wire rope, the fleet angle should not exceed 2 degrees.

Example: Fleet Angle Calculation for 36" Chain Drive Barge Moving Winch

36" Chain Drive Moving Winch



a=18"
b=x (distance to be determined)
A°=1.5° (minimum for a smooth drum)

tanA=a/b

tan 1.5°=18"/x
.02619=18"/x
x=18"/.02619
x ~ 688" (rounded up to next whole number)
x ~688" / 12 (convert to feet)
x ~58'

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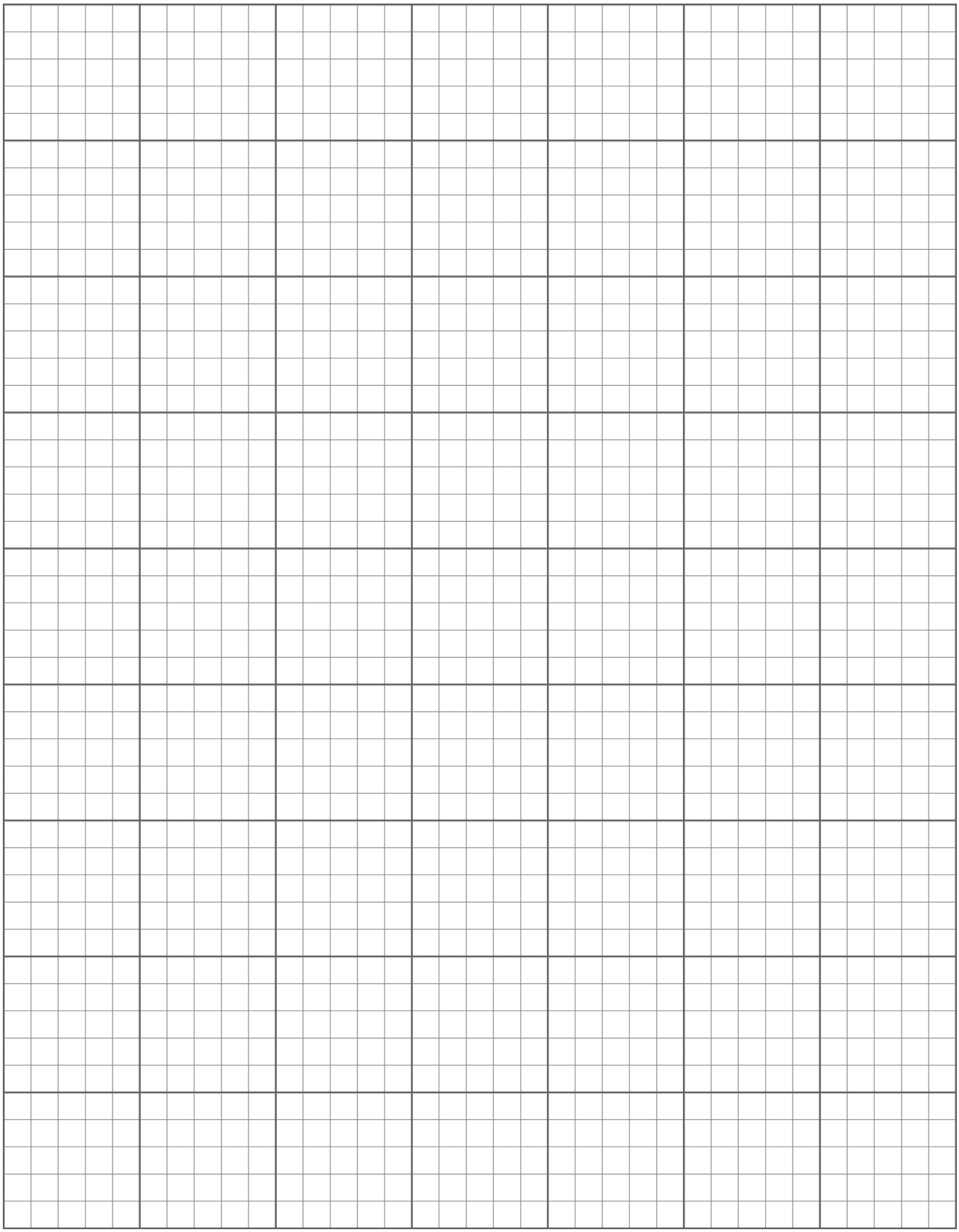
Dimensions. All dimensions shown in this catalog are in feet and inches. Weights are in English pounds. Capacities are in short tons of 2,000 pounds. Please note that dimensions and weights are nominal and are subject to standard variations. Maximum test pressure on hatches, doors, and enclosures is 2 PSI unless advised in writing by NABRICO of a higher allowance. Product details and specifications are subject to change without notice.



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KEVEL CHOCK
KEVEL
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BARGE CRANES
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8” SIZE
10” SIZE