

**NOTE TO SPECIFYING ARCHITECT REGARDING  
SECTION 11076  
LINE SHAFT WINCH SYSTEM**

1. Highest state of art in stage technology: motorized battens.
2. Dynamic loads are vertical eliminating the need for head block beams.
3. Stage loft can be smaller, sized to fit the flying battens.
4. Electrical equipment is just under the roof level on a conventional grid floor. Above each batten is a shaft of the same approximate length that is rotated by a corresponding winch. The shaft has drums that wind up cables on 10-foot centers.
5. Stage floor is completely free of equipment.
6. Control panels are located on side walls of the stage.
7. Operation is simple. Battens are lowered to add equipment loads or take off equipment loads without the need for balance weight used with conventional counterweighted battens.
8. Equipment is more expensive but there are some off-setting building economies.
9. Phone 800-548-8982 for clarification or assistance. No charge, or course.

**SECTION 11076  
LINE SHAFT WINCH SYSTEM**

**PART 1—GENERAL**

- 1.01 The specification sections "General Conditions", "Special Requirements", and "General Requirements" form a part of this section by this reference, and shall have the same force and effect as if printed in full.
- 1.02 This section of specifications includes all labor, supervision, equipment, tools, materials and all other means of construction necessary to perform the stage equipment work as shown on the drawings, described in this specification, or as necessary to complete the work in a first class manner.
- 1.03 This contractor must make a complete field check of the site conditions and shall take accurate measurements before fabrication. Miscellaneous items necessary for a proper installation of the line shaft winch systems and related equipment shall be supplied and correctly installed by the Contractor. The Contractor shall be held responsible for the quality of materials and labor furnished to insure the proper installation of the specified materials.
- 1.04 The system specified is a line-shaft system that includes a total of \_\_\_\_ individual motorized line shaft batters, each of which is capable of lifting 1500 pounds. No part of the system will be located on the floor or on the stage house walls, except for control panels, and related items.
- 1.05 Complete wiring diagrams including both power requirements and control requirements shall be provided by this contractor, but the actual connections, wire, and conduits shall be performed by others.
- 1.06 Work not included in this contract:
1. Electrical connections, wiring, and conduit.
  2. Structural steel.

**PAR 2—PRODUCTS**

- 2.01 Line Shaft Winch:
1. Each winch unit shall have the capacity to raise and lower the specified load at the specified speed.
  2. The winch shall have the following characteristics: Speed is 25fpm; Lifting Capacity is 500 pounds; Travel is 20 feet; Number of Drums is 5
  3. Construction  
The integrated motor-brake -gear reducer unit and associated components, including the helical drum, shall be supported by a sturdy steel base, holding the elements of the winch in proper alignment. Both ends of each drum shall be supported by a self-aligning flange bearing. Alternate drums shall be threaded in opposite directions, to keep the batten from "walking" as its elevation changes. Drums shall be interconnected by shafts with universal joints at each end. Side plates shall hold three keeper rollers designed to prevent cross winding of the lift line on the drums.
- 2.02 Gearmotor:
1. Motors, primary brakes, and gearboxes shall be an integrated unit, with the first stage pinion gear mounted directly on the motor's armature shaft. No couplings will be permitted between the motor and gear reducer. Exceptions will be permitted only when special gearing or torque requirements cannot be met with an integrated unit.
  2. Motors shall be totally enclosed fan cooled (TEFC). The motor shall have a minimum AGMA service factor of 1.0 for constant operation.
  3. The gear reducer shall be a combination Helical/Worm reducer. The gear case shall be cast iron for protection against shock damage. The output shaft(s) shall have double lip

oil seals to prevent leaks. The gearing service factor shall be a minimum of 1.0 with a mechanical strength service factor of 1.25.

#### 2.03 Primary Brake:

1. For motors of 20HP or less the primary brake shall be an integral part of the motor, mounted directly on the motor's armature shaft. No couplings will be permitted between the motor and primary brake.
2. Brakes shall be spring applied, direct acting, electrically released, and equipped with a manual release. The brake shall be AC/DC electro-magnetic unit with a minimum retarding torque equal to 200 percent of motor full load torque.
3. The brake shall be released by energizing the coil simultaneously with the motor winding to provide fail-safe breaking in case of power failure.

#### 2.04 Shafts, Keys, and Couplings:

1. Shafts shall be designed to accommodate the applied loads (including shock and bending loads) in accordance with ANSI B 106.1M, "Design of Transmission Shafting".
2. All connections shall be keyed, using keys designed to accommodate the applied loads. Keys shall be in accordance with ANSI B 17.1, "Keys and Keyseats".
3. Couplings shall be chosen to accommodate the applied loads, including shock and bending loads. Couplings shall accommodate the possible parallel and angular misalignments caused during manufacturing, assembly, and installation, as well as by structural tolerances and structural or equipment deflections.
4. In the case of line shaft hoists, the couplings in the shafts between the drums shall be universal joints in order to compensate for misalignment and deflections.
5. Only couplings made of steel with steel to steel contact surfaces shall be used.

#### 2.05 Bearings:

1. Bearings shall be selected to accommodate the applied loads and speeds.
2. The use of self-aligning flange bearings is preferred. The use of other bearing types shall be in accordance with good engineering practice. Pillow blocks may be used only where they are subject to compressive forces only.

#### 2.06 Helical Drums:

1. Winding drums shall be designed to properly support the required loads.
2. Drums shall be helically grooved to accept a single layer of cable accommodating the entire travel distance plus three dead wraps. Each drum shall have a minimum pitch diameter of 28 times the cable diameter.
3. Drum construction shall be of the all welded type. Cables shall enter the drum through holes drilled from root of the cable groove through the tubing wall at a 45 degree angle and shall be retained by a Nicropress TM stop sleeve.
4. Appropriately sized steel side plates at each end of the drum shall support drums. Each side plate shall contain a self-aligning flange bearing to support the drum and shaft.

#### 2.07 Fixed Speed Starters:

1. Each fixed speed winch shall be controlled by a full voltage, reversing starter built in accordance with UL Standard 508. Enclosure shall be NEMA 12 with hinged, latching cover. The interior of the starter cabinet shall be "touch safe" per IEC 204-1 "Protection against direct contact" rules.
2. The NEMA/IEC, magnetically operated, mechanically and electrically interlocked, reversing starter shall be sized to match the winch motor horsepower and shall be rated for plugging and jogging. An IEC Class 10 (Bi-metallic) thermal overload relay shall be provided, sized to trip at 115% of the motor's "Full Load Amps".
3. A separate line contactor shall be provided, controlled by the E-stop and overtravel limit switches, to provide a redundant means of removing power from the winch.
4. Starters shall be wired so that operation of the normal end of travel limit switches shall only allow movement away from the limit switch. Operation of an overtravel limit switch shall open the line contactor, and will not allow further movement in either direction.

5. A spring return toggle switch shall be housed inside the starter cabinet to allow override of the overtravel limits for resetting purposes.
6. Each starter shall be provided with fuses properly sized per UL 198C guidelines or circuit breakers for primary motor protection. Provide a control circuit transformer with properly sized primary and secondary fusing. Properly labeled, screw clamp terminals shall be provided for all field connections.

2.08 Emergency Stop Circuit:

1. The emergency stop circuit shall be a hard wired circuit that does not contain any solid state components.
2. At a minimum, this shall be a normally closed circuit wired in series through normally closed E-stop switches, directly controlling the line contactor(s) of the associated motor(s). Emergency stop circuits that interrupt control power to reversing contactors are not acceptable.
3. Other supervised circuits may be considered, but only if they provide a greater level of reliability and security.

2.09 Control Stations:

1. Control stations shall be wall mounted NEMA 1 enclosures, containing a hold to operate (dead man) Up and Down pushbuttons for each winch. A key operated On/Off switch shall be provided. A red, mushroom head emergency stop button shall be provided that directly controls the line contactor in the starter.
2. Panel components (pushbuttons, key switches, switches, indicators, E-stop switches, and the like) shall be industrial grade, heavy duty components with 7/8" (22mm) operators).
3. Panel components shall be Telemecanique ZB series or Allen Bradley Bulletin 800MR.

PART 3—EXECUTION

- 3.01 All items provided under this section shall have the manufacturer's standard finish and color, except as noted. All turnbuckles, clips, tracks, chains and other items of incidental hardware shall be furnished plated or painted.
- 3.02 The equipment installer shall have the responsibility of coordinating his work with other contractors on the project.
- 3.03 Four sets of as-built drawings and four sets of operating and maintenance manuals shall be provided.
- 3.04 The manufacturer of the line shaft winches shall provide a technical representative for the "turn-on". This individual shall also demonstrate the equipment to the owner's designees and shall provide instructions to the owner's personnel.
- 3.05 All work shall be executed using high standards of workmanship in fabrications and erection. The finished installation shall be complete and functional in every respect.

**END OF SECTION**