

CONSTRUCTION PRODUCTS DIVISION

48" (1250mm) DOUBLE TWIST TWISTER

TECHNICAL SPECIFICATIONS

The machine is a horizontal double twist twister capable of 1500 <sup>T</sup>RPM on the bow designed for continuous operation for the production of electrical wires as a cabler or lay up machine as well as a strander or buncher of inner conductors with seven or more non ferrous component strands into a compressed or compacted construction.

The range of products accommodated by this machine is as follows:

1.0 CABLING

Sizes in American wire gauge 14, 12, 10, 8, 6, 4, 3, 2 in the 2, 3, 4 conductors configuration for each size.

1.1 Lay Lengths of Conductors:

Of utmost importance is the maximum permissible lay length of conductors. The following table indicates these values.

| Size of Conductor,<br>AWG | Maximum length of lay, mm |                 |
|---------------------------|---------------------------|-----------------|
|                           | 2 and 3<br>conductors     | 4<br>conductors |
| 14                        | 130                       | 150             |
| 12                        | 140                       | 160             |
| 10                        | 160                       | 190             |
| 8                         | 220                       | 250             |
| 6                         | 270                       | 310             |
| 4                         | 320                       | 360             |
| 3                         | 340                       | 390             |
| 2                         | 370                       | 420             |

The allowable lay length must be maintained throughout the speed ranges of the double twist twister inclusive of the acceleration and deceleration periods.

## 2.0 STRANDING

Sizes in American wire gauge, 8, 6, 4, 3, 2. Stranded conductors of seven wire construction.

### 2.1 Lay Lengths of Stranded Conductors:

The formula for lay length states that the lay must not be less than 8x the diameter or more than 16x of the said diameter.

In the case of 8 AWG strand 7 wire construction this translates as:

$$8 \times .146 = 1.168" \text{ minimum to}$$
$$16 \times .146 = 2.336" \text{ maximum.}$$

It is of utmost importance that the lay must remain well within these limits throughout the speed ranges of the twister inclusive of acceleration and deceleration periods.

2.2 The allowable variation in the lay length of the various products is a direct result of digital tracking of bow, capstan, and take up speed. This is directly controllable from a dedicated lay dial on the operator panel.

3.0 The double twist twister is composed of four distinct subassemblies.

### 3.1 The Main Cubicle:

Contains the take up, capable of rotating a 48" diameter reel with a final full weight of 2200kg, the cradle, traverse mechanism, capable of depositing all the wire sizes specified in paragraphs 1 and 2 in such way that one wire width or diameter will be deposited for each drum (reel) revolution throughout all machine speed ranges, multipass capstan, bow assembly and their associated DC motors, the lift platform and its hydraulic system as well as the exhaust fans.

The lift platform and take up pintles must advance and retract at a rate of no less than 22mm per second.

The loading and unloading occurs from the floor level on the operator side and viewed from this position the "hand" of the machine is right to left with pay-offs on the right side. The sliding, pneumatically operated doors of the main cubicle have inspection plates at the top of the right and left hand corners. This is to facilitate a quick disengagement of the cylinder for the purpose of opening the door manually in case of power loss.

2500  
MIN SPEED  
ON TRAU  
TRAU  
MONITOR

OF ELECTRICAL

To the right of the main cubicle and being supported by it is the lay plate and its supporting shaft. ✓ ?

While in operation at its top most speed the double twist twister must not generate noise in excess of 85 dbA. ✓

3.2 The Electrical Cabinet:

Houses the drive controllers, electrics, and on board controlling computer. It also serves as an operator's console with its associated command controls. ✓

Although it is a self supporting structure it integrates within the perimeter of the main cubicle. ✓

3.3 The Capstan Tensioning Unit:

This is a self contained structure comprised of two rollers with electromagnetic brakes. It is designed to assist the fabrication of stranded conductors. ✓

*ELECTRO-PNEUMATIC*

*HIGH LOW SWITCH*

3.4 The Counter:

It should be external to the main cubicle. It should monitor the centre wire in the stranding mode and one of a maximum of four conductors in the cabling mode. The dual level downcount in metres should be displayed on the control cabinet. Length monitoring is essential to cabling/stranding operations.

*EXTERNAL AND INTERNAL*

Length monitoring and display using the inputs of the multipass inner capstan must be avoided unless variations of less than 0.2% are guaranteed. ?

4.0 ELECTRICAL

The system will operate on a three phase <sup>460</sup> ~~440~~ VAC 60 Hertz input.

4.1 The design is such that it will facilitate the approval of power utilities in Canada by using CSA approved subcomponents. Circuit breakers are preferably "Square D" push buttons and switches are preferably Telemecanique. ✓

*CSA APPROVED*

4.2 Signal wires are screened and/or shielded. ✓

*TACHO'S & ENCODER*

4.2A *SEPARATE WIRE IN BATH (TACHO/ENR) WHERE*

4.3 All electrical branches are individually fused. ✓

*LIGHTING FUSED  
PSU FUSED  
ETC*

4.4 Clearly marked terminal strips are designed for rapid installation and troubleshooting. ✓

4.5 The main electrical cabinet will have a name plate outlining its electrical characteristics; input voltages and KVA. ✓ ✓

5.0 ELECTRONICS

- 5.1 The drives controllers for all DC motors are Shackleton Systems. ✓
- 5.2 The logic system is 24 VDC industrial, provided by a regulated, modular, power supply. ✓
- 5.3 Tacho generators are designed for better than .5% regulation. ✓

5.4 Proximity switches are of the inductive type with a target recognition of 4mm. Preferably "Omron". *OR TELEMECHANICS*

ARRANGE  
BOW DISABLE  
TO OPEN DOOR  
WHEN ROTOR AT REST

5.5 The electrical - electronic system must provide door opening push buttons inside the main cubicle in addition to those located on the operator's console. *OK*

5.6 The inboard controlling computer is an industrial class Allen-Bradley PLC-5 series. ✓✓

5.7 All discrete electronic components must be identified by their generic or jedec numbers. In house brands must be avoided. Preferred manufacturers are National Semiconductors or Motorola. *AMR*

5.8 Conceptually no "black boxes" are accepted. Phillips Cables Ltd. expects total disclosure of information relating to the machinery it purchases. Phillips Cables Ltd. will not exploit such for commercial advantages. The information is used solely for maintenance purposes. ✓

6.0 The machine will be painted light blue, Phillips will provide a colour sample. ✓

7.0 PRESHIPMENT PERFORMANCE SPECIFICATIONS

7.1 Acceptance trials will be witnessed by Phillips Cables personnel at the suppliers location. These will consist of no less than 3 hours continuous running of the machine in a production mode. ✓

7.2 The product will be #8 AWG strand, .146" diameter resulting from bunching of seven individual strands at 1500 RPM on the main bow. The final lay will remain within specifications as stated in paragraph 2.1. ✓

7.3 Phillips Cables will provide the necessary materials for performance trials. ✓

7.4 Prior to shipment all pertinent mechanical and electrical drawings including modifications must be submitted for approval by designated Phillips Cables Ltd. representative.

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