



SPENDRUP  
FAN Co.

SPENDRUP  
FAN Co.



# SPENDRUP FAN COMPANY

GRAND JUNCTION COLO USA

1-800-525-1450

MODEL 152-091-1800

SERIAL 5723 HP 350

RPM 1800 FRAME 449TC VOLTS 460

IMPELLER 091-16-31 MM 1517

**RELIANCE  
ELECTRIC**

**DUTY MASTER®**

**XE**  
ENERGY EFFICIENT

| FRAME  | TYPE | DESIGN | IDENTIFICATION NO. | MODEL NO.         |
|--------|------|--------|--------------------|-------------------|
| 449TCZ | P    | B      | B473945-010        | 1001 CM B473945   |
|        |      |        | 460V               | 60 PHASE 3 CODE G |

**RELIANCE  
ELECTRIC**

**DUTY MASTER®**

**XE**  
**ENERGY EFFICIENT**

FRAME

TYPE

DESIGN

IDENTIFICATION NO.

MODEL NO.

449TCZ

P

B

B473945 010

L001 CM

B473945

HP

350 VOLTS

460 HZ

60

PHASE

3

CODE G

RPM

1780 AMPS

392

S.F.

1.00

AMB

30°C

INSUL  
CLASS

F

ENCL

TEAD DUTY

0.99

POWER  
FACTOR

86.7

MOTOR  
WEIGHT

2880 LBS.

NEMA NOM.  
EFFICIENCY

96.2

GUARANTEED  
EFFICIENCY

95.8

MAX CORR  
KVAR

67.0

DRIVE END  
BEARING

90BC03J30X

OPP D.E.  
BEARING

90BC03J30X



MIN OF 1500 FPM @ 350HP @ 1.0SF

USUIT FOR OPER @ 6600 FT ALT; AIR OVER MTR

T1 T2 T3  
L1 L2 L3

RELIANCE ELECTRIC CO.  
GREENVILLE, SC 29615

PLANT (G) - UL FILE NO. E54825  
MADE IN U.S.A.

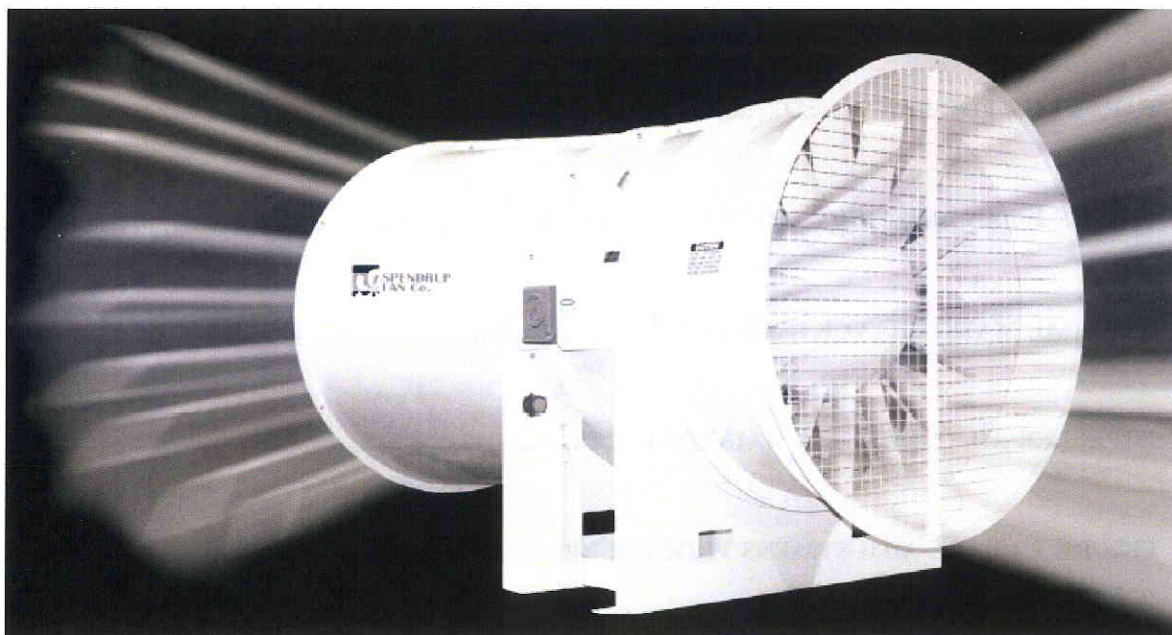


900-1-H

• Equipment • Installation

• Maintenance • Assembly

# Operator's Manual



**Tough mining fans for rough mining conditions.**

*ORO HONDO FAN*

Fan Serial # 5728

**IMPORTANT!**  
Maintenance Instructions.  
Keep for reference.



**SPENDRUP  
FAN Co.**

Grand Junction, Colorado

|                                                           |           |
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## OPERATION PARTS & MAINTENANCE MANUAL

***MODEL #:*** 152-091-1800-A-1-D with Accessories

***SERIAL #:*** 5728

***CUSTOMER:*** SD Science & Technology Authority

***SHIPPED TO:*** Ross Maintenance Shop  
100 Ross Street  
Lead, SD

***PO #:*** 477

***PO DATE:*** 2/4/09

## A. DESCRIPTION OF EQUIPMENT

### A-1 General:

The Spondrup Fan Co. fan is a high performance, variable pitch, vane axial fan. It is a quality product that with proper care should give you many years of satisfactory operation.

### A-2 Adjustable pitch - Arrangement 4

The adjustable pitch fan has a fabricated steel hub and individually adjustable cast aluminum airfoil blades. The casings are accurately formed with heavy welded inlet and outlet flanges. Casings are complete with guide vanes and motor mount which is machined to receive a NEMA "C" face electric motor. The adjustable pitch rotor is machined to directly mount on the motor shaft. Blade adjustment is made when the fan rotor is at rest and power is locked out. A "blade position index" is stamped on the hub next to each individually adjustable blade and an index mark is stamped in the skirt of each blade. To change the angle of attack of the blade; merely *loosen* (DO NOT REMOVE) the allen head bolts located at the root of the blade; set the index mark at the required blade setting; and retighten the bolts to torque specified.

Blade base bolt torque:

1/2" Allen bolts - 90 ft.-lbs

5/8" Allen bolts - 125 ft.-lbs.

(CAUTION: Do not set blade angles to a higher setting without checking that the motor amp draw is below the maximum amp rating of the motor.) The major components of the direct drive adjustable pitch fan are detailed on page 4.

### A-3 Adjustable Pitch - Arrangement 9

This fan has the same adjustable pitch impeller as the Arrangement 4 fan, but is a V-belt driven unit with the motor mounted on the exterior of the fan casing on an adjustable motor base. The adjustable pitch impeller is machined to directly mount on the shaft. The inner fairing is extended to enclose and protect the fan shaft and bearings. The V-belt drive is isolated from the airstream by a belt tube which is welded to the inner fairing and the fan casing. The major components of the belt drive adjustable pitch fan are detailed on page 4.

### A-4 Fixed pitch

Fixed pitch - non adjustable impellers are also used on Arrangement 4 and Arrangement 9 fans. Fans made with fixed pitch impellers are nearly identical to those above except that the impeller does not allow adjustment.

### A-5 Accessories

Various accessories are available for the fan.

Inlet Cones and Bells/Outlet Diffusers - must be used to achieve catalogued performance

Duct Adapters - to customer's specified size and type

Skids and Cages

Mounting Feet

Silencer Packages

Nema or X/P enclosed starters

Guard Screens

Power Trickle Dusters

Inlet Buildings

Turning Boxes

## B. INSTALLATION AND START-UP

### B-1 Receiving

Spondrup Fan Co. equipment is thoroughly inspected at the factory and barring damage in transit, should be in perfect condition upon arrival. When a carrier signs the Spondrup Fan Co.'s bill of lading, the carrier accepts the responsibility for any subsequent shortages or damage, evident or concealed, and any claim must be made against the carrier by the purchaser. Evident shortage or damage should be noted on the carrier's delivery document before signature of acceptance. Inspection by the carrier of evident or concealed damage must be requested. After inspection, issue a purchase order for necessary parts or arrange for return of the equipment to Spondrup Fan Co. factory for repair.

### B-2 Handling

Spondrup Fan Co. fans may be handled and moved, using good rigging techniques, being careful to avoid concentrated stresses that will distort any of the parts.

### B-3 Safety Precautions

The fan which you have purchased is a rotating piece of equipment and can become a source of danger to life or cause injury if not properly applied. The maximum operating temperature and speed for which this fan is designed must not be exceeded. Consult factory for design limitations.

Personnel who will operate or maintain this fan should be given this bulletin to read and warned of the potential hazards of this equipment.

This pamphlet contains general recommendations, but specific requirements may apply to the individual installation. Such requirements are outlined in the federal, state and local safety codes. Strict compliance with these codes and strict adherence to these installation instructions are the responsibility of the user.

### B-4 Storage

If not installed immediately, this fan should be protected to remain dry at all times.

For extended storage, abide by the following guidelines:

1. Store in an area which is dry, protected from low temperature, rapid and extreme changes in humidity, and free from vibration.
2. Every 90 days, the rotor should be turned several revolutions.
3. Every 6 months, add grease to bearings to purge and replace old grease.
4. If motors are equipped with space heaters, make them operable.
5. Motor windings should be megged at time of storage and at removal from storage. The resistance reading at removal must not have dropped more than 50% of the initial reading. If the drop is more than 50%, the motor must be dried electrically or mechanically.
6. Upon removal from storage, bearings should be regreased with an ample supply of fresh grease to purge and replace old grease.

### B-5 Vibration Isolation

When your fan is energized, it will generate a thrust force which causes the fan to be displaced opposite to the direction of air flow. This force must be resisted to maintain duct alignment and to protect the flexible connectors. Some installations, particularly horizontal units with long hanging rods, may require snubbers to limit the fan movement.

### B-7 Free Inlet

Fans with open inlets require the use of an inlet bell or inlet cone. Published fan performance is based on the use of these items. Operation of fan unit with bare open inlet will result in decreased performance and increased noise.

### B-8 Outlet Cone

The vane axial fan is inherently a high velocity air moving device. It is quite common to utilize a diverging cone on the fan discharge to minimize the velocity pressure loss and regain static pressure. The use of an outlet cone enables more of the fan's pressure capability to be available to overcome system static pressure.

### B-9 Flexible Connections

All ducts should be closely aligned with the fan and flexible connections provided between the fan and duct to prevent structure borne noise from being transmitted through the duct work.

Axial fans require the air to enter the impeller unobstructed. Special care must

be taken in the installation of inlet flexible connections. Since the inlet side of the fan is under a negative pressure, connection material tends to be sucked inward disrupting the flow of air to the impeller and causing reduced fan performance. The thrust of the fan aggravates this situation in that the fan tends to move forward against the direction of the air flow when it is operating. Flexible connections made at the large diameter of inlet bells and/or cones eliminate this problem.

#### **B-10 Fan Mounting Hardware**

All hardware used in the field for support or connection of your fan should be a minimum of Grade 5 quality.

#### **B-11 Electrical**

The motor leads terminate in the conduit box mounted on the exterior of the fan casing. Rigid conduit should be run from the motor starter to the fan with a short section of flexible conduit at the conduit box to allow for fan movement. Wire size and motor overloads should be sized in accordance with the motor nameplate electrical data.

#### **B-12 Start-up Check List**

After the equipment has been installed correctly and a check has been made for tightness of all hardware and mounting bolts, the fan will be ready to operate after these final safety checks to prevent injury to personnel or damage to the equipment.

1. Check for correct supply voltage and motor overloads.
2. Remove all tramp material from fan, duct and area in front of fan intake.
3. Check blade pitch setting.
4. If belt driven fan, check alignment of belts and sheaves.
5. "Bump" motor to check fan rotation. Rotation should match rotation arrow welded on fan casing.
6. Start fan. Check motor amperage in each phase for balance and correct motor load.
7. Check for vibration and any unusual noise.

### **C. MAINTENANCE**

#### **C-1 General**

The basic design and precision construction of your Spindrup fan is designed for long, trouble-free performance. The impellers are statically and dynamically balanced after assembly and the completely assembled fan is given a running balance check before final inspection and shipment. To ensure long life and trouble free service, routine maintenance and inspection

should be observed. Your fan has been lubricated prior to shipment from the factory and should be relubricated per the proper schedule after start of operation. Motor and bearing manufacturers recommended schedules are packed with the fan. Mixing of lubricants is not recommended.

Cleanliness is important in lubrication. Any grease used should be fresh and free from contamination. Similarly, care should be taken to properly clean the area around the grease inlet to prevent contamination. Maintenance personnel should be alert for excessive vibration or any unusual sounds in the equipment. If the fan is to remain idle for an extended period, it is recommended that the exposed surfaces be covered with a protective coating. Bearings should be protected in line with manufacturer's recommendations and the impeller should be rotated periodically.

#### **C-2 Lubrication - Arrangement 4**

In Arrangement 4, the motor is the heart of the unit and particular care should be taken in maintenance of the motor to ensure a long and continuous operating life. The unit should be checked periodically for vibration and any unusual noises. There are two bearings in the motor with grease leads extending from the motor to the outside of the casing. These leads are terminated with standard grease fittings protected inside steel covers.

The following procedure should be followed for proper lubrication:

1. Stop motor and lock out the switch.
2. Locate the grease inlet and relief fittings. Clean the area thoroughly, remove steel caps from grease fittings and pipe plugs from relief fittings.
3. Fill with the recommended volume of the recommended lubricant using a hand operated grease gun. If possible, rotate fan impeller by hand during greasing.
4. Remove excess grease and purge grease from area and replace grease fitting caps.
5. Run motor for at least one hour.
6. Clean up any purged grease and replace pipe plugs in relief lines.
7. Return unit to operation.

The various motor manufacturers have different recommended volumes and types of grease. Check the motor manufacturer's instructions, packed with the fan, before lubricating the motor.

#### **C-3 Lubrication - Arrangement 9**

In Arrangement 9, both the fan bearings and the motor bearings need to be included in your planned maintenance schedule. The fan unit should be

inspected periodically for any unusual noises or change in vibration. The two fan bearings have grease leads extended to the outside of the fan casing. These leads are fitted with standard grease fittings.

The following procedure should be followed for proper lubrication:

1. Stop motor and lock out the switch.
2. Locate the grease inlets and reliefs on the motor and clean the area of dirt and contaminated grease. Grease the motor per the recommendation of the motor manufacturer.
3. Locate the grease inlets in the fan casing and clean the area of dirt and contaminated grease. Remove cap from grease fitting.
4. Lubricate the bearings per the manufacturer's instruction packed with the fan.
5. Add lubricant slowly and rotate fan impeller during lubrication, when possible and where good safety practice permits.
6. Replace grease fitting caps and clean excess grease from area.
7. Return unit to operation. Unit should be watched for several hours for proper operation.

#### **C-4 Grease Lead Location**

On the Arrangement 4 fan, the grease fittings are located on the outside of the fan casing within 15° of the electrical conduit box. Both fittings are in the same area. The inlet leads have standard grease fittings.

On the Arrangement 9 fan, the grease leads are brought to the outside of the fan through the belt tunnel. The grease fittings are attached to clips which are welded to the adjustable motor base.

### **D. DISASSEMBLY AND ASSEMBLY**

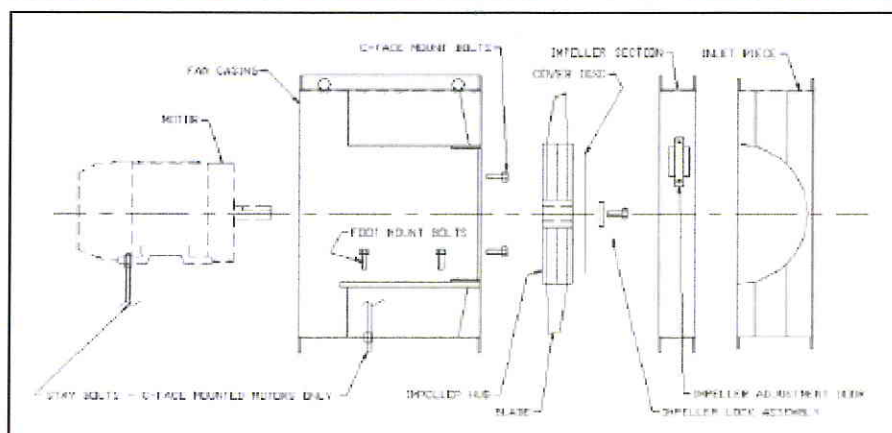
#### **D-1 Arrangement 4**

Warning: Disconnect all power sources from fan to avoid electrical shock and personal injury from rotating parts.

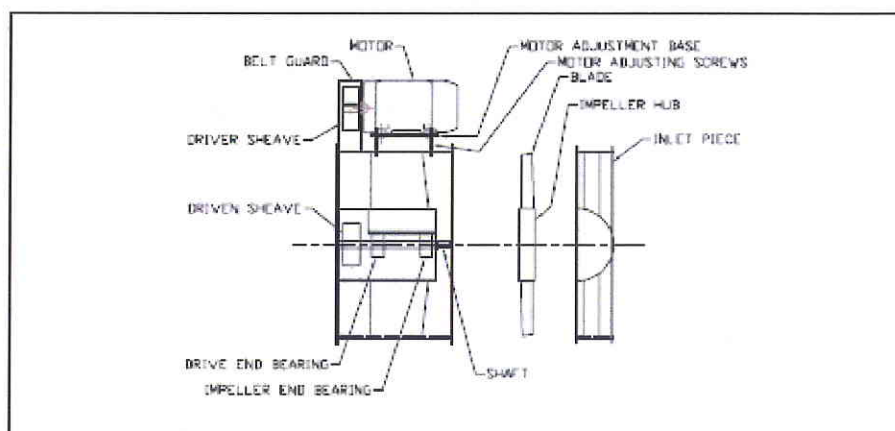
##### **D-1a Impeller Removal and Disassembly**

1. Remove inlet attachment.
2. Remove hex head bolt securing impeller to shaft.
3. Remove hub and blade assembly.
4. If blades are to be removed from hub, matchmark each blade and blade backing plate so they can be replaced in the same blade socket. Note the blade angle before removing.
5. Remove aluminum disc from hub.
6. Remove blade retaining bolts from base of wing.
7. Remove blades.

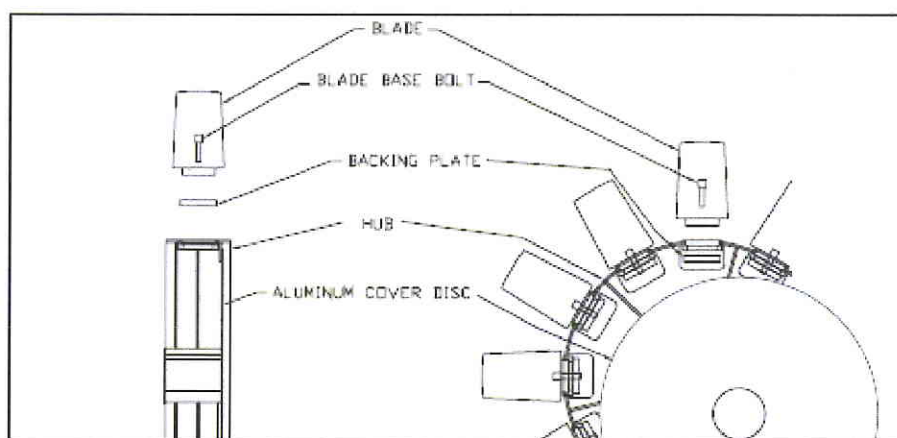
##### **D-1b Impeller Reassembly**



**DIRECT DRIVEN (ARRANGEMENT 4)**



**BELT DRIVEN (ARRANGEMENT 9)**



**IMPELLER**

**IF YOU ARE CALLING ABOUT YOU FAN,  
PLEASE HAVE THE FOLLOWING INFORMATION:**

- |                                             |                       |
|---------------------------------------------|-----------------------|
| A. Purchase date.                           | C. Fan model number.  |
| B. Fan serial number, welded on fan casing. | D. Impeller diameter. |



## **PARTS ORDERING INFORMATION**

**Please provide the following information when ordering  
part(s) or service**

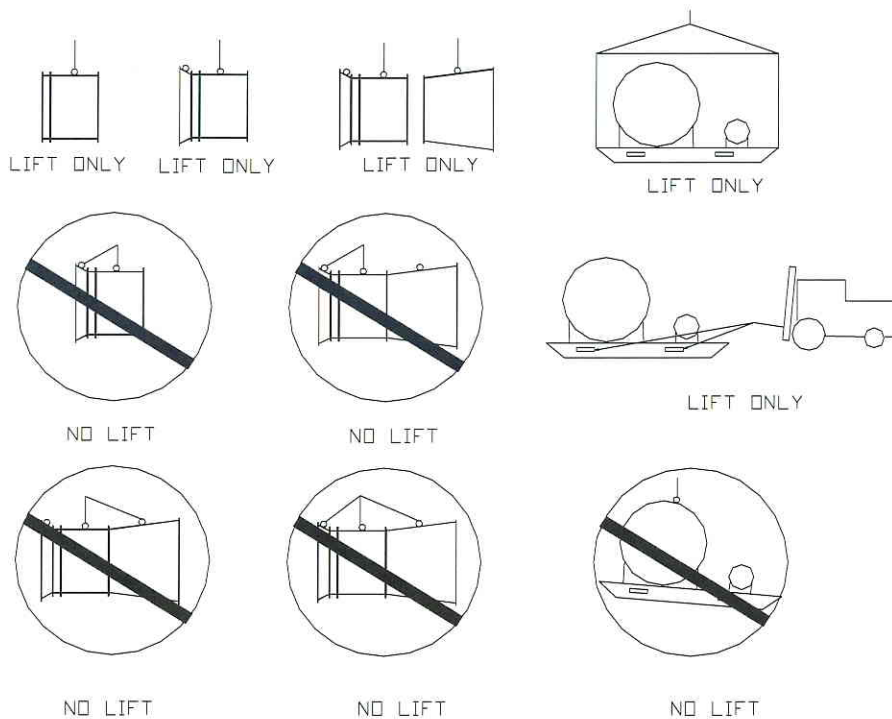
### ***REQUIRED INFORMATION:***

1. Welded serial number on the side of the fan casing.
2. List all parts and part numbers needed.
3. List applicable invoice number if available.



## LIFTING INSTRUCTIONS

1. Lift individual components ONLY.
2. To lift the entire unit (i.e.) skid mounted fan with motor, **LIFT BY SKID ONLY**.





## WARNING STATEMENT OF FAN(S)

Warning/Caution statement and maintenance manual is required reading for all personnel prior to operation and maintenance. Serious injuries can occur when procedure is not followed. Upon installation, adjustment, maintenance, and/or inspection of any components:

1. Electrical power must be locked out to all components/assemblies needing service. All local, State and Federal safety procedures and MSHA/OSHA requirements must be followed.
2. All safety devices (i.e.) safety screens, covers, adapters etc, must be replaced as per design prior to power being connected. All safety devices not supplied by Spendrup are the sole responsibility of the user.
3. Any exchanged/replaced components must be of original equipment manufacturer. Equipment must be installed complete and in the proper manner.
4. All material supplied by the end user (i.e.) electrical cable and connections, must meet all Federal, State and County codes as well as MSHA/OSHA requirements. The owner is responsible for future updates to meet Federal, State, and County codes as well as MSHA/OSHA requirements.
5. Installation of the unit must meet all Federal, State and County codes, as well as MSHA/OSHA requirements.
6. Application, location and use of the equipment is the sole responsibility of the end user.



## CAUTION STATEMENT FOR EQUIPMENT

### 1. GENERAL SAFETY:

All electrical parts including the portable cable and wiring shall be kept in a safe condition. There shall be no openings into the casings of the electrical parts. A permissible distribution box shall be used for connection to the power circuit, unless connection is made in fresh intake air.

### 2. SERVICING:

Explosion-proof enclosures shall be restored to the original state, with respect to all flame arresting paths, lead entrances, following any disassembly for repair/rebuilding by owner or independent shop.

### 3. FASTENING:

All bolts, nuts, screws and other means of fastening, as well as threaded covers shall be properly in place and secured.

### 4. RENEWALS AND REPAIRS:

Inspections, repairs or renewals of electrical parts shall not be made unless the portable cable is disconnected from the circuit furnishing power. The cable shall not be connected again until all the parts are properly assembled.

Special care shall be taken in making renewals or repairs. LEAVE NO PARTS OFF! Use replacement parts exactly like those furnished by the manufacturer. When any lead entrance is disturbed, the original leads exact duplicate hereof shall be used and stuffing boxes shall be repacked in the approved manner.



5. **CABLE REQUIREMENTS**

A flame resistant portable cable with a bureau assigned identification number, adequately protected by an automatic circuit-interrupting device shall be used. Special care shall be taken in handling the cable to guard against mechanical injury and wear.

Splices in portable cables shall be made in a workmanlike manner, mechanically strong and well insulated. Only one temporary splice is permitted in the trailing cable and must be replaced with a permanent splice within 24 hours. The splice cannot be located within 25 ft. of the machine.



**PARTS LIST FOR FAN ASSEMBLY WITH ACCESSORIES**

MODEL: 152-091-1800-A-1-D with Accessories

SERIAL NO: 5728

| ITEM NO. | QTY. | PART NUMBER | DESCRIPTION                    |
|----------|------|-------------|--------------------------------|
| 1        | 1    | 103752      | Diffuser                       |
| 2        | 1    | 110105      | Fan, Model# 152-091-1800-A-1-D |
| 3        | 1    | 110328      | Safety Screen                  |
| 4        | 1    | 110109      | Inlet Cone (Adapter)           |

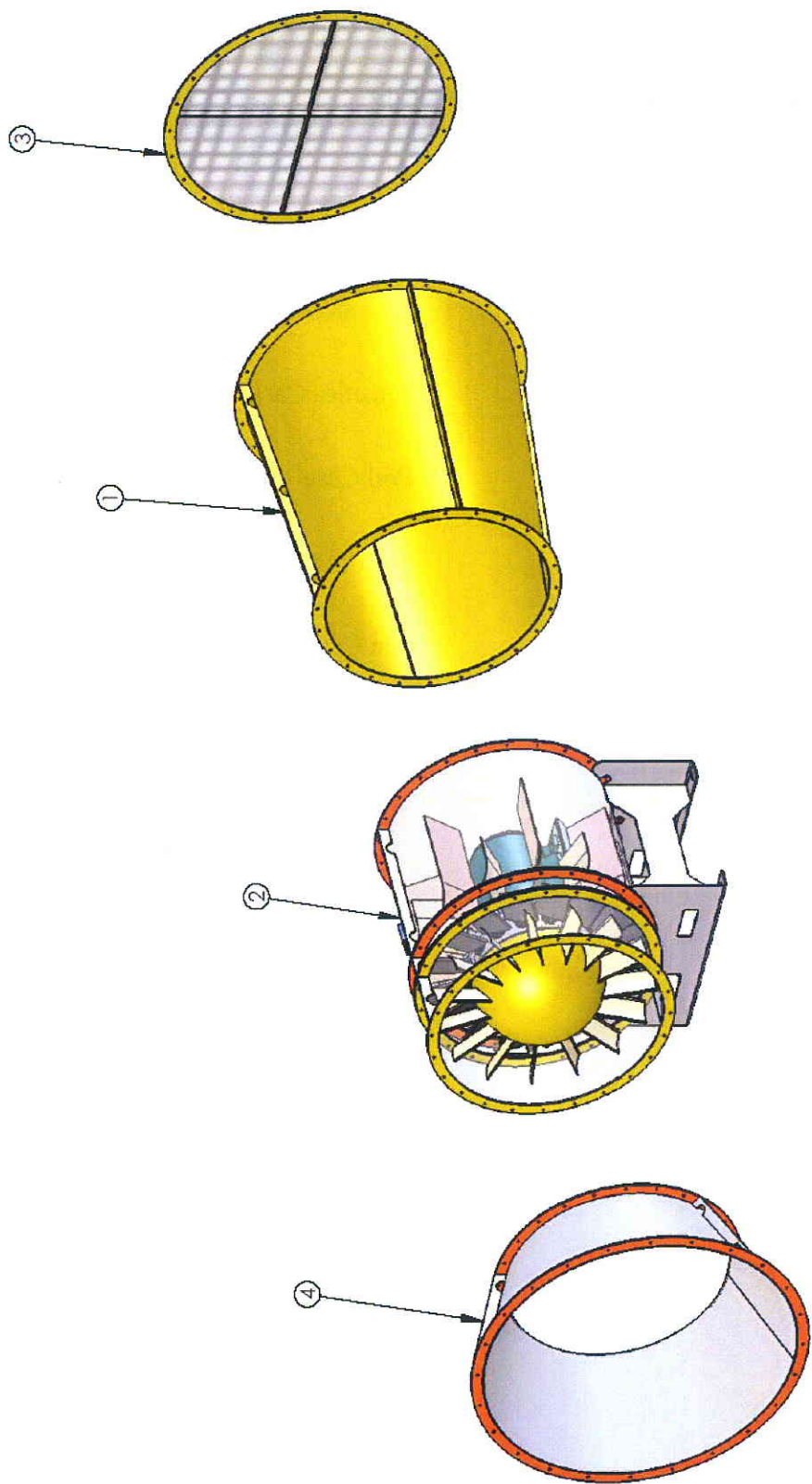


Figure 1: FAN ASSEMBLY DRAWING W/ACCESSORIES

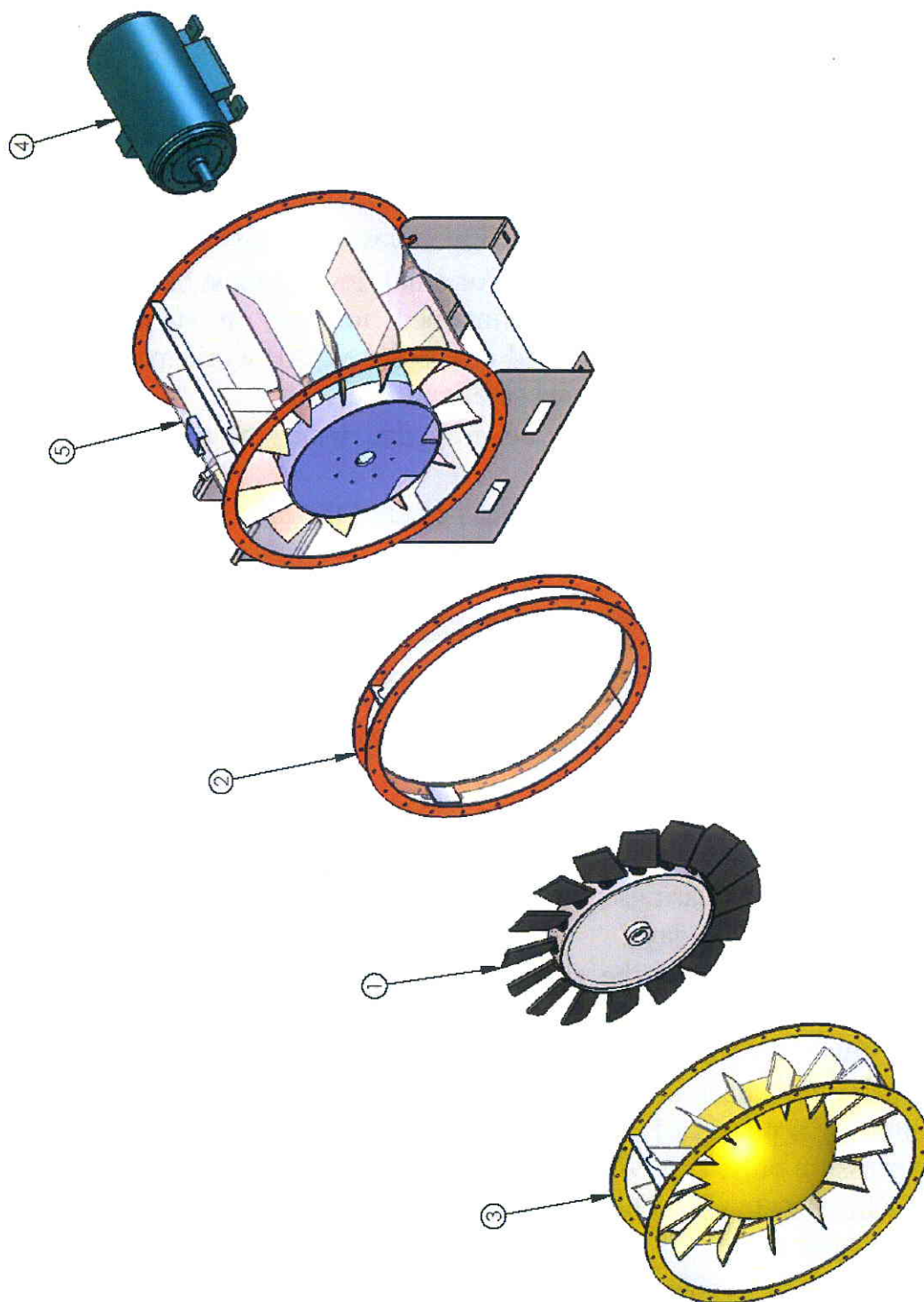
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|-------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---------------------------------------------------------------------------------|-------------------------------|------------------------------------------------|
| SO #:                                                                                                                               | QTY: | DATE: / /                               | PROPERTY OF SPENDRUP FAN COMPANY<br>THE INFORMATION CONTAINED WITHIN<br>THIS DOCUMENT IS CLASSIFIED AND<br>PROPRIETARY AND NOT TO BE USED,<br>COPIED OR REPRODUCED WITHOUT THE<br>PRIOR WRITTEN CONSENT OF<br>SPENDRUP FAN COMPANY | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL: $\pm 1/32$<br>ANGULAR: $\pm 1^\circ$<br>TWO PLACE DECIMAL: $\pm 0.15$<br>THREE PLACE DECIMAL: $\pm 0.05$<br>MATERIAL: |  |  | DRAWN: _____<br>CHECKED: _____<br>ENG. APPR: _____                              | NAME: _____<br>DATE: 02/06/09 | PART NAME:<br>Fan, 152-091-1800-A-1-D,w_Access |
|                                                                                                                                     |      |                                         |                                                                                                                                                                                                                                    | FINISH: _____<br>P/N: QTY: _____<br>Refer to Detail Drawings                                                                                                                 |  |  | JOB ORDER: _____<br>SEE DWG. NO. <b>A</b><br>SCALE: 1:48<br>WEIGHT: 816.3721 LB |                               |                                                |
| <b>SPENDRUP FAN Co.</b><br>2768 C 1/2 ROAD<br>P.O. BOX 4308<br>GRAND JCT, CO<br>81502<br>TEL: (970) 243-3429<br>FAX: (970) 242-6724 |      | SHEET 4 OF 4<br>REV. <b>A</b><br>111175 |                                                                                                                                                                                                                                    |                                                                                                                                                                              |  |  |                                                                                 |                               |                                                |



**SPENDRUP  
FAN Co.**

**PARTS LIST FOR FAN**  
**MODEL: 152-091-1800-A-1-D**  
**SERIAL NO: 5728**

| <b>ITEM NO.</b> | <b>QTY.</b> | <b>PART NUMBER</b> | <b>DESCRIPTION</b>             |
|-----------------|-------------|--------------------|--------------------------------|
| 1               | 1           | 109432             | Impeller,152-091-16, #31 Blade |
| 2               | 1           | 109438             | Impeller Case                  |
| 3               | 1           | 109441             | Pod Case                       |
| 4               | 1           | 110339             | Motor, 350HP, 1800RPM          |
| 5               | 1           | 110973             | Fan Case                       |



|                                                                                                                                                                                                                           |      |           |                                                                                                                                                                                                                     |                                                                                                                                                                              |      |      |                                  |       |                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|----------------------------------|-------|-----------------------------------------------|
| SO #:                                                                                                                                                                                                                     | QTY: | DATE: / / | PROPERTY OF SPENDRUP FAN COMPANY<br>THE INFORMATION CONTAINED WITHIN THIS DOCUMENT IS CLASSIFIED AND PROPRIETARY AND NOT TO BE USED, COPIED OR REPRODUCED WITHOUT THE PRIOR WRITTEN CONSENT OF SPENDRUP FAN COMPANY | DIMENSIONS ARE IN INCHES<br>TOLERANCES:<br>FRACTIONAL: $\pm 1/32$<br>ANGULAR: $\pm 1^\circ$<br>TWO PLACE DECIMAL: $\pm 0.015$<br>THREE PLACE DECIMAL: $\pm 0.005$<br>NATURAL |      |      | NAME                             | DATE  | PART NAME:<br>Fan, 152-09 I-1800-A-1-D, 350HP |
|                                                                                                                                                                                                                           |      |           |                                                                                                                                                                                                                     | FIN                                                                                                                                                                          | DATE | DATE |                                  |       |                                               |
|  <b>SPENDRUP FAN Co.</b><br>2768 C 1/2 ROAD<br>P.O. BOX 4308<br>GRAND JCT, CO<br>81502<br>TEL: (970) 243-3429<br>FAX: (970) 242-6724 |      |           |                                                                                                                                                                                                                     | FINISH                                                                                                                                                                       |      |      | FIN QTY                          | REV.: |                                               |
|                                                                                                                                                                                                                           |      |           |                                                                                                                                                                                                                     | Refer to Detail Drawings                                                                                                                                                     |      |      | 110105                           | REV.: |                                               |
|                                                                                                                                                                                                                           |      |           |                                                                                                                                                                                                                     | JOB ORDER:                                                                                                                                                                   |      |      | SCALE: 1:48 WEIGHT: 4500.304 LBS |       |                                               |
|                                                                                                                                                                                                                           |      |           |                                                                                                                                                                                                                     | SHEET 2 OF 2                                                                                                                                                                 |      |      |                                  |       |                                               |

Figure 2: FAN ASSEMBLY DRAWING



## GENERAL MAINTENANCE INSTRUCTIONS

### **GENERAL SAFETY:**

- All power must be locked out before any attempt to install, service, inspect and/or perform work of any nature
- Only qualified personnel are to perform any work to this equipment.
- All service, components, cables and/or other devices must be qualified and approved, installed and maintained for use in standard or explosion proof environments and atmospheres. All work must meet local, state and federal codes and safety policies.
- Electrical power cables are to be grounded inside of the electrical control box.
- Make sure no rocks or other debris has entered the fan.
- Verify the correct voltage is being used.

### **2. DIRECTIONAL ARROWS AND IMPELLERS:**

- Check to see if the impeller is following directional arrows.
- To change the direction of the impeller, change 2 of the 3 power leads.

### **3. MAINTENANCE:**

- Grease the motor bearings (via grease zirks) with 4 shots of Chevron SRI Grease every 90 days.
- (If applicable) to clean the silencer, remove the bolts and slide the inner section from the outer section. Replace the fiberglass mat with a new 6" thick material without paper backing.
- (If applicable) Check inside the regular or permissible starter box after running for a period of six months. Check all screws and nuts. Use light pressure only. **DO NOT OVER TIGHTEN!**
- If the fan starts to severely vibrate, check the impeller or the electrical motor bearings.
- In the event of problems with the fan, **DO NO DISASSEMBLE!!** Call the factory for assistance.

**ANY QUESTIONS CONCERNING THE EQUIPMENT PLEASE CALL;  
800-525-1450 or 970-243-3429**



## IMPELLER ADJUSTMENT & MAINTENANCE

### 1. **BLADE DESCRIPTION:**

- Blades are made of #356.2-T6 cast aluminum.
- Rotors are made of fabricated steel.
- Impeller unit is static and dynamically balanced.
- Impeller tip clearance is 0.25% of the diameter average.

### 2. **BLADE ADJUSTMENT:**

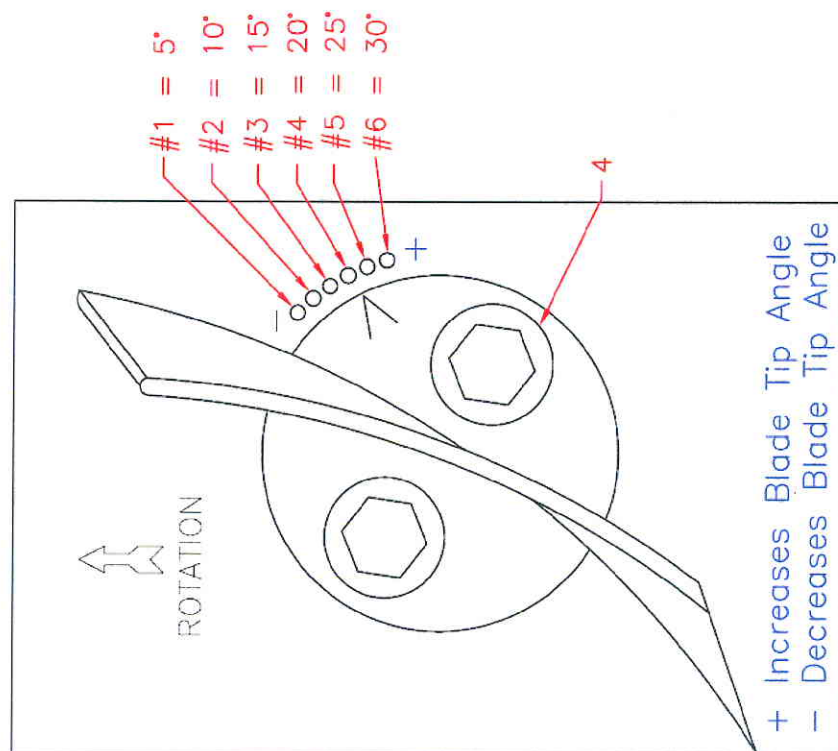
1. All power to the unit must be locked out.
  2. Impeller must come to a complete stop before removing cover on the outside of the impeller section.
  3. Loosen bolts at the base of the impeller blade. **DO NOT REMOVE BOLTS!!**
  4. Raise or lower the pitch of the impeller blade to the required corresponding adjustment mark.
  5. The reference point for the blade adjustment is located above the blade boss; corresponding mark is stamped at the base of the blade above the bolt hole. Marks on the hub are at 5° increments.
  6. There are 5 marked adjustment points on the hub, and the Impeller blades must be set the same. **DO NOT EXCEED MOTOR FULL LOAD AMPS.**
  7. Torque the bolts that secure the blades to the hub, **NOTE; TORQUE BOLTS TO 100 FT WITH WASHERS, OR 80 FT/LBS WITHOUT WASHERS.**
  8. Repeat the above steps until all blades have been adjusted.
- **CAUTION: WHEN ADJUSTING THE BLADES, DO NOT MOVE MORE THAN ½ SETTING (2-1/2° AT TIP) AT ANY ONE TIME. CHECK MOTOR AMP DRAW AFTER EACH ADJUSTMENT.**

### 3. **REMOVAL OF IMPELLER ASSEMBLY:**

1. All power to the unit must be locked out.
2. Impeller must be at a complete stop
3. Remove necessary items from in front of the impeller.
4. Remove hold down bolt and front aluminum disk.
5. Loosen the bolt above the keyway.
6. Impeller may be removed, use care not to damage blades.
7. Perform in reverse when re-assembling.
8. Torque hold down bolt to **125 FT/LBS**

### BLADE ADJUSTMENT PROCEDURE:

1. LOCK OUT ALL POWER TO FAN
2. MAKE SURE FAN HAS COME TO A COMPLETE STOP.
3. REMOVE IMPELLER ADJUSTMENT DOOR.
4. LOOSEN BOTH SOCKET HEAD CAP SCREWS AT BLADE BASE. (DO NOT REMOVE!)
5. ROTATE BLADE TO HIGHER OR LOWER BLADE ANGLE AS NEEDED.
6. RE-TIGHTEN SOCKET HEAD CAP SCREWS TO SPECIFIED TORQUE.
7. REPEAT STEPS 4-5-6 FOR EACH BLADE.
8. DOUBLE CHECK THAT ALL BLADES ARE SET AT SAME SETTING AND ARE TORQUED CORRECTLY.
9. ROTATE IMPELLER BY HAND TO INSURE BLADES ARE NOT RUBBING FAN HOUSING.
10. REPLACE IMPELLER ADJUSTMENT DOOR.



NOTES: 1. BELT DRIVEN FANS MAY REQUIRE 2 PEOPLE FOR ADJUSTMENT DUE TO BELT TENSION / STIFFNESS.  
 2. ALL SOCKETS AND DRIVE EXTENSIONS SHOULD BE TAPED TOGETHER TO PREVENT LOSS INTO FAN.

|                                                                                                                     |                                                                                                    |                                                                                                                                                                                                 |  |  |  |                     |  |                         |  |
|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|---------------------|--|-------------------------|--|
| <br><b>SPENDRUP</b><br>FAN Co. | 2768 C 1/2 RD.<br>P.O. BOX 4308<br>GRAND JCT. CO 81502<br>TEL: (970)243-3429<br>FAX: (970)242-6722 | PROPERTY OF SPENDRUP FAN COMPANY                                                                                                                                                                |  |  |  | FABRICATED BY       |  | TITLE: BLADE ADJUSTMENT |  |
|                                                                                                                     |                                                                                                    | THE INFORMATION CONTAINED WITHIN<br>THIS DOCUMENT IS CLASSIFIED AND<br>PROPRIETARY AND NOT TO BE USED,<br>COPIED OR REPRODUCED WITHOUT THE<br>PRIOR WRITTEN CONSENT OF SPENDRUP<br>FAN COMPANY. |  |  |  | DATE                |  | DATE DRAWN: 12/14/04    |  |
|                                                                                                                     |                                                                                                    |                                                                                                                                                                                                 |  |  |  | CHECKED BY          |  | DRAWN BY: KB            |  |
|                                                                                                                     |                                                                                                    |                                                                                                                                                                                                 |  |  |  | DATE                |  | DRAWING #               |  |
|                                                                                                                     |                                                                                                    |                                                                                                                                                                                                 |  |  |  | BLADE ADJUSTMENT CW |  | REV                     |  |
|                                                                                                                     |                                                                                                    |                                                                                                                                                                                                 |  |  |  |                     |  |                         |  |

Figure 3: BLADE ADJUSTMENT PROCEDURE

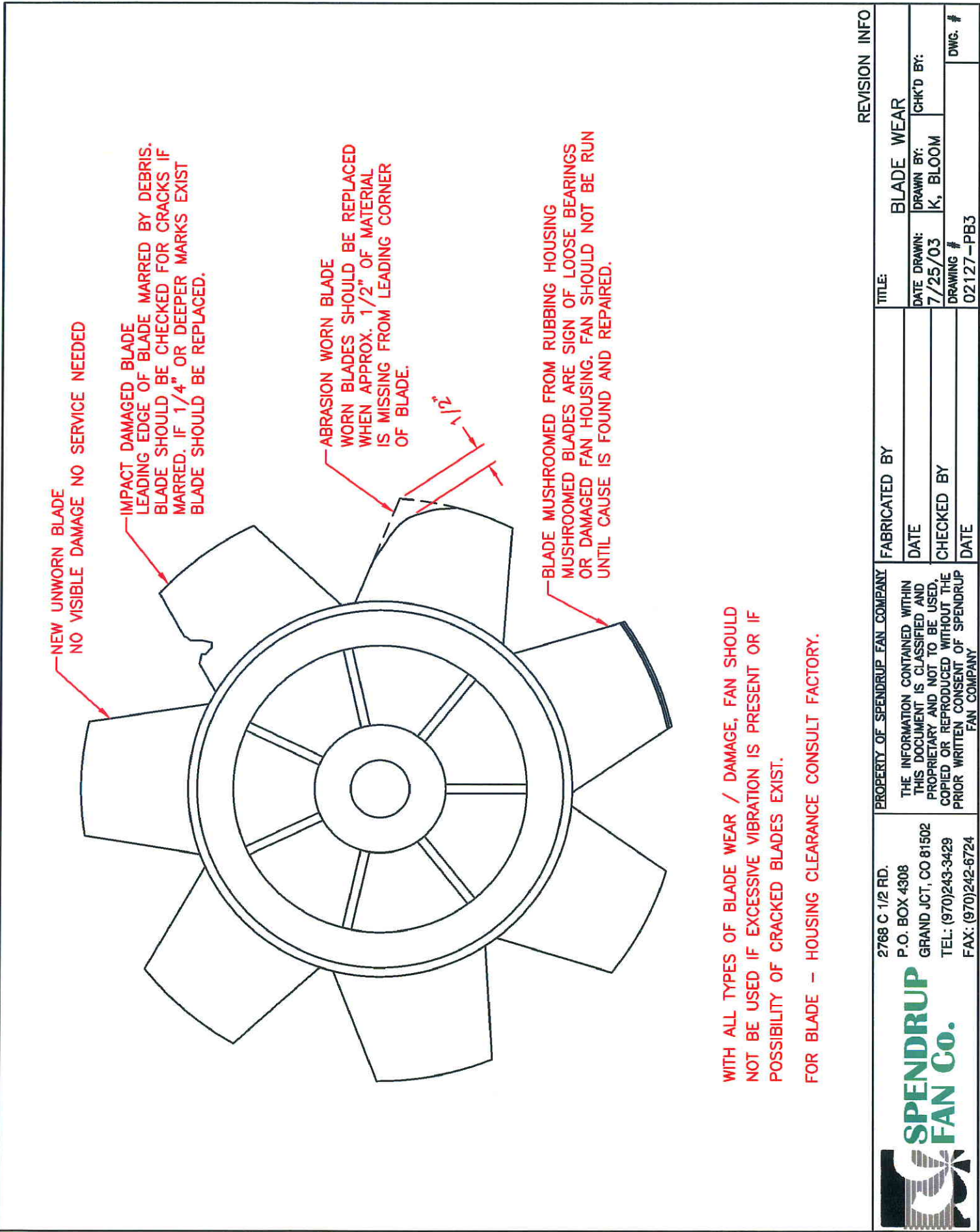


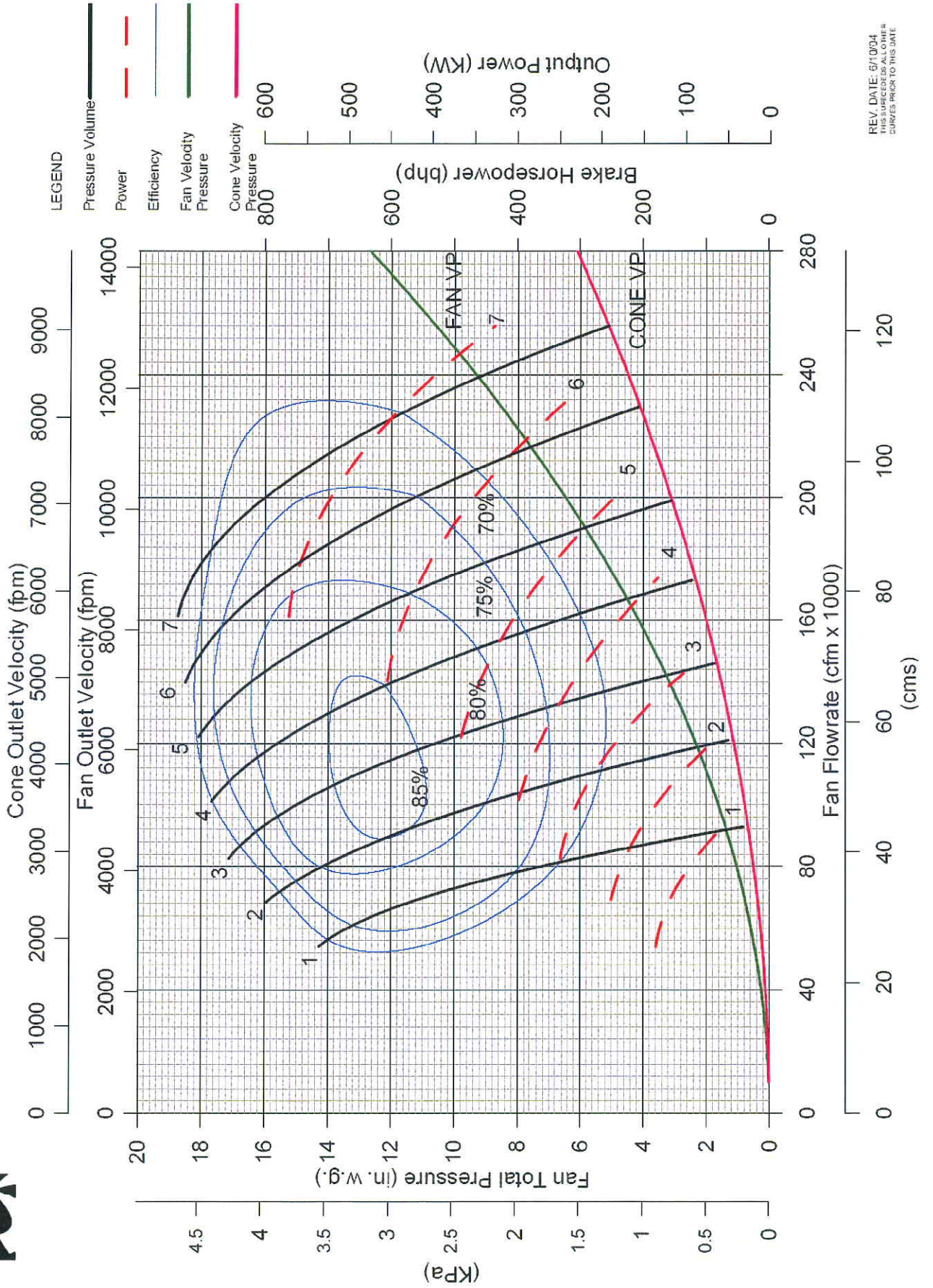
Figure 4: GENERAL BLADE WEAR GUIDE

|                                                                                                                               |  |                                                                                                                                                                                                                                    |  |                                             |  |                                            |  |                                 |  |
|-------------------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------|--|--------------------------------------------|--|---------------------------------|--|
| <b>SPENDRUP FAN Co.</b><br>2768 C 1/2 RD.<br>P.O. BOX 4308<br>GRAND JCT, CO 81502<br>TEL: (970)243-3429<br>FAX: (970)242-6724 |  | PROPERTY OF SPENDRUP FAN COMPANY<br>THE INFORMATION CONTAINED WITHIN<br>THIS DOCUMENT IS CLASSIFIED AND<br>PROPRIETARY AND NOT TO BE USED,<br>COPIED OR REPRODUCED WITHOUT THE<br>PRIOR WRITTEN CONSENT OF SPENDRUP<br>FAN COMPANY |  | FABRICATED BY<br>DATE<br>CHECKED BY<br>DATE |  | TITLE:<br>BLADE WEAR                       |  | REVISION INFO                   |  |
|                                                                                                                               |  |                                                                                                                                                                                                                                    |  |                                             |  | DATE DRAWN: 7/25/03<br>DRAWING # 02127-PB3 |  | DRAWN BY: K, BLOOM<br>CHK'D BY: |  |
|                                                                                                                               |  |                                                                                                                                                                                                                                    |  |                                             |  |                                            |  | DWG. #                          |  |



# **Series 152-91-1760**

Fan Diameter 60 inches  
Air Density 0.075 lbs./cu. ft.



REV. DATE: 6/10/04  
THIS SERIES ALL OTHER  
CURVES PRIOR TO THIS DATE

**Figure 5: FAN PERFORMANCE CURVE**



## Spendrup Fan Company Guarantee

January, 2000:

Seller warrants that the products covered by this contract conform to applicable drawings and specifications accepted in writing by the Seller will be free from defects in material and workmanship will be merchantable and will perform in accordance with the specifications accepted in writing by the Seller.

All products manufactured by **Spendrup Fan Company** are guaranteed for a period of 18 months from the date the products have been shipped from Grand Junction, Colorado, USA.

Seller's sole responsibility pursuant to the guarantee is to repair, replace such part or product. The cost of removal or reinstallation of the product shall be a cost of Buyer. For purpose of remedying any defects, Buyer agrees to provide Seller with reasonable assistance and access to the work.

Component parts and accessories not of the Seller's manufacture are warranted only to the extent that the manufacturers thereof warrant them.

**There are no other warranties, express or implied, which extend beyond those set forth above. The warranty of merchantability is limited to the time period specified above.**

Sellers' warranties are contingent upon the product being stored, installed, maintained, and operated in accordance with good engineering practices and instructions contained in the Seller's operating and maintenance manual.

### **THIS GUARANTEE DOES NOT COVER:**

- Unauthorized repairs.
- Freight
- Incidental or consequential costs or damages.
- PLEASE ADVISE THE FOLLOWING:
- Purchase date.
- Fan serial number, welded on fan casing.
- Fan model number.
- Impeller diameter.
- Direct driven or belt driven.
- Standard model or MSHA approved or explosion proof



# CHEVRON SRI GREASE OEM

## NLGI 2

### CUSTOMER BENEFITS

Chevron SRI Grease OEM delivers value through:

- **Ability to meet bearing OEM requirements** — Suitable for high rpm operations, operating temperatures ranging from -29°C to 177°C (-20°F to 350°F) and offers excellent rust protection in the presence of both salt and fresh water.
- **Excellent oxidation stability** — Provides exceptional bearing life at operating temperatures in the range of 93°C to 177°C (199°F to 350°F).
- **Silent operations** — Meets low noise requirements of most major bearing manufacturers.
- **Good low shear stability** — Will not soften excessively under prolonged low shear stress.

### FEATURES

Chevron SRI Grease OEM is a high temperature ball and roller bearing grease.

It is formulated with ISOSYN® base stocks, a synthetic polyurea ashless organic thickener, and high performance rust and oxidation inhibitors (the latter to provide superior rust protection in severe applications). Its texture is smooth and buttery and its color is dark green.

Chevron SRI Grease OEM is specifically designed to meet the factory-fill performance requirements of the major manufacturers of rolling element bearings.

Chevron SRI Grease OEM is manufactured to meet the stringent requirements of bearing OEMs (Original Equipment Manufacturers). It combines low noise operation, high temperature performance and low shear stability. ASTM D 3336 tests show that the life of a 204 K bearing lubricated with Chevron SRI Grease OEM and operating at 150°C (302°F) and 10,000 rpm is about 3000 hours. This is nearly 10 times the life possible when using conventional lithium greases and about three times that when using sodium greases. It passes ASTM D 1743-73 rust test with 5% synthetic sea water.

### APPLICATIONS

Chevron SRI Grease OEM is recommended:



- for use in antifriction bearings operating at high speeds (10,000 rpm and greater)
- where silent operations are required
- where the operating temperatures are on the order of 150°C (302°F) and higher
- where there is a likelihood that water or salt water will get into the bearings

It performs satisfactorily in bearings at temperatures as low as -30°C (-22°F).

Applications where Chevron SRI Grease OEM will outperform most other greases include:

- As a "life-pack" lubricant by manufacturers of rolling element bearings, particularly ball bearings.
- Other applications where silent operations, high temperature performance, or low shear stability are called for.

Bearing manufacturers that specifically use Chevron SRI Grease OEM are NSK, NTN, FAG, SKF, NMB, GMN, Torrington, Fujikoshi, American Koyo.

## TYPICAL TEST DATA

| NLGI Grade                                                                                                                                | 2                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| CPS Number                                                                                                                                | 254510                                           |
| MSDS Number                                                                                                                               | 6979                                             |
| Operating Temperature, °C(°F)<br>Minimum <sup>1</sup><br>Maximum <sup>2</sup>                                                             | -30(-22)<br>177(350)                             |
| Penetration, at 25°C(77°F)<br>Unworked<br>Worked<br>Worked (100,000 strokes)                                                              | 255<br>280<br>380 max                            |
| Dropping Point, °C(°F)                                                                                                                    | 243(470)                                         |
| High Temperature Life, hours at 177°C(350°F), ASTM D 3336                                                                                 | 600                                              |
| Grease Noise<br>Average Peak Value (SKF), micron/s<br>SKF BQ2, %<br>SKF BQ3, %<br>Anderson Spike Value (Chevron)<br>Pulse Count (Chevron) | 10 max<br>50 min<br>95 min<br>3.5 max<br>250 max |
| Lincoln Ventmeter, psig at 30 s, at<br>75°F<br>30°F<br>0°F<br>-22°F                                                                       | 225<br>425<br>750<br>♦                           |
| Thickener, %<br>Type                                                                                                                      | 8.0<br>Polyurea                                  |
| ISO Viscosity Grade, Base Oil Equivalent                                                                                                  | 100                                              |
| Viscosity, Kinematic*<br>cSt at 40°C<br>cSt at 100°C                                                                                      | 116<br>12.3                                      |
| Viscosity, Saybolt*<br>SUS at 100°F<br>SUS at 210°F                                                                                       | 606<br>69                                        |
| Viscosity Index*                                                                                                                          | 95                                               |
| Flash Point, °C(°F)*                                                                                                                      | 260(500)                                         |
| Pour Point, °C(°F)*                                                                                                                       | -15(+5)                                          |
| Texture                                                                                                                                   | Smooth, Buttery                                  |
| Color                                                                                                                                     | Dark Green                                       |

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

- <sup>1</sup> Minimum operating temperature is the lowest temperature at which a grease, already in place, could be expected to provide lubrication. Most greases cannot be pumped at these minimum temperatures.
- <sup>2</sup> Maximum operating temperature is the highest temperature at which the grease could be used with frequent (daily) relubrication.
- ♦ Not tested at this temperature
- \* Determined on mineral oil extracted by vacuum filtration



**SPENDRUP  
FAN Co.**

## NOTES