

**8000  
PROPELLER  
PUMPS  
DATA SECTION**

# 8000 Propeller Pumps Data

## Table of Contents

### Construction Features

8211A, Water Lubricated Lineshaft . . . . .	003
8211B, Oil Lubricated Lineshaft . . . . .	004
8312A, Water Lubricated Lineshaft . . . . .	005
8312B, Oil Lubricated Lineshaft . . . . .	006

### Typical Specifications

8211A, Water Lubricated Lineshaft . . . . .	007–008
8211B, Oil Lubricated Lineshaft . . . . .	009–010
8312A, Water Lubricated Lineshaft . . . . .	011–012
8312B, Water Lubricated Lineshaft . . . . .	013–014
8312B, Oil Lubricated Lineshaft . . . . .	015–016

### Bowl Assemblies

8211 Sectional Drawing . . . . .	017
8312 Sectional Drawing . . . . .	018
Material Specifications . . . . .	019

### Column, Tube and Shaft

Sectional Drawings . . . . .	020–026
Material Specifications . . . . .	027–029
Technical Data . . . . .	030

### Discharge Heads

Sectional Drawings . . . . .	031–035
Material Specifications . . . . .	036–037
Technical Data . . . . .	038–039
Oiler Assembly . . . . .	040
Spacer Coupling and High Ring Base . . . . .	041
Flanged Couplings . . . . .	042

### Dimension Drawings

8211 – D Discharge Head . . . . .	043
8211 – H Discharge Head . . . . .	044
8211 – F Discharge Head, Flanged . . . . .	045
8211 – F Discharge Head, Plain End . . . . .	046
8211 – UG Discharge Head, Flanged . . . . .	047
8211 – UG Discharge Head, Plain End . . . . .	048
8312 – D Discharge Head . . . . .	049
8312 – H Discharge Head . . . . .	050
8312 – F Discharge Head, Flanged . . . . .	051
8312 – F Discharge Head, Plain End . . . . .	052
8312 – UG Discharge Head, Flanged . . . . .	053
8312 – UG Discharge Head, Plain End . . . . .	054

**CONSTRUCTION FEATURES – 8211A OPEN LINESHAFT**

		Standard	Optional At Extra Price
Type	Vertical, One or Two Stage, Axial Flow	x	
Rotation	CCW, Viewed from the Driven End	x	
Strainer	Basket, Clip-on Type		x
Bowls	Diffuser Type Discharge and Intermediate, Belled Suction with Radial Vanes	x	
Propellers	Axial Flow Type, Attached to Pumpshaft with Thrust Snap Rings and Keys	x	
Bearing, Suction Case	Sleeve Type, Grease Packed	x	
Bearing, Intermediate Bowl	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Lower	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Upper	Threaded Tube Connector, Spiral Groove, Product Lubricated	x	
Shaft, Bowl	Ground and Polished, Threaded for Shaft Coupling, Grooved for Snap Rings and with Keyway(s)	x	
Pipe, Column	8" Through 12" Threaded	x	
Coupling, Column Pipe	Threaded, Sleeve Type 8" Through 12"	x	
Pipe, Column	20" Through 36" Flanged	x	
Shaft, Line	Open, Product (Water) Lubricated	x	
Sleeves, Shaft	Straight, Replaceable	x	
Coupling, Lineshaft	Threaded, Sleeve Type	x	
Bearing, Lineshaft	Straight, Rubber, Product (Water) Lubricated	x	
Retainer, Bearing	8" Through 12", One Piece Cast, Locked in Coupling by Ends of Column Pipe	x	
	20" Through 36" Fabricated, Welded in Column Pipe	x	
Discharge Head	8" Through 12" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied where Required to Allow Complete Unit Withdrawal	x	
	8" Thru 12" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	8" Thru 12" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Motor Pedestal with Integral Base Plate to Allow Complete Unit Withdrawal	x	
	20" Thru 36" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
	20" Thru 36" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
Packing Box	Retains Packing, Bushing, Split-Type Packing Gland	x	
Coupling, Driver	Gib Key with Adjusting Nut	x	

## CONSTRUCTION FEATURES – 8211B ENCLOSED LINESHAFT

		Standard	Optional At Extra Price
Type	Vertical, One or Two Stage Axial Flow	x	
Rotation	CCW, Viewed from the Driven End	x	
Strainer	Basket, Clip-on Type		x
Bowls	Diffuser Type Discharge and Intermediate, Belled Suction with Radial Vanes	x	
Propellers	Axial Flow Type, Attached to Pumpshaft with Thrust Snap Rings and Keys	x	
Bearing, Suction Case	Sleeve Type, Grease Packed	x	
Bearing, Intermediate Bowl	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Lower	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Upper	Threaded Tube Connector, Spiral Groove External Source (Oil) Lubricated		
Shaft, Bowl	Ground and Polished, Threaded for Shaft Coupling, Grooved for Snap Rings and with Keyways	x	
Pipe, Column	8" Through 12" Threaded	x	
Pipe, Column	20" Through 36" Flanged	x	
Tube, Shaft Enclosing	Encloses Shaft, Contains the Lubricant Required for the Lineshaft Connector and Discharge Bowl Connector Bearings	x	
Bearing, Connector	Threaded, Functions as Enclosing Tube Connector and Shaft Bearing, Requires External Source of Lubricant (Oil)	x	
Shaft, Line	Enclosed, Requires External Source (Oil) Lubrication, Threaded for Coupling	x	
Coupling, Lineshaft	Threaded, Sleeve Type	x	
Discharge Head	8" Thru 12" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied where Required to Allow Complete Unit Withdrawal	x	
	8" Thru 12" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	8" Thru 12" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Motor Pedestal with Integral Base Plate to Allow Complete Unit Withdrawal	x	
	20" Thru 36" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
	20" Thru 36" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
Head Parts, Enclosing Tube	Consists of a Combination Enclosing Tube Tension Nut and Bearing, Tapped for Introduction of External Lubricant (Oil), and Copper Gasket.	x	
Oiler	Solenoid Operated, Automatic, One Quart Capacity	x	
	Solenoid Operated, Automatic, Two Quart Capacity		x
	Manual Operated, Ten Ounce Capacity		x
Coupling, Driver	Gib Key with Adjusting Nut	x	

**CONSTRUCTION FEATURES – 8312A OPEN LINESHAFT**

		Standard	Optional At Extra Price
Type	Vertical, One or Two Stage Mixed Flow	x	
Rotation	CCW, Viewed From Driven End	x	
Strainer	Basket, Clip-on Type		x
Bowls	Diffuser Type Discharge and Intermediate, Belled Suction with Radial Vanes	x	
Propellers	10" Thru 20" Mixed Flow Type, Attached to Pumpshaft by Lock Collets and Lock Nuts	x	
	24" Thru 30" Mixed Flow Type, Attached to Pumpshaft by Lock Collets with Longitudinal Keys and Lock Nuts	x	
Bearing, Suction Case	Sleeve Type, Grease Packed	x	
Bearing, Intermediate Bowl	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Lower	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Upper	Threaded Tube Connector Spiral Groove (Product Lubricated)	x	
Shaft, Bowl	Ground and Polished, Threaded for Shaft Coupling (with Keyways 24" and 30")	x	
Cone, Diffuser	10" Through 14" Tapered Fabricated Steel Section, Threaded One End, Flanged One End	x	
Column, Tapered Bottom	16" Through 36" Fabricated Steel, Flanged Two Ends	x	
Pipe, Column	10" Through 14" Threaded	x	
Coupling, Column Pipe	10" Through 14" Threaded, Sleeve Type	x	
Pipe, Column	16" Through 36" Flanged	x	
Shaft, Line	Open, Product (Water) Lubricated	x	
Sleeves, Shaft	Straight, Replaceable	x	
Coupling, Lineshaft	Threaded, Sleeve Type	x	
Bearing, Lineshaft	Straight, Rubber, Product (Water) Lubricated	x	
Retainer, Bearing	10" Thru 14" One Piece Cast, Locked in Coupling by Ends of Column Pipe	x	
	16" Through 36" Fabricated, Welded in Column Pipe	x	
Discharge Head	10" Thru 14" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied Where Required to Allow Complete Unit Withdrawal	x	
	8" Thru 14" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	8" Thru 14" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Motor Pedestal with Integral Base Plate to Allow Complete Unit Withdrawal	x	
	16" Thru 36" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
	16" Thru 36" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
Packing Box	Retains Packing, Bushing, Split-Type Packing Gland	x	
Coupling, Driver	Gib Key with Adjusting Nut	x	

## CONSTRUCTION FEATURES – 8312B ENCLOSED LINESHAFT

		Standard	Optional At Extra Price
Type	Vertical, One or Two Stage Mixed Flow	x	
Rotation	CCW, Viewed from Driven End	x	
Strainer	Basket, Clip-on Type		x
Bowls	Diffuser Type Discharge and Intermediate Belled Suction with Radial Vanes	x	
Propellers	10" Thru 20" Mixed Flow Type, Attached to Pumpshaft by Lock Collets and Lock Nuts	x	
	24" Thru 30" Mixed Flow Type, Attached to Pumpshaft by Lock Collets with Longitudinal Keys and Lock Nuts	x	
Bearing, Suction Case	Sleeve Type, Grease Packed	x	
Bearing, Intermediate Bowl	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Lower	Sleeve Type, Product Lubricated	x	
Bearing, Discharge Bowl Upper	Threaded Tube Connector Spiral Groove External Source (Oil) Lubricated	x	
Shaft, Bowl	Ground and Polished, Threaded for Shaft Coupling (with Keyways 24" and 30")	x	
Cone, Diffuser	10" Thru 14" Fabricated Steel, Threaded One End, Flanged One End, Tapered Section	x	
Column, Tapered Bottom	16" Through 36" Fabricated Steel, Flanged Two Ends	x	
Pipe, Column	10" Through 14" Threaded	x	
Coupling, Column	10" Through 14" Threaded, Sleeve Type	x	
Pipe, Column	16" Through 36" Flanged	x	
Tube, Shaft Enclosing	Encloses Shaft, Contains the Lubricant Required for the Lineshaft Connector and Discharge Bowl Connector Bearings	x	
Bearing, Connector	Threaded, Functions as Enclosing Tube Connector and Shaft Bearing, Requires External Source of Lubricant (Oil)	x	
Shaft, Line	Enclosed, Requires External Source (Oil) Lubrication, Threaded for Coupling	x	
Coupling, Lineshaft	Threaded, Sleeve Type	x	
Discharge Head	10" Thru 14" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied where Required to Allow Complete Unit Withdrawal	x	
	10" Thru 14" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	10" Thru 14" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Motor Pedestal with Integral Base Plate to Allow Complete Unit Withdrawal	x	
	16" Thru 36" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
	16" Thru 36" Fabricated Steel, Below Ground Elbow, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal	x	
Head Parts, Enclosing Tube	Consists of a Combination Enclosing Tube Tension Nut and Bearing, Tapped for Introduction of External Lubricant (Oil), and Copper Gasket.	x	
Oiler	Solenoid Operated, Automatic, One Quart Capacity	x	
	Solenoid Operated, Automatic, Two Quart Capacity		x
	Manual Operated, Ten ounce Capacity		x
Coupling, Driver	Gib Key with Adjusting Nut	x	

**8211 VERTICAL MIXED-FLOW PROPELLER PUMP SPECIFICATIONS, OPEN LINESHAFT CONSTRUCTION**

**PART 1, GENERAL**

- 1.01 This specification includes the supply of \_\_\_\_ vertical mixed-flow propeller product lubricated open lineshaft pump(s). Each unit shall include a bowl assembly, (optional suction strainer), column and open lineshaft, discharge head (or motor pedestal and underground discharge elbow), sealing assembly and driver.
- 1.02 **QUALITY ASSURANCE**
  - A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
  - B. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
  - C. The vertical mixed-flow propeller pump(s) specified in this section shall be furnished by and be the product of one manufacturer.
  - D. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
  - E. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.
- 1.03 **PERFORMANCE**
  - A. The pump(s) shall be designed for continuous operation under normal service.
  - B. **OPERATION CRITERIA**

	Flow (GPM)	TDH (ft.)	Max. Pump Speed (RPM)	Max. Solids Passage	Max. Shutoff Head (ft.)	Minimum Submergence Over Bell (inches)
Design Condition						
Secondary Condition						

- C. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.
- D. Minimum water level shall be at elevation \_\_\_\_\_ feet.
- E. Pump(s) are to be mounted at \_\_\_\_\_ feet elevation with the sump floor at \_\_\_\_\_ feet elevation.
- F. Pump discharge centerline shall be at \_\_\_\_\_ feet elevation.
- G. Maximum pump speed shall not exceed \_\_\_\_\_ RPM.
- H. Driver size shall be limited to \_\_\_\_\_ HP maximum in the hydraulic curve range.
- I. Liquid pumped is \_\_\_\_\_ with a maximum temperature of \_\_\_\_ deg. F.
- J. Pump(s) shall be operated in the manufacturer's published performance curve range.

**PART 2, PRODUCTS**

- 2.01 **PUMPS**
  - A. **Manufacturers**
    - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
    - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
  - B. **Design**
    - 1. **Rotation**
      - a. The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.
    - 2. **Propeller**
      - a. The propeller shall be of bronze construction conforming to ASTM B584, C83600. They shall be of one-piece construction, mixed-flow \_\_\_\_-vane design capable of passing a \_\_\_\_ solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller(s) shall be statically and dynamically balanced to limit vibration and supported on both sides by sleeve-type bearings for stability.
      - b. Propeller(s) are to be secured to the shaft by means of a (steel drive collet and bronze lock nut bowl sizes through 20") (steel drive collet, bronze lock nut and longitudinal keys for bowl sizes 24" and larger) to prevent axial movement.
      - c. Propeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut when utilizing a vertical hollow-shaft motor, or by an adjustable coupling when using a vertical solid-shaft motor.
  - 3. **Bowls**
    - a. The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.
    - b. Bowls shall be flange connected.
    - c. Bowls shall be designed with smooth passages to ensure efficient operation.
    - d. The bowl assembly shall include a cast iron suction bell of the flared inlet type incorporating a permanently grease-packed bronze bearing. The suction bell shall incorporate a minimum of three guide vanes designed to minimize entrance losses and reduce vortexing.
    - e. A bronze sand cap shall be provided to prevent entrance of sand into the suction bell bearing.
    - f. The discharge bowl shall be provided with a bronze bearing immediately above the propeller as well as a bronze connector bearing.
  - OPTIONAL**
  - g. Bronze bowl liners shall be supplied. Liners shall be of bronze construction conforming to ASTM, B505 C93200, or ASTM B584, C83600.
  - 4. **Propeller Shaft**
    - a. Propeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel) designed to transmit the drive torque required.
    - b. The shaft shall be supported by bronze bearings located on both sides of each propeller.
    - c. Propeller shaft coupling shall be of carbon steel construction conforming to ASTM A108 GR12L14.
  - 5. **Column**
    - a. Column pipe shall be not less than \_\_\_\_ inches nominal diameter and weigh not less than \_\_\_\_ pounds per foot.

- b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
- 6. Lineshafts
  - a. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration.
  - b. Lineshafting shall be made of carbon steel conforming to AISI 1045 (or ASTM A582, 416) and be furnished in sections not over ten feet in length.
  - c. Lineshafting shall be coupled with extra-strong threaded steel (or 416 stainless steel) couplings machined from solid bar steel.
  - d. Lineshafting shall be fitted with stainless steel replaceable sleeves at each bearing and shall conform to AISI 304 material.
  - e. Lineshaft bearings shall be of neoprene material construction.
  - f. Lineshaft bearings shall be retained in bronze guides that are fitted into the column coupling and secured in place by the butted column pipe ends. (For 20" and larger column sizes, retainers will be steel and fabricated into the column assembly.)
- 7. Discharge Head Assembly (above ground, packed box)
  - a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the discharge head and be coupled to a vertical hollow shaft or vertical solid shaft driver.
  - e. The shaft sealing assembly shall consist of a cast iron packing box, cast iron packing gland, bronze packing box bushing, stainless steel packing gland nuts and bolts and synthetic packing.
  - f. Packing box shall be rated for 175 PSI.
  - g. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
- 8. Discharge Head Assembly (above ground, mechanical seal)
  - a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the discharge head and be coupled to a vertical solid shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - e. The shaft sealing assembly shall consist of a cast iron packing box, bronze packing box bushing, steel gland nuts and studs and mechanical seal.
  - f. Packing box shall be rated for 175 PSI.
  - g. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
- 9. Discharge Head Assembly (below ground, packed box)
  - a. The pump discharge shall be of the below ground construction and consist of a driver mounting-base, underground elbow and riser pipe.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the driver-mounting base and be coupled to a vertical hollow shaft driver. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron packing box, cast iron packing gland, bronze packing box bushing, stainless steel packing gland nuts and bolts and synthetic packing.
  - g. Packing box shall be rated for 175 PSI.
  - h. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
- 10. Discharge Head Assembly (below ground, mechanical seal)
  - a. The pump discharge shall be of below ground construction and consist of a driver mounting-base, underground elbow and riser pipe as required.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly and be coupled to a vertical solids shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron packing box, bronze packing box bushing, steel gland nuts and studs, and mechanical seal.
  - g. Packing box shall be rated for 175 PSI.
  - h. Driver mounting-base shall be fitted with guards to prevent injury from the rotating shaft and/or coupling.
- 11. Vibration Limitations (Field)
  - a. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.
- 12. Testing
  - a. A certified factory performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from minimum recommended flow to 150% of design flow. A minimum of six points shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.



**8211 VERTICAL MIXED-FLOW PROPELLER PUMP SPECIFICATIONS, ENCLOSED LINESHAFT CONSTRUCTION – OIL LUBRICATED**

**PART 1. GENERAL**

1.01 This specification includes the supply of \_\_\_\_ vertical mixed-flow propeller oil lubricated enclosed lineshaft pump(s). Each unit shall include a bowl assembly, (optional suction strainer), column, enclosing tube and lineshaft, discharge head (or motor pedestal and discharge elbow), sealing assembly and driver.

- 1.02 QUALITY ASSURANCE
- A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
  - B. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
  - C. The vertical mixed-flow propeller pump(s) specified in this section shall be furnished by and be the product of one manufacturer.
  - D. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
  - E. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.

1.03 PERFORMANCE

- A. The pump(s) shall be designed for continuous operation under normal service.
- B. OPERATION CRITERIA

	Flow (GPM)	TDH (ft.)	Max. Pump Speed (RPM)	Max. Solids Passage	Max. Shutoff Head (ft.)	Minimum Submergence Over Bell (inches)
Design Condition						
Secondary Condition						

- C. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.
- D. Minimum water level shall be at elevation \_\_\_\_\_ feet.
- E. Pump(s) are to be mounted at \_\_\_\_\_ feet elevation with the sump floor at \_\_\_\_\_ feet elevation.
- F. Pump discharge centerline shall be at \_\_\_\_\_ feet elevation.
- G. Maximum pump speed shall not exceed \_\_\_\_\_ RPM.
- H. Driver size shall be limited to \_\_\_\_\_ HP maximum in the hydraulic curve range.
- I. Liquid pumped is \_\_\_\_\_ with a maximum temperature of \_\_\_\_ deg. F.
- J. Pump(s) shall be operated in the manufacturer’s published performance curve range.

**PART 2, PRODUCTS**

2.01 PUMPS

- A. Manufacturers
    - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
    - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
  - B. Design
    - 1. Rotation
      - a. The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.
    - 2. Propeller
      - a. The propeller shall be of bronze construction conforming to ASTM B584, C83600. They shall be of one-piece construction, mixed-flow \_\_\_\_-vane design capable of passing a \_\_\_\_ solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller(s) shall be statically and dynamically balanced to limit vibration and supported on both sides by sleeve-type bearings for stability.
      - b. Propeller(s) are to be secured to the shaft by means of a (steel drive collet and bronze lock nut bowl sizes through 20”) (steel drive collet, bronze lock nut and longitudinal keys for bowl sizes 24” and larger) to prevent axial movement.
      - c. Propeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut when utilizing a vertical hollow-shaft motor, or by an adjustable coupling when using a vertical solid-shaft motor.
    - 3. Bowls
      - a. The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.
      - b. Bowls shall be flange connected.
      - c. Bowls shall be designed with smooth passages to ensure efficient operation.
      - d. The bowl assembly shall include a cast iron suction bell of the flared inlet type incorporating a permanently grease-packed bronze bearing. The suction bell shall incorporate a minimum of three guide vanes designed to minimize entrance losses and reduce vortexing.
      - e. A bronze sand cap shall be provided to prevent entrance of sand into the suction bell bearing.
      - f. The discharge bowl shall be provided with a bronze bearing immediately above the propeller as well as a bronze connector bearing.
- OPTIONAL**
- g. Bronze bowl liners shall be supplied. Liners shall be of bronze construction conforming to ASTM, B505 C93200, or ASTM B584, C83600.
  - 4. Propeller Shaft
    - a. Propeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel) designed to transmit the drive torque required.

- b. The shaft shall be supported by bronze bearings located on both sides of each propeller.
  - c. Propeller shaft coupling shall be of carbon steel construction conforming to ASTM A108 GR12L14.
5. Column
- a. Column pipe shall be not less than \_\_\_ inches nominal diameter and weigh not less than \_\_\_ pounds per foot.
  - b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
6. Lineshafts
- a. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration.
  - b. Lineshafting shall be made of carbon steel conforming to AISI 1045 (or ASTM A582, 416) and be furnished in sections not over ten feet in length.
  - c. Lineshafting shall be coupled with extra-strong threaded steel (or 416 stainless steel) couplings machined from solid bar steel.
  - d. An enclosing tube shall be provided to house the lineshaft. It shall be of extra-strong ASTM A120, Schedule 80 pipe construction and furnished in interchangeable sections not over five feet in length. Each end of the enclosing tube shall be machined to receive bronze connector bearings.
  - e. Enclosing tube connector bearings shall be of bronze material conforming to ASTM B505 C93200 material.
  - f. Units with overall lengths exceeding 30 feet shall incorporate an enclosing tube stabilizer for each additional 50 feet of the tube assembly.
7. Discharge Head Assembly (above ground)
- a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. A drive shaft of the same material as the lineshaft shall extend through the sealing assembly of the discharge head and be coupled to a vertical hollow shaft or vertical solid shaft driver.
  - e. The shaft sealing assembly shall consist of a bronze tension nut, a suitable oiler and oil reservoir to ensure proper lubrication for the bearings when the pump is in operation. The oiler shall be furnished with a \_\_\_\_\_ volt solenoid for automatic operation.
  - f. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
- OR**
8. Discharge Head Assembly (below ground)
- a. The pump discharge shall be of the below ground construction and consist of a driver mounting-base, underground elbow and riser pipe.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. A driveshaft of the same material as the lineshaft shall extend through the sealing assembly of the driver-mounting base and be coupled to a vertical hollow shaft driver.
  - f. The shaft sealing assembly shall consist of a bronze tension nut, a suitable oiler and oiler reservoir to ensure proper lubrication for the bearings when the pump is in operation. The oiler shall be furnished with a \_\_\_\_\_ volt solenoid for automatic operation.
  - g. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
9. Vibration Limitations (Field)
- a. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.
10. Testing
- a. A certified factory performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from minimum recommended flow to 150% of design flow. A minimum of six points shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

**8312 VERTICAL MIXED-FLOW PROPELLER PUMP SPECIFICATIONS, OPEN LINESHAFT CONSTRUCTION**

**PART 1. GENERAL**

1.01 This specification includes the supply of \_\_\_\_ vertical mixed-flow propeller product lubricated open lineshaft pump(s). Each unit shall include a bowl assembly, (optional suction strainer), column and open lineshaft, discharge head (or motor pedestal and underground discharge elbow), sealing assembly and driver.

1.02 QUALITY ASSURANCE

- A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
- B. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
- C. The vertical mixed-flow propeller pump(s) specified in this section shall be furnished by and be the product of one manufacturer.
- D. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
- E. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.

1.03 PERFORMANCE

A. The pump(s) shall be designed for continuous operation under normal service.

B. OPERATION CRITERIA

	Flow (GPM)	TDH (ft.)	Max. Pump Speed (RPM)	Max. Solids Passage	Max. Shutoff Head (ft.)	Minimum Submergence Over Bell (inches)
Design Condition						
Secondary Condition						

- C. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.
- D. Minimum water level shall be at elevation \_\_\_\_\_ feet.
- E. Pump(s) are to be mounted at \_\_\_\_\_ feet elevation with the sump floor at \_\_\_\_\_ feet elevation.
- F. Pump discharge centerline shall be at \_\_\_\_\_ feet elevation.
- G. Maximum pump speed shall not exceed \_\_\_\_\_ RPM.
- H. Driver size shall be limited to \_\_\_\_\_ HP maximum in the hydraulic curve range.
- I. Liquid pumped is \_\_\_\_\_ with a maximum temperature of \_\_\_\_ deg. F.
- J. Pump(s) shall be operated in the manufacturer's published performance curve range.

**PART 2. PRODUCTS**

2.01 PUMPS

- A. Manufacturers
    - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
    - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
  - B. Design
    - 1. Rotation
      - a. The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.
    - 2. Propeller
      - a. The propeller shall be of bronze construction conforming to ASTM B584, C83600. They shall be of one-piece construction, mixed-flow \_\_\_\_-vane design capable of passing a \_\_\_\_ solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller(s) shall be statically and dynamically balanced to limit vibration and supported on both sides by sleeve-type bearings for stability.
      - b. Propeller(s) are to be secured to the shaft by means of a (steel drive collet and bronze lock nut bowl sizes through 20") (steel drive collet, bronze lock nut and longitudinal keys for bowl sizes 24" and larger) to prevent axial movement.
      - c. Propeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut when utilizing a vertical hollow-shaft motor, or by an adjustable coupling when using a vertical solid-shaft motor.
    - 3. Bowls
      - a. The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.
      - b. Bowls shall be flange connected.
      - c. Bowls shall be designed with smooth passages to ensure efficient operation.
      - d. The bowl assembly shall include a cast iron suction bell of the flared inlet type incorporating a permanently grease-packed bronze bearing. The suction bell shall incorporate a minimum of three guide vanes designed to minimize entrance losses and reduce vortexing.
      - e. A bronze sand cap shall be provided to prevent entrance of sand into the suction bell bearing.
      - f. The discharge bowl shall be provided with a bronze bearing immediately above the propeller as well as a bronze connector bearing.
- OPTIONAL**
- g. Bronze bowl liners shall be supplied. Liners shall be of bronze construction conforming to ASTM, B505 C93200, or ASTM B584, C83600.
  - 4. Propeller Shaft
    - a. Propeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel) designed to transmit the drive torque required.
    - b. The shaft shall be supported by bronze bearings located on both sides of each propeller.
    - c. Propeller shaft coupling shall be of carbon steel construction conforming to ASTM A108 GR12L14.

5. Column
  - a. Column pipe shall be not less than \_\_\_\_ inches nominal diameter and weigh not less than \_\_\_\_ pounds per foot.
  - b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
6. Lineshafts
  - a. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration.
  - b. Lineshafting shall be made of carbon steel conforming to AISI 1045 (or ASTM A582, 416) and be furnished in sections not over ten feet in length.
  - c. Lineshafting shall be coupled with extra-strong threaded steel (or 416 stainless steel) couplings machined from solid bar steel.
  - d. Lineshafting shall be fitted with stainless steel replaceable sleeves at each bearing and shall conform to AISI 304 material.
  - e. Lineshaft bearings shall be of neoprene material construction.
  - f. Lineshaft bearings shall be retained in bronze guides that are fitted into the column coupling and secured in place by the butted column pipe ends. (For 20" and larger column sizes, retainers will be steel and fabricated into the column assembly.)
7. Discharge Head Assembly (above ground, packed box)
  - a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the discharge head and be coupled to a vertical hollow shaft or vertical solid shaft driver.
  - e. The shaft sealing assembly shall consist of a cast iron packing box, cast iron packing gland, bronze packing box bushing, stainless steel packing gland nuts and bolts and synthetic packing.
  - f. Packing box shall be rated for 175 PSI.
  - g. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
8. Discharge Head Assembly (above ground, mechanical seal)
  - a. The pump discharge head shall be of the above ground type of either cast iron or fabricated steel construction with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the discharge head and be coupled to a vertical solid shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - e. The shaft sealing assembly shall consist of a cast iron packing box, bronze packing box bushing, steel gland nuts and bolts and mechanical seal.
  - f. Packing box shall be rated for 175 PSI.
  - g. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
9. Discharge Head Assembly (below ground, packed box)
  - a. The pump discharge shall be of the below ground construction and consist of a driver mounting-base, underground elbow and riser pipe.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. The driveshaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly of the driver-mounting base and be coupled to a vertical hollow shaft driver. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron packing box, cast iron packing gland, bronze packing box bushing, stainless steel packing gland nuts and bolts and synthetic packing.
  - g. Packing box shall be rated for 175 PSI.
  - h. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
10. Discharge Head Assembly (below ground, mechanical seal)
  - a. The pump discharge shall be of below ground construction and consist of a driver mounting-base, underground elbow and riser pipe as required.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. The drive shaft shall be made of 416 stainless steel conforming to ASTM A582, 416 and shall extend through the sealing assembly and be coupled to a vertical solids shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron packing box, bronze packing box bushing, steel gland nuts and studs, and mechanical seal.
  - g. Packing box shall be rated for 175 PSI.
  - h. Driver mounting-base shall be fitted with guards to prevent injury from the rotating shaft and/or coupling.
11. Vibration Limitations (Field)
  - a. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.
12. Testing
  - a. A certified factory performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from minimum recommended flow to 150% of design flow. A minimum of six points shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

**8312 VERTICAL MIXED-FLOW PROPELLER PUMP SPECIFICATIONS  
ENCLOSED LINESHAFT CONSTRUCTION – WATER FLUSH LUBRICATED**

**PART 1. GENERAL**

- 1.01 This specification includes the supply of \_\_\_\_ vertical mixed-flow propeller water-flushed lubricated enclosed lineshaft pump(s). Each unit shall include a bowl assembly, (optional suction strainer), column, enclosing tube and lineshaft, discharge head (or motor pedestal and underground discharge elbow), sealing assembly and driver.
- 1.02 **QUALITY ASSURANCE**
  - A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
  - B. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
  - C. The vertical mixed-flow propeller pump(s) specified in this section shall be furnished by and be the product of one manufacturer.
  - D. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
  - E. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.
- 1.03 **PERFORMANCE**
  - A. The pump(s) shall be designed for continuous operation under normal service.
  - B. **OPERATION CRITERIA**

	Flow (GPM)	TDH (ft.)	Max. Pump Speed (RPM)	Max. Solids Passage	Max. Shutoff Head (ft.)	Minimum Submergence Over Bell (inches)
Design Condition						
Secondary Condition						

    - C. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.
    - D. Minimum water level shall be at elevation \_\_\_\_ feet.
    - E. Pump(s) are to be mounted at \_\_\_\_ feet elevation with the sump floor at \_\_\_\_ feet elevation.
    - F. Pump discharge centerline shall be at \_\_\_\_ feet elevation.
    - G. Maximum pump speed shall not exceed \_\_\_\_ RPM.
    - H. Driver size shall be limited to \_\_\_\_ HP maximum in the hydraulic curve range.
    - I. Liquid pumped is \_\_\_\_ with a maximum temperature of \_\_\_\_ deg. F.
    - J. Pump(s) shall be operated in the manufacturer’s published performance curve range.

**PART 2, PRODUCTS**

- 2.01 **PUMPS**
  - A. Manufacturers
    - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
    - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
  - B. Design
    - 1. Rotation
      - a. The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.
    - 2. Propeller
      - a. The propeller shall be of bronze construction conforming to ASTM B584, C83600. They shall be of one-piece construction, mixed-flow \_\_\_\_-vane design capable of passing a \_\_\_\_ solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller(s) shall be statically and dynamically balanced to limit vibration and supported on both sides by sleeve-type bearings for stability.
      - b. Propeller(s) are to be secured to the shaft by means of a (steel drive collet and bronze lock nut bowl sizes through 20”) (steel drive collet, bronze lock nut and longitudinal keys for bowl sizes 24” and larger) to prevent axial movement.
      - c. Propeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut when utilizing a vertical hollow-shaft motor, or by an adjustable coupling when using a vertical solid-shaft motor.
    - 3. Bowls
      - a. The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.
      - b. Bowls shall be flange connected.
      - c. Bowls shall be designed with smooth passages to ensure efficient operation.
      - d. The bowl assembly shall include a cast iron suction bell of the flared inlet type incorporating a permanently grease-packed bronze bearing. The suction bell shall incorporate a minimum of three guide vanes designed to minimize entrance losses and reduce vortexing.
      - e. A bronze sand cap shall be provided to prevent entrance of sand into the suction bell bearing.
      - f. The discharge bowl shall be provided with a bronze bearing immediately above the propeller as well as a bronze connector bearing.

**OPTIONAL**

- g. Bronze bowl liners shall be supplied. Liners shall be of bronze construction conforming to ASTM, B505 C93200, or ASTM B584, C83600.
- 4. Propeller Shaft
  - a. Propeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel) designed to transmit the drive torque required.
  - b. The shaft shall be supported by bronze bearings located on both sides of each propeller.

- c. Propeller shaft coupling shall be of stainless steel construction conforming to ASTM A582, 416.
- 5. Column
  - a. Column pipe shall be not less than \_\_\_ inches nominal diameter and weigh not less than \_\_\_ pounds per foot.
  - b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
- 6. Lineshafts
  - a. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration.
  - b. Lineshafting shall be made of stainless steel conforming to ASTM A582, 416 and be furnished in sections not over ten feet in length.
  - c. Lineshafting shall be coupled with extra-strong threaded 416 stainless steel couplings machined from solid bar steel.
  - d. An enclosing tube shall be provided to house the lineshaft. It shall be of extra-strong ASTM A120, Schedule 80 pipe construction and furnished in interchangeable sections not over five feet in length. Each end of the enclosing tube shall be machined to receive bronze connector bearings.
  - e. Enclosing tube connector bearings shall be of bronze material conforming to ASTM B505 C93200 material.
  - f. Units with overall lengths exceeding 30 feet shall incorporate an enclosing tube stabilizer for each additional 50 feet of the tube assembly.
- 7. Discharge Head Assembly (above ground, packed box)
  - a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. A drive shaft of the same material as the lineshaft shall extend through the sealing assembly of the discharge head and be coupled to a vertical hollow shaft or vertical solid shaft driver.
  - e. The shaft sealing assembly shall consist of a cast iron tension box, cast iron packing gland, bronze connector bearing, stainless steel packing box washer, stainless steel packing gland nuts and bolts and synthetic packing.
  - f. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
  - g. A sufficient clean water supply shall be supplied by the owner for this water flush lubrication.

**OR**
- 8. Discharge Head Assembly (above ground, mechanical seal)
  - a. The pump discharge head shall be of the above ground type of either cast iron or fabricated steel construction with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. A drive shaft of the same material as the lineshaft shall extend through the sealing assembly of the discharge head and be coupled to a vertical solid shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - e. The shaft sealing assembly shall consist of a cast iron tension box, cast iron packing gland, bronze connector bearing, stainless steel packing gland nuts and bolts and cartridge-type or split-type mechanical seal.
  - f. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
  - g. A sufficient clean water supply shall be supplied by the owner for this water flush lubrication.

**OR**
- 9. Discharge Head Assembly (below ground, packed box)
  - a. The pump discharge shall be of the below ground construction and consist of a driver mounting-base, underground elbow and riser pipe.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. A driveshaft of the same material as the lineshaft shall extend through the sealing assembly of the driver-mounting base and be coupled to a vertical hollow shaft driver. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron tension box, cast iron packing gland, bronze connector bearing, stainless steel packing gland nuts and bolts and synthetic packing.
  - g. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
  - h. A sufficient clean water supply shall be supplied by the owner for this water flush lubrication.

**OR**
- 10. Discharge Head Assembly (below ground, mechanical seal)
  - a. The pump discharge shall be of below ground construction and consist of a driver mounting-base, underground elbow and riser pipe as required.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. A drive shaft of the same material as the lineshaft shall extend through the sealing assembly and be coupled to a vertical solid shaft driver using a spacer type coupling to permit easy field removal of the mechanical seal. (Vertical hollow shaft motors may be used in conjunction with a steady bushing.)
  - f. The shaft sealing assembly shall consist of a cast iron tension box, cast iron packing gland, bronze packing box bushing, stainless steel gland nuts and bolts, and cartridge-type or split-type mechanical seal.
  - g. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
- 11. Vibration Limitations (Field)
  - a. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.
- 12. Testing
  - a. A certified factory performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from minimum recommended flow to 150% of design flow. A minimum of six points shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

**8312 VERTICAL MIXED-FLOW PROPELLER PUMP SPECIFICATIONS  
ENCLOSED LINESHAFT CONSTRUCTION – OIL LUBRICATED**

**PART 1. GENERAL**

- 1.01 This specification includes the supply of \_\_\_\_ vertical mixed-flow propeller oil lubricated enclosed lineshaft pump(s). Each unit shall include a bowl assembly, (optional suction strainer), column, enclosing tube and lineshaft, discharge head (or motor pedestal and underground discharge elbow), sealing assembly and driver.
- 1.02 **QUALITY ASSURANCE**
  - A. All pumping equipment furnished under this Section shall be of a design and manufacture that has been used in similar applications, and it shall be demonstrated to the satisfaction of the Owner that the quality is equal to equipment made by that manufacturer specifically named herein.
  - B. Unit responsibility. Pump(s), complete with motor, necessary guards and all other specified accessories and appurtenances shall be furnished by the pump manufacturer to insure compatibility and integrity of the individual components, and provide the specified warranty for all components.
  - C. The vertical mixed-flow propeller pump(s) specified in this section shall be furnished by and be the product of one manufacturer.
  - D. Pumps are to be engineered and manufactured under a written Quality Assurance program. The Quality Assurance program is to be in effect for at least ten years, to include a written record of periodic internal and external audits to confirm compliance with such program.
  - E. Pump(s) are to be engineered and manufactured under the certification of ISO-9001:2000.

1.03 **PERFORMANCE**

- A. The pump(s) shall be designed for continuous operation under normal service.
- B. **OPERATION CRITERIA**

	Flow (GPM)	TDH (ft.)	Max. Pump Speed (RPM)	Max. Solids Passage	Max. Shutoff Head (ft.)	Minimum Submergence Over Bell (inches)
Design Condition						
Secondary Condition						

- C. Total dynamic head shall be as measured at the discharge of the pump and shall include velocity head and vertical static head from the minimum water level to the centerline of the pump discharge.
- D. Minimum water level shall be at elevation \_\_\_\_\_ feet.
- E. Pump(s) are to be mounted at \_\_\_\_\_ feet elevation with the sump floor at \_\_\_\_\_ feet elevation.
- F. Pump discharge centerline shall be at \_\_\_\_\_ feet elevation.
- G. Maximum pump speed shall not exceed \_\_\_\_\_ RPM.
- H. Driver size shall be limited to \_\_\_\_\_ HP maximum in the hydraulic curve range.
- I. Liquid pumped is \_\_\_\_\_ with a maximum temperature of \_\_\_\_ deg. F.
- J. Pump(s) shall be operated in the manufacturer's published performance curve range.

**PART 2, PRODUCTS**

2.01 **PUMPS**

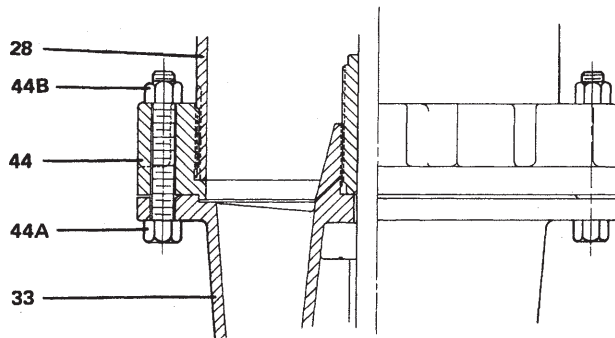
- A. **Manufacturers**
    - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
    - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
  - B. **Design**
    - 1. **Rotation**
      - a. The pump will be counterclockwise rotation when viewed from the driver end looking at the pump.
    - 2. **Propeller**
      - a. The propeller shall be of bronze construction conforming to ASTM B584, C83600. They shall be of one-piece construction, mixed-flow \_\_\_\_-vane design capable of passing a \_\_\_\_ solid. Vane leading edges shall be rounded to prevent accumulation of fibrous material. Propeller(s) shall be statically and dynamically balanced to limit vibration and supported on both sides by sleeve-type bearings for stability.
      - b. Propeller(s) are to be secured to the shaft by means of a (steel drive collet and bronze lock nut bowl sizes through 20") (steel drive collet, bronze lock nut and longitudinal keys for bowl sizes 24" and larger) to prevent axial movement.
      - c. Propeller location within the bowl shall be adjustable by means of a top shaft-adjusting nut when utilizing a vertical hollow-shaft motor, or by an adjustable coupling when using a vertical solid-shaft motor.
    - 3. **Bowls**
      - a. The bowls shall be made of close-grained cast iron conforming to ASTM A48 CL30. Castings shall be free from blowholes, sand holes and shall be accurately machined and fitted to close dimensions.
      - b. Bowls shall be flange connected.
      - c. Bowls shall be designed with smooth passages to ensure efficient operation.
      - d. The bowl assembly shall include a cast iron suction bell of the flared inlet type incorporating a permanently grease-packed bronze bearing. The suction bell shall incorporate a minimum of three guide vanes designed to minimize entrance losses and reduce vortexing.
      - e. A bronze sand cap shall be provided to prevent entrance of sand into the suction bell bearing.
      - f. The discharge bowl shall be provided with a bronze bearing immediately above the propeller as well as a bronze connector bearing.
- OPTIONAL**
- g. Bronze bowl liners shall be supplied. Liners shall be of bronze construction conforming to ASTM, B505 C93200, or ASTM B584, C83600.
  - 4. **Propeller Shaft**
    - a. Propeller shaft shall be of stainless steel construction conforming to ASTM A582 (416 stainless steel) designed to transmit the drive torque required.
    - b. The shaft shall be supported by bronze bearings located on both sides of each propeller.
    - c. Propeller shaft coupling shall be of carbon steel construction conforming to ASTM A108 GR12L14.

5. Column
  - a. Column pipe shall be not less than \_\_\_\_ inches nominal diameter and weigh not less than \_\_\_\_ pounds per foot.
  - b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
6. Lineshafts
  - a. Lineshafting shall be of ample size to transmit the torque and operate the pump without distortion or vibration.
  - b. Lineshafting shall be made of carbon steel conforming to AISI 1045 (or ASTM A582, 416) and be furnished in sections not over ten feet in length.
  - c. Lineshafting shall be coupled with extra-strong threaded steel (or 416 stainless steel) couplings machined from solid bar steel.
  - d. An enclosing tube shall be provided to house the lineshaft. It shall be of extra-strong ASTM A120, Schedule 80 pipe construction and furnished in interchangeable sections not over five feet in length. Each end of the enclosing tube shall be machined to receive bronze connector bearings.
  - e. Enclosing tube connector bearings shall be of bronze material conforming to ASTM B505 C93200 material.
  - f. Units with overall lengths exceeding 30 feet shall incorporate an enclosing tube stabilizer for each additional 50 feet of the tube assembly.
7. Discharge Head Assembly (above ground)
  - a. The pump discharge head shall be of the above ground type of either cast iron for discharge sizes of 8" through 12", or fabricated steel construction for discharge sizes 14" and larger with an ANSI 125# or 150# discharge flange.
  - b. The discharge head shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, discharge heads of fabricated steel shall be specifically designed to elevate the discharge head natural frequency above the operating speed.
  - d. A drive shaft of the same material as the lineshaft shall extend through the sealing assembly of the discharge head and be coupled to a vertical hollow shaft or vertical solid shaft driver.
  - e. The shaft sealing assembly shall consist of a bronze tension nut, a suitable oiler and oil reservoir to ensure proper lubrication for the bearings when the pump is in operation. The oiler shall be furnished with a \_\_\_\_ volt solenoid for automatic operation.
  - f. Discharge head openings shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.

**OR**
8. Discharge Head Assembly (below ground)
  - a. The pump discharge shall be of the below ground construction and consist of a driver mounting-base, underground elbow and riser pipe.
  - b. The driver mounting-base shall be of sufficient design to support the entire weight of the pump and driver.
  - c. If the application uses a variable frequency drive, the mounting-base shall be fabricated steel and specifically designed to elevate the mounting-base natural frequency above the operating speed.
  - d. The underground elbow shall be of fabricated steel and have an ANSI 150# discharge flange.
  - e. A driveshaft of the same material as the lineshaft shall extend through the sealing assembly of the driver-mounting base and be coupled to a vertical hollow shaft driver.
  - f. The shaft sealing assembly shall consist of a bronze tension nut, a suitable oiler and oiler reservoir to ensure proper lubrication for the bearings when the pump is in operation. The oiler shall be furnished with a \_\_\_\_ volt solenoid for automatic operation.
  - g. Driver mounting-base shall be fitted with stainless steel guards to prevent injury from the rotating shaft and/or coupling.
9. Vibration Limitations (Field)
  - a. The limits of vibration as set forth in the standards of the Hydraulic Institute shall govern.
10. Testing
  - a. A certified factory performance test shall be performed on each bowl assembly in accordance with Hydraulic Institute Standards, latest edition. Tests shall be sufficient to determine the curves of head, input horsepower, and efficiency relative to capacity from minimum recommended flow to 150% of design flow. A minimum of six points shall be taken for each test. At least one point of the six shall be taken as near as possible to each specified condition.

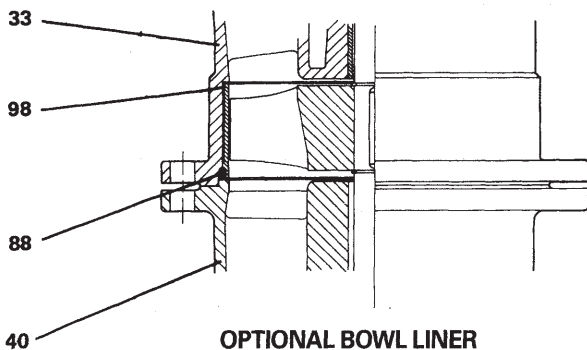


**SECTIONAL DRAWINGS – 8211 BOWL ASSEMBLY**

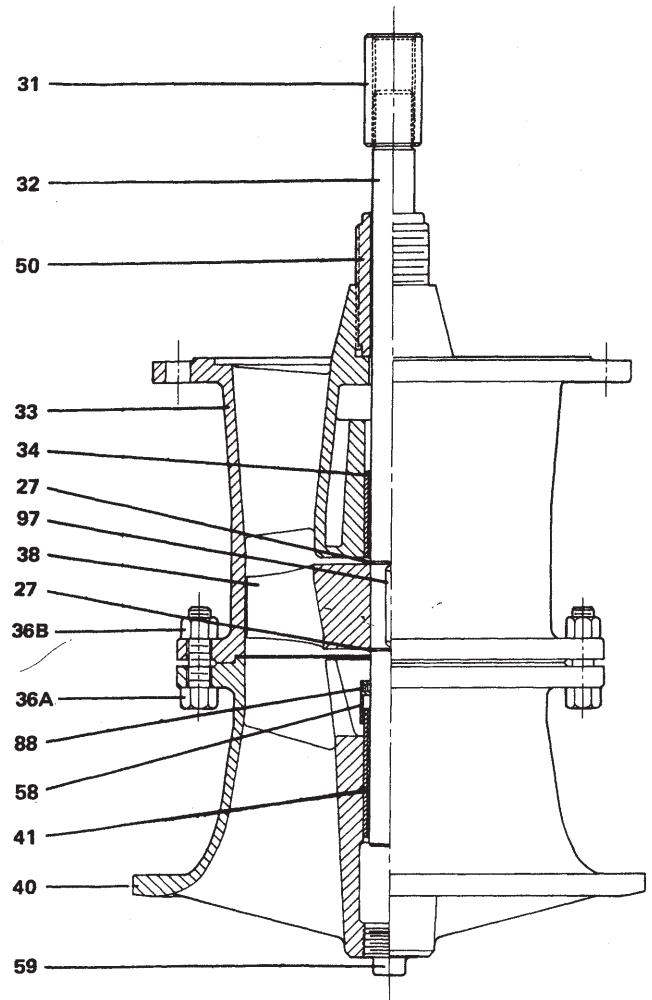


**THREADED COLUMN CONNECTION**

8" 8211, 8" COLUMN  
10" 8211, 10" COLUMN  
12" 8211, 12" COLUMN

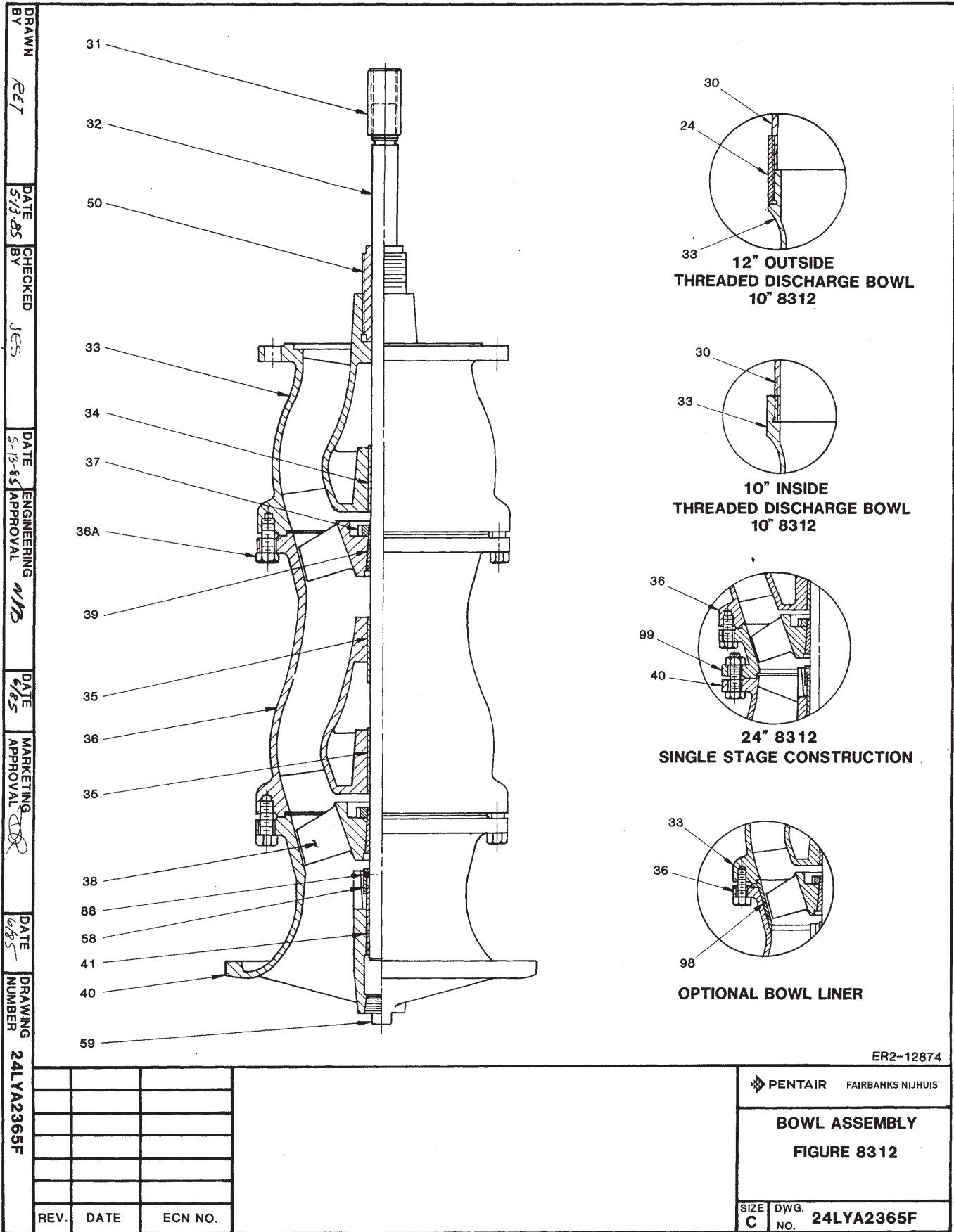


**OPTIONAL BOWL LINER**



REF. NO.	DESCRIPTION
27	SNAP RING
28	COLUMN PIPE
31	SHAFT COUPLING
32	PUMP SHAFT
33	DISCHARGE BOWL
34	DISCHARGE BOWL BEARING
36A	CAP SCREW
36B	NUT
38	PROPELLER
40	SUCTION BELL

REF. NO.	DESCRIPTION
41	SUCTION BELL BEARING
44	COMPANION FLANGE
44A	CAP SCREW
44B	NUT
50	CONNECTOR BEARING
58	SAND CAP
59	SUCTION BELL PIPE PLUG
88	SET SCREW
97	PROPELLER KEY
98	BOWL LINER



ER2-12874

PENTAIR FAIRBANKS NIJHUIS

**BOWL ASSEMBLY  
FIGURE 8312**

SIZE DWG. NO. **24LYA2365F**

REV.	DATE	ECN NO.

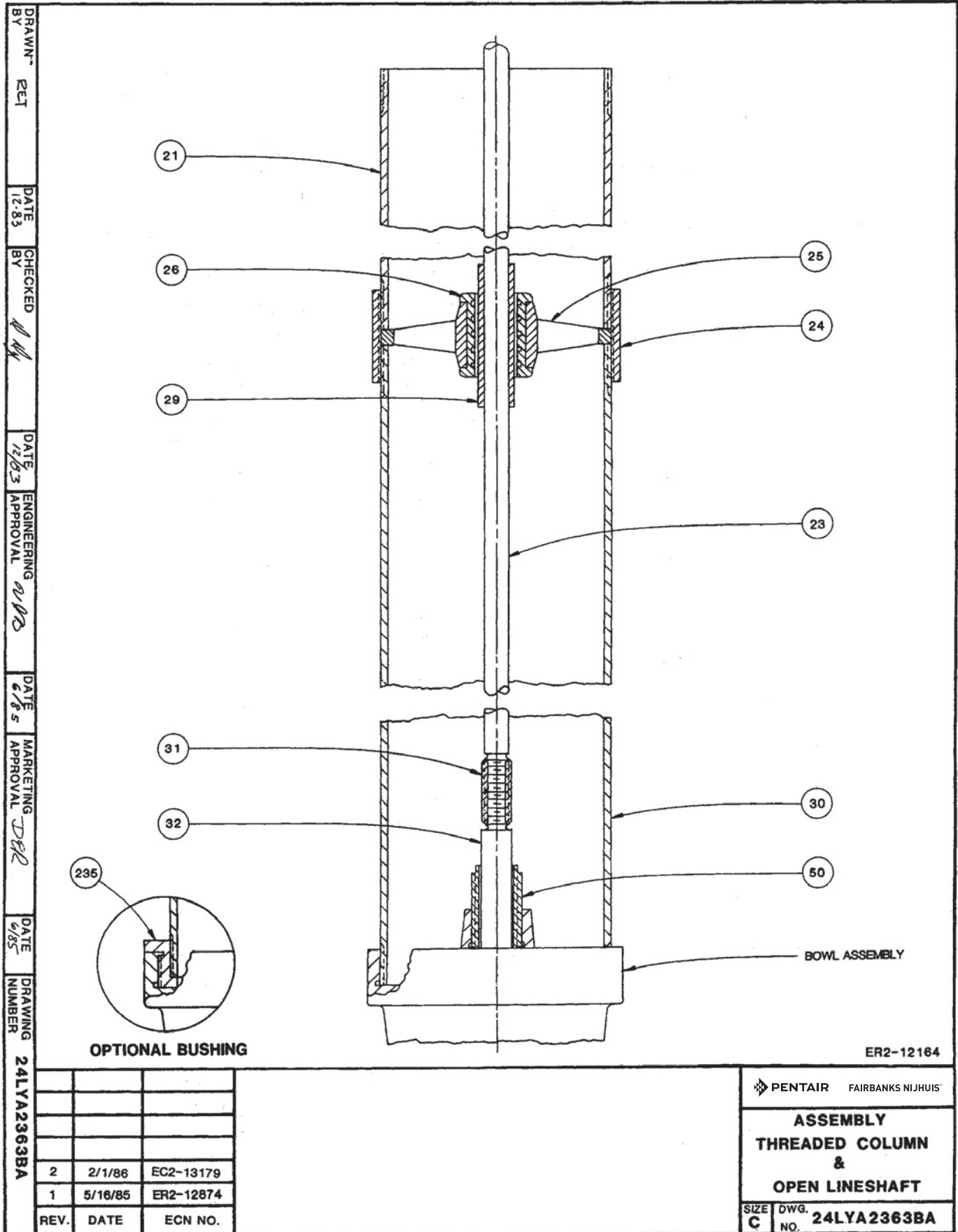
8211

REF. NO.	DESCRIPTION	MATERIAL	SPECIFICATION (1)
27	SNAP RING	STAINLESS STEEL	A564-(632)
28	COLUMN PIPE	STEEL	A53-Gr.B
31	SHAFT COUPLING	STEEL	A108-Gr12L14
32	PUMP SHAFT	416 STAINLESS STEEL	A582-416
33	DISCHARGE BOWL	CAST IRON	A48-CLASS 30
34	DISCHARGE BOWL BEARING	BRONZE	B505-(932)
35	INTERMEDIATE BOWL BEARING	BRONZE	B505-(932)
36	INTERMEDIATE BOWL	CAST IRON	A48-CLASS 30
36A	CAP SCREW	STEEL	SAE BOLT STEEL
36B	NUT	STEEL	SAE BOLT STEEL
38	PROPELLER	BRONZE	B584 (836)
40	SUCTION BELL	CAST IRON	A48-CLASS 30
41	SUCTION BELL BEARING	BRONZE	B505-(932)
44	COMPANION FLANGE	CAST IRON	A48-CLASS 30
44A	CAPSCREW	STEEL	SAE BOLT STEEL
44B	NUT	STEEL	SAE BOLT STEEL
50	CONNECTOR BEARING	BRONZE	B505-(932)
58	SAND CAP	BRONZE	B505-(932)
59	SUCTION BELL PIPE PLUG	CAST IRON	A48-CLASS 30
88	SET SCREW	STEEL	SAE BOLT STEEL
97	PROPELLER KEY	STEEL	AISI-1018
98	BOWL LINER	BRONZE	B505-(932)

8312

REF. NO.	DESCRIPTION	MATERIAL	SPECIFICATION (1)
24	COLUMN COUPLING	STEEL	A53-Gr.B
30	COLUMN	STEEL	A53-Gr.B
31	SHAFT COUPLING	STEEL	A108-Gr12L14
32	PUMP SHAFT	416 STAINLESS STEEL	A582-416
33	DISCHARGE BOWL	CAST IRON	A48-CLASS 30
34	DISCHARGE BOWL BEARING	BRONZE B584	B505-(932)
35	INTERMEDIATE BOWL BEARING	BRONZE B584	B505-(932)
36	INTERMEDIATE BOWL	CAST IRON	A48-CLASS 30
36A	CAP SCREW	STEEL	SAE BOLT STEEL
37	PROPELLER LOCK NUT	BRONZE	B584 (865)
38	PROPELLER	BRONZE	B584 (836)
39	PROPELLER LOCK COLLET	STEEL	A108-Gr12L14
40	SUCTION BELL	CAST IRON	A48-CLASS 30
41	SUCTION BELL BEARING	BRONZE	B505-(932)
50	CONNECTOR BEARING	BRONZE	B505-(932)
58	SAND CAP	BRONZE	B505-(932)
59	SUCTION BELL PIPE PLUG	CAST IRON	A48-CLASS 30
88	SET SCREW	STEEL	SAE BOLT STEEL
98	BOWL LINER	BRONZE	B505-(932)
99	BOWL SEAT SECTION	CAST IRON	A48-CLASS 30

(1) ALL MATERIAL DESIGNATIONS ARE ASTM UNLESS OTHERWISE NOTED, AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.



DRAWN BY	RET	DATE			CHECKED BY			DATE			ENGINEERING APPROVAL			DATE			MARKETING APPROVAL			DATE			DRAWING NUMBER		
		12-83			<i>[Signature]</i>			2-83			<i>[Signature]</i>			6/85			<i>[Signature]</i>			6/85			24LYA2363AZ		

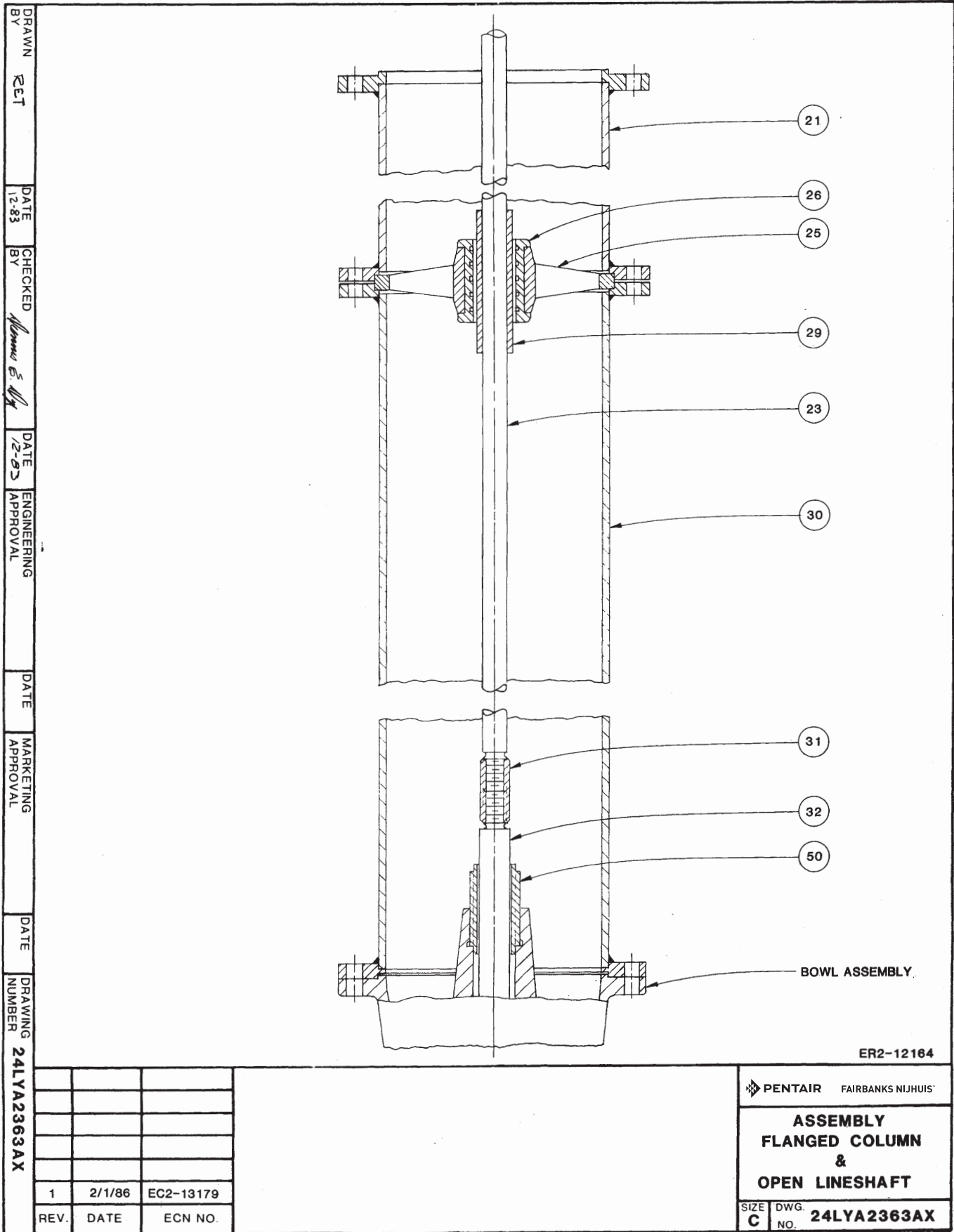
  

ER2-12164

PENTAIR FAIRBANKS NIJHUIS™		
<b>ASSEMBLY THREADED COLUMN &amp; ENCLOSED LINESHAFT</b>		
SIZE	DWG.	NO. <b>24LYA2363AZ</b>
C		

REV.	DATE	ECN NO.
2	2/1/86	EC2-13179
1	5/16/85	ER2-12874



ER2-12164

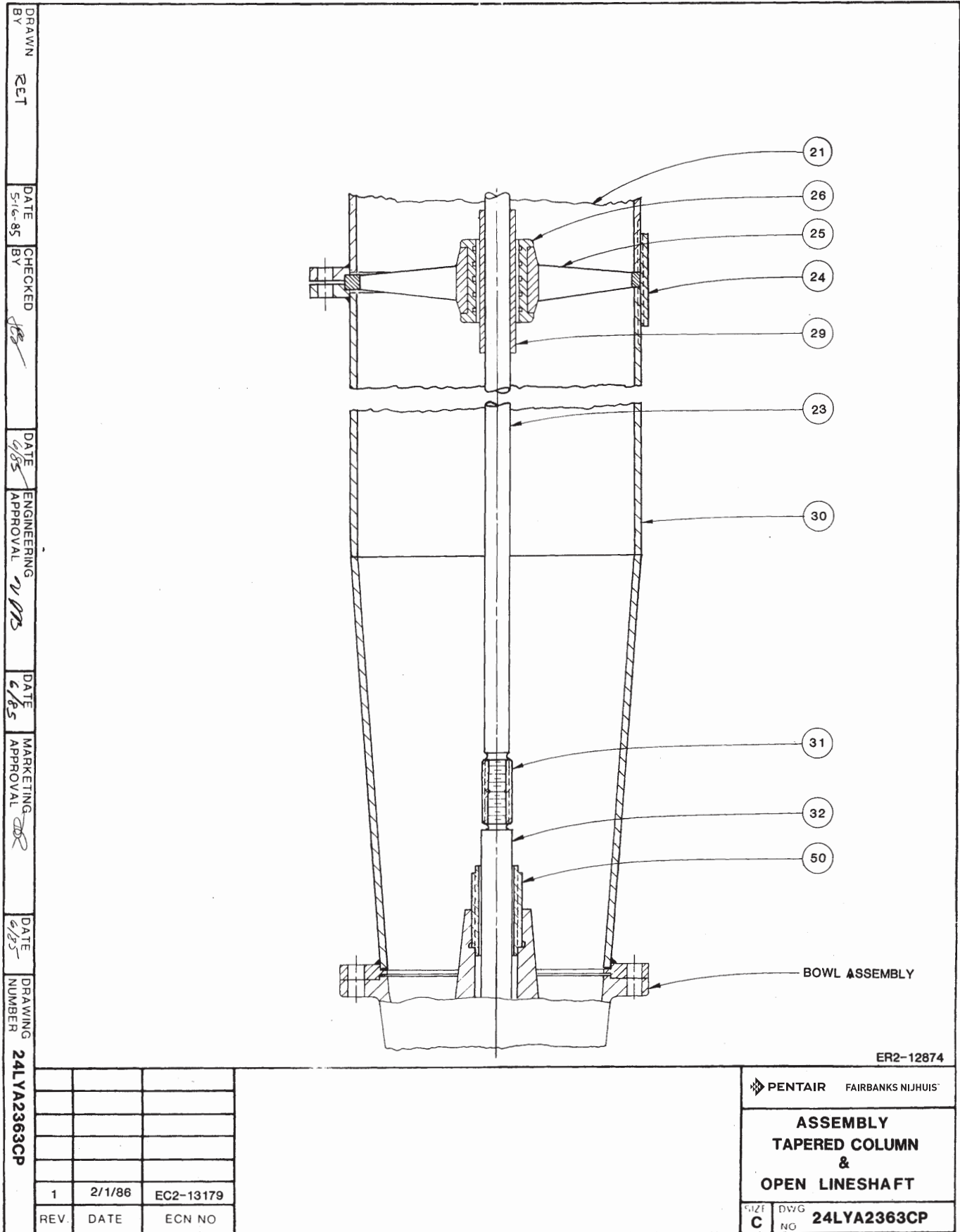
PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY  
FLANGED COLUMN  
&  
OPEN LINESHAFT**

SIZE DWG. NO. **24LYA2363AX**

DRAWN BY	RET	DATE	12-83	CHECKED BY	<i>James S. [Signature]</i>	DATE	2-83	ENGINEERING APPROVAL	DATE		MARKETING APPROVAL	DATE		DRAWING NUMBER	24LYA2363AX
REV.	DATE	ECN NO.													
1	2/1/86	EC2-13179													

DRAWN BY RET	DATE 12-83	CHECKED BY <i>[Signature]</i>	DATE 2/83	ENGINEERING APPROVAL	DATE	MARKETING APPROVAL	DATE	DRAWING NUMBER 24LYA2363BB
ER2-12164								
<b>ASSEMBLY FLANGED COLUMN &amp; ENCLOSED LINESHAFT</b>								
SIZE <b>C</b> DWG. NO. <b>24LYA2363BB</b>								
REV.	DATE	ECN NO.						
1	2/1/86	EC2-13179						



ER2-12874

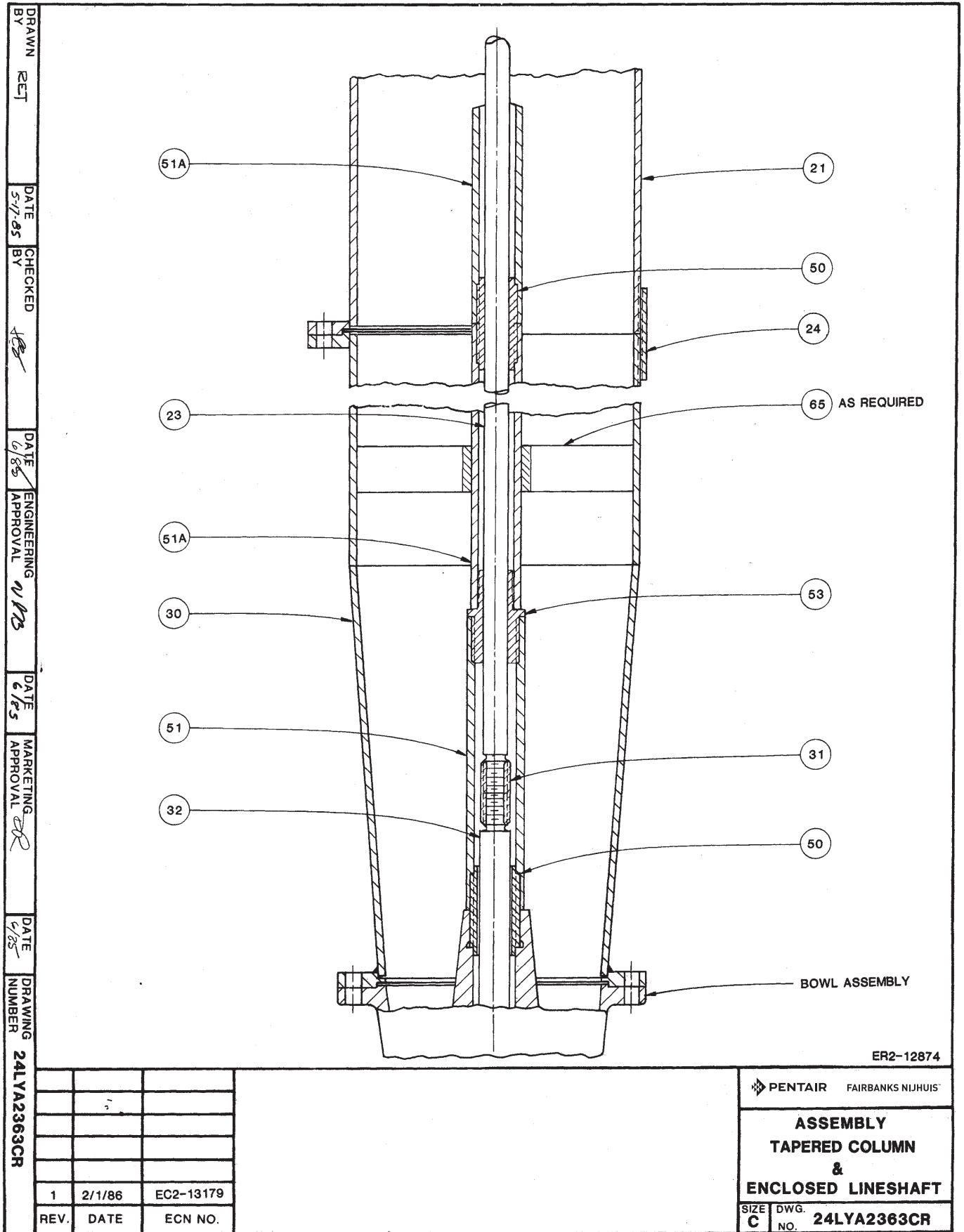
PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY  
TAPERED COLUMN  
&  
OPEN LINESHAFT**

SIZE DWG  
C NG **24LYA2363CP**

DRAWN BY	RET	DATE	5/16/85	CHECKED BY	[Signature]	DATE	9/85	ENGINEERING APPROVAL	[Signature]	DATE	6/85	MARKETING APPROVAL	[Signature]	DATE	6/85	DRAWING NUMBER	24LYA2363CP
REV.	DATE	ECN NO															
1	2/1/86	EC2-13179															





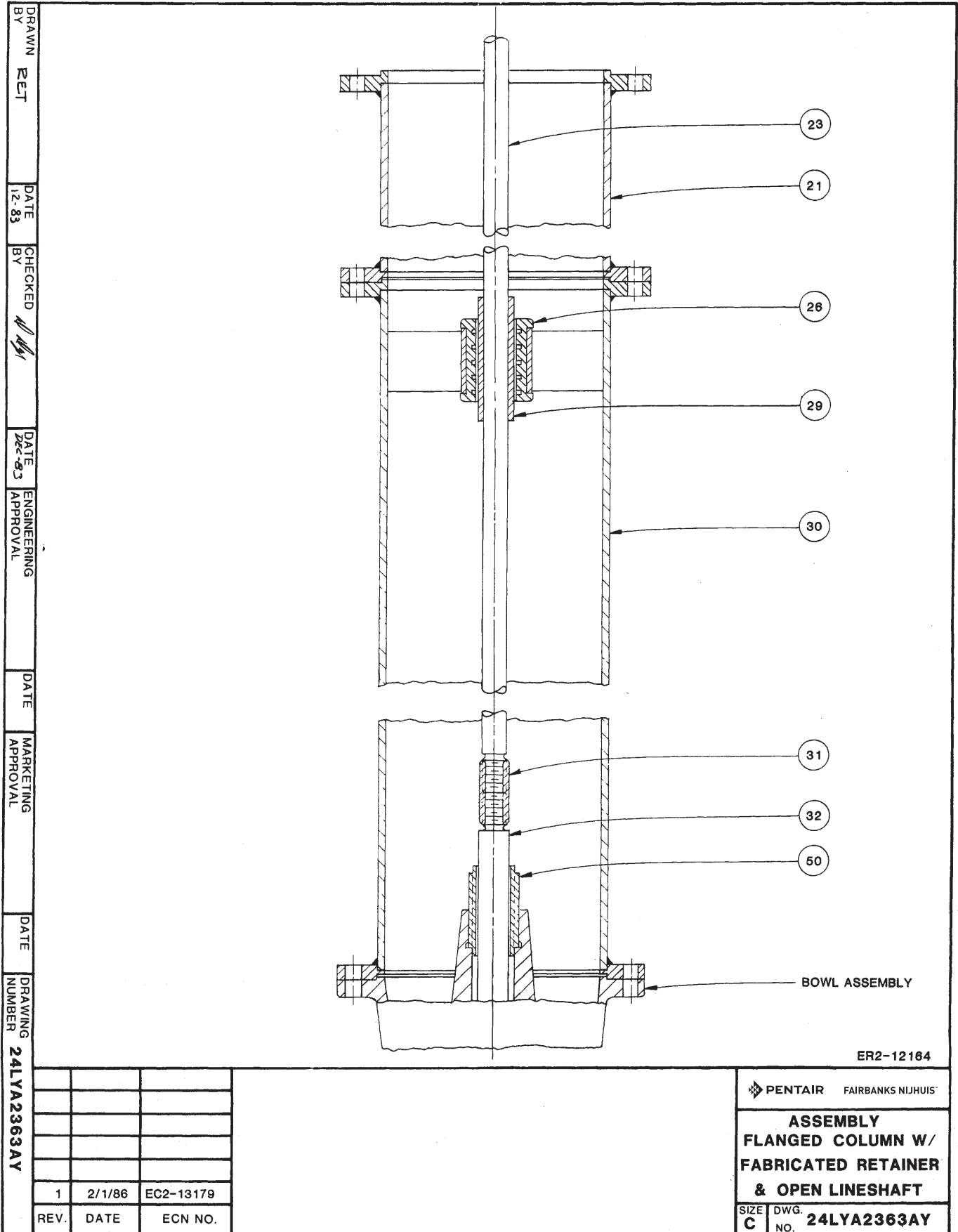
ER2-12874

**PENTAIR** FAIRBANKS NIJHUIS™

**ASSEMBLY  
TAPERED COLUMN  
&  
ENCLOSED LINESHAFT**

SIZE **C** DWG. NO. **24LYA2363CR**

1	2/1/86	EC2-13179
REV.	DATE	ECN NO.



ER2-12164

PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY  
FLANGED COLUMN W/  
FABRICATED RETAINER  
& OPEN LINESHAFT**

SIZE DWG. NO. **24LYA2363AY**

DRAWN BY	RET	DATE	12-83	CHECKED BY	[Signature]	DATE	2-83	ENGINEERING APPROVAL	DATE		MARKETING APPROVAL	DATE		DRAWING NUMBER	24LYA2363AY
----------	-----	------	-------	------------	-------------	------	------	----------------------	------	--	--------------------	------	--	----------------	-------------

REV.	DATE	ECN NO.
1	2/1/86	EC2-13179

**24LYA2363BA — THREADED COLUMN AND OPEN LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
24	Column Coupling	Steel	A53 GR B
25	Bearing Retainer	Bronze	B584 Alloy 836
26	Bearing	Rubber	Neoprene
29	Lineshaft Sleeve	Stainless Steel	AISI 304
30	Bottom Column	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932
235	Column Reducing Bushing	Cast Iron	A48 Class 30

**24LYA2363AZ — THREADED COLUMN AND ENCLOSED LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
24	Column Coupling	Steel	A53 GR B
30	Bottom Column	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932
51	Bottom Enclosing Tube	Steel	See Note 2
51A	Enclosing Tube	Steel	See Note 2
53	Step Connector Bearing	Bronze	B505 Alloy 932
65	Tube Stabilizer	Rubber	Natural
235	Column Reducing Bushing	Cast Iron	A48 Class 30

NOTE: 1. ALL MATERIAL SPECIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.

NOTE: 2. ALL CIRCULAR SECTIONS 1/8" THRU 4" DIAMETER ARE A120 AND 5" AND LARGER ARE A53 Gr.B. ALL FLAT SECTIONS ARE A283 GR.D.

**24LYA2363AX — FLANGED COLUMN AND OPEN LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column & Flange	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
25	Bearing Retainer	Bronze	B584 Alloy 836
26	Bearing	Rubber	Neoprene
29	Lineshaft Sleeve	Stainless Steel	AISI 304
30	Bottom Column & Flange	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932

**24LYA2363BB — FLANGED COLUMN AND ENCLOSED LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column & Flange	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
30	Bottom Column & Flange	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932
51	Bottom Enclosing Tube	Steel	See Note 2
51A	Enclosing Tube	Steel	See Note 2
53	Step Connector Bearing	Bronze	B505 Alloy 932
65	Tube Stabilizer	Rubber	Natural

NOTE: 1. ALL MATERIAL SPECIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.

NOTE: 2. ALL CIRCULAR SECTIONS 1/8" THRU 4" DIAMETER ARE A120 AND 5" AND LARGER ARE A53 Gr.B. ALL FLAT SECTIONS ARE A283 GR.D.

**24LYA2363CP — TAPERED COLUMN AND OPEN LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
24	Column Coupling	Steel	A53 GR B
25	Bearing Retainer	Bronze	B584 Alloy 836
26	Bearing	Rubber	Neoprene
29	Lineshaft Sleeve	Stainless Steel	AISI 304
30	Bottom Column	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932

**24LYA2363CR — TAPERED COLUMN AND ENCLOSED LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
24	Column Coupling	Steel	A53 GR B
30	Bottom Column	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932
51	Bottom Enclosing Tube	Steel	See Note 2
51A	Enclosing Tube	Steel	See Note 2
53	Step Connector Bearing	Bronze	B505 Alloy 932
65	Tube Stabilizer	Rubber	Natural

**24LYA2363AY — FLANGED COLUMN W/FABRICATED RETAINER AND OPEN LINESHAFT**

Reference Number	Part Name	Material	Specification (1)
21	Top Column	Steel	See Note 2
23	Lineshaft	Steel	AISI 1045
26	Bearing	Rubber	Neoprene
29	Lineshaft Sleeve	Stainless Steel	AISI 304
30	Bottom Column	Steel	See Note 2
31	Shaft Coupling	Steel	A108 GR 12L14
32	Pump Shaft	Stainless Steel	A582-416
50	Connector Bearing	Bronze	B505 Alloy 932

NOTE: 1. ALL MATERIAL SPECIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.

NOTE: 2. ALL CIRCULAR SECTIONS 1/8" THRU 4" DIAMETER ARE A120 AND 5" AND LARGER ARE A53 Gr.B. ALL FLAT SECTIONS ARE A283 GR.D.

**THREADED COLUMN**

Column Size (Inches)	Column O.D. (Inches)	Wall Thickness (Inches)	Pipe Schedule	Pipe Wt. Per Foot (Lbs.)	Column Coupling O.D. (Inches)	Coupling Length (Inches)	Coupling Weight (Lbs.)
8	8.625	.277	30	24.70	9 <sup>9</sup> / <sub>16</sub>	5 <sup>3</sup> / <sub>8</sub>	24
10	10.75	.279	-	31.20	11 <sup>1</sup> / <sub>16</sub>	5 <sup>7</sup> / <sub>8</sub>	33
12	12.75	.330	30	43.77	13 <sup>7</sup> / <sub>8</sub>	6 <sup>1</sup> / <sub>8</sub>	47
14	14.00	.375	30	54.57	15 <sup>1</sup> / <sub>8</sub>	6 <sup>7</sup> / <sub>8</sub>	57

**FLANGED COLUMN**

Column Size (Inches)	Column O.D. (Inches)	Wall Thickness (Inches)	Pipe Wt. Per Foot (Lbs.)	Flange O.D. (Inches)	Flange Wt. Per Mating Pairs (Lbs.)	Welded In Bearing Retainer Weight (Lbs.)
8	8.625	.277	24.70	11 <sup>3</sup> / <sub>4</sub>	30	4
10	10.75	.279	31.20	13 <sup>7</sup> / <sub>8</sub>	37	7
12	12.75	.330	43.77	16 <sup>3</sup> / <sub>8</sub>	56	10
14	14.00	.375	54.57	17 <sup>9</sup> / <sub>8</sub>	61	16
16	16.00	.250	42.05	20	54	18
20	20.00	.250	52.73	24 <sup>1</sup> / <sub>4</sub>	74	23
24	24.00	.250	63.41	28 <sup>1</sup> / <sub>2</sub>	92	31
30	30.00	.375	119.00	34 <sup>1</sup> / <sub>2</sub>	114	35
36	36.00	.375	143.34	40 <sup>1</sup> / <sub>2</sub>	153	40

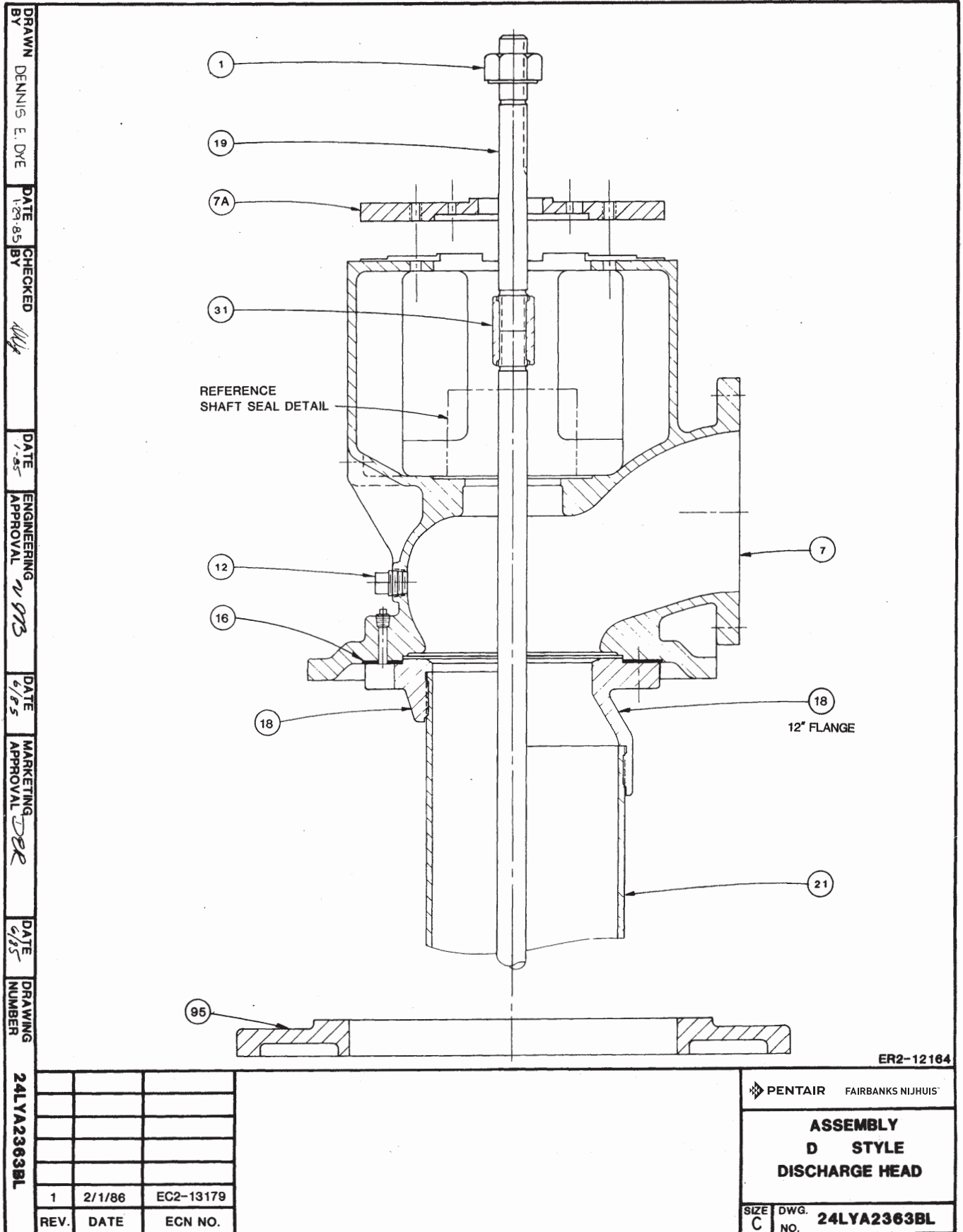
**ENCLOSING TUBE AND CONNECTOR BEARING**

Tube Size (Inches)	Lineshaft Size (Inches)	Tube O.D. (Inches)	Wall Thickness (Inches)	Schedule	Weight Per Foot (Lbs.)	Connector Bearing Weight (Lbs.)	Connector Bearing Length (Inches)
1 <sup>1</sup> / <sub>2</sub>	1	1.900	.200	80	3.63	1.5	3.88
2	1 <sup>1</sup> / <sub>4</sub>	2.375	.218	80	5.02	3	4.75
2 <sup>1</sup> / <sub>2</sub>	1 <sup>1</sup> / <sub>2</sub> -1 <sup>11</sup> / <sub>16</sub>	2.875	.276	80	7.66	5	5.00
3	1 <sup>15</sup> / <sub>16</sub> - 2 <sup>3</sup> / <sub>16</sub>	3.500	.300	80	10.25	7.5	5.25
3 <sup>1</sup> / <sub>2</sub>	2 <sup>7</sup> / <sub>16</sub>	4.000	.318	80	12.50	9	5.50
5	2 <sup>15</sup> / <sub>16</sub>	5.563	.375	80	20.78	35	8.00

**LINESHAFT**

Size (Inches)	Weight Per Linear Foot (Lbs.)	Shaft Stress	Open Lineshaft	
			Sleeve Thickness (Inches)	Bearing Length (Inches)
1	2.67	Per	.093	5.00 (1)
1 <sup>1</sup> / <sub>4</sub>	4.18	ANSI	.093	5.00
1 <sup>1</sup> / <sub>2</sub>	6.01	B58.1	.093	5.00
1 <sup>1</sup> / <sub>16</sub>	7.60	Sections	.093	5.00
1 <sup>15</sup> / <sub>16</sub>	10.02	A4.2.3	.093	5.00
2 <sup>3</sup> / <sub>16</sub>	12.78	Or	.093	5.75
2 <sup>7</sup> / <sub>16</sub>	15.87	A4.3.3	.122	5.75
2 <sup>15</sup> / <sub>16</sub>	23.04		.122	5.75

(1) For 1" shaft size used with 8" column, bearing length = 3.63.



ER2-12164

PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY  
D STYLE  
DISCHARGE HEAD**

SIZE C DWG. NO. **24LYA2363BL**

DRAWING NUMBER		
24LYA2363BL		
REV.	DATE	ECN NO.
1	2/1/86	EC2-13179

DRAWN BY DENNIS E. DYE  
DATE 1-29-85  
CHECKED BY *MD*  
DATE 1-85  
ENGINEERING APPROVAL *W 975*  
DATE 6/85  
MARKETING APPROVAL *DR*  
DATE 6/85  
DRAWING NUMBER

DRAWN BY <i>J. Miller</i>	DATE 6/4/85	CHECKED BY <i>JSM</i>	DATE 	ENGINEERING APPROVAL <i>rv/073</i>	DATE 4/7/85	MARKETING APPROVAL <i>DEB</i>	DATE 9/25	DRAWING NUMBER
------------------------------	----------------	--------------------------	----------	---------------------------------------	----------------	----------------------------------	--------------	-------------------

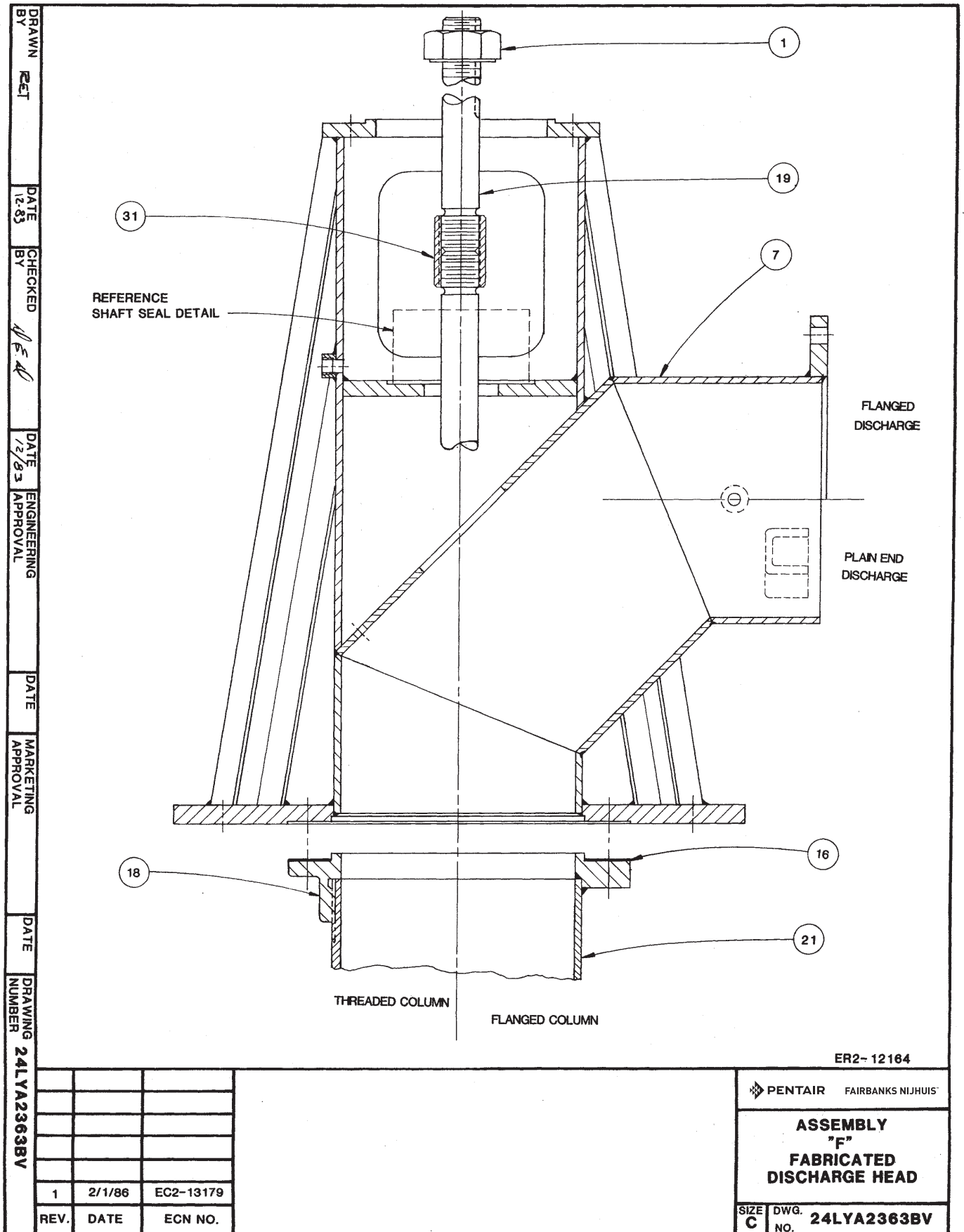
ER2-12164

<b>H DISCHARGE HEAD ASSEMBLY</b>	
SIZE <b>C</b>	DWG. NO. <b>24LYA2363BF</b>

REV.	DATE	ECN NO.
1	2/1/86	EC2-13179





DATE	DATE	DATE	DATE	DATE	DATE	DRAWING NUMBER
12/83	1/2/83	1/2/83				24LYA2363BV
CHECKED BY	ENGINEERING APPROVAL	MARKETING APPROVAL				
RET						
BY						

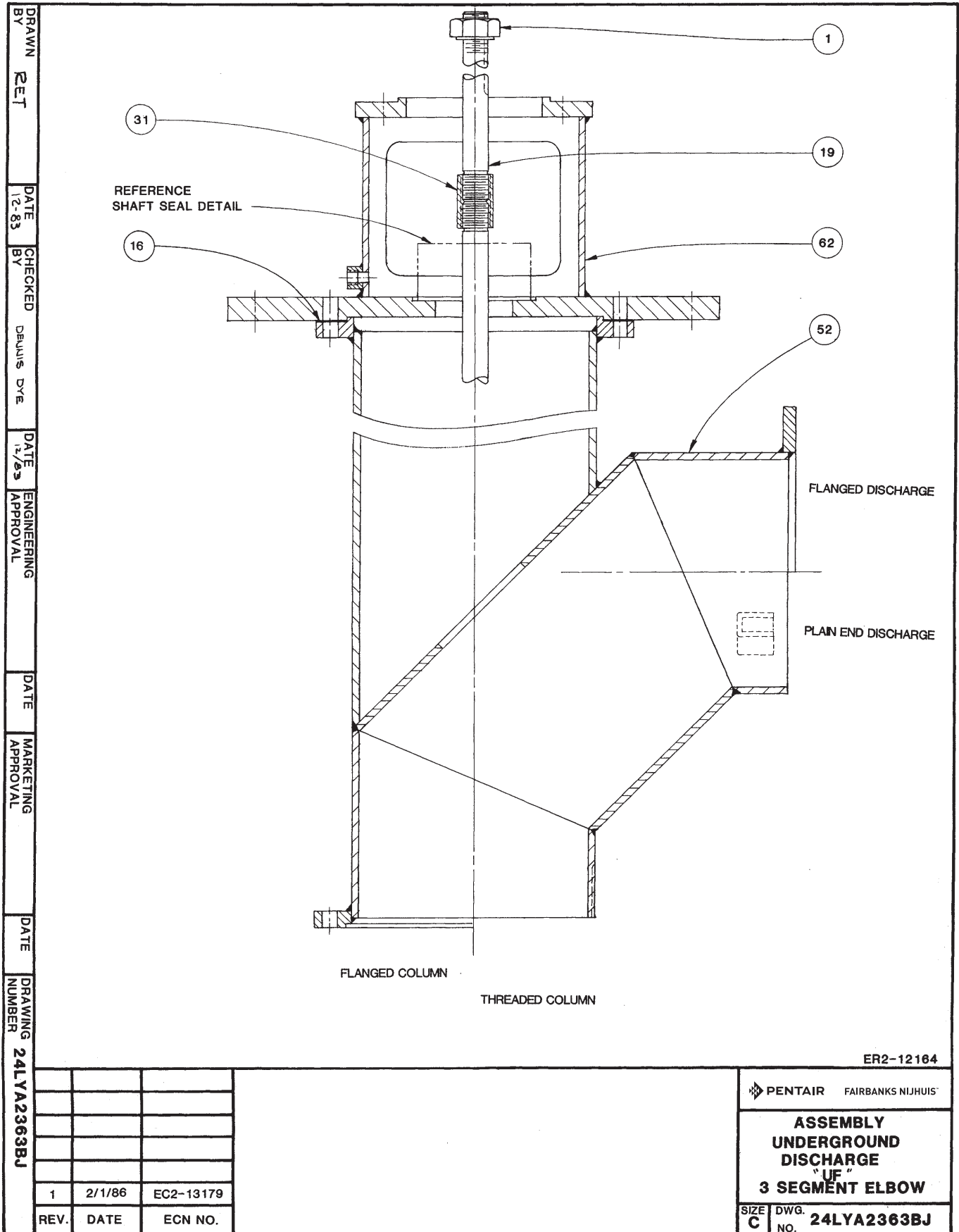
REV.	DATE	ECN NO.
1	2/1/86	EC2-13179

ER2-12164

PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY  
"F"  
FABRICATED  
DISCHARGE HEAD**

SIZE DWG. NO. **24LYA2363BV**



DRAWN BY DENNIS E. DYE	DATE 2-85	CHECKED BY <i>[Signature]</i>	DATE 2/1/85	ENGINEERING APPROVAL	DATE	MARKETING APPROVAL	DATE	DRAWING NUMBER	25LYA3463A
<p style="text-align: center;"><b>TENSION NUT</b> (OIL LUBRICATED)</p>					<p style="text-align: center;"><b>PACKING BOX</b> (175 PSI RATING)</p>				
<p style="text-align: center;"><b>PACKING BOX</b> (WATER FLUSH)</p>					<p style="text-align: center;"><b>PACKING BOX</b> (175 PSI W/BY-PASS) (400 PSI RATING)</p>				
NOTE: 400 PSI PACKING BOX REQUIRES SIX BOLTS									
								PENTAIR FAIRBANKS NIJHUIS	
								<b>SHAFT SEAL DETAIL ASSEMBLY</b>	
								SIZE C	DWG. NO. <b>25LYA3463A</b>
REV.	DATE	ECN NO.							
1	2/1/86	EC2-13179							

24LYA2363BL AND 24LYA2363BF

**D AND H DISCHARGE HEADS**

REFERENCE NUMBER	PART NAME	MATERIAL	SPECIFICATION (1)
1	Top Shaft Adjusting Nut	Steel	A108-Gr. 12L14
7	Discharge Head	Cast Iron	A48 Class 30
7A	Motor Adaptor Plate	Steel	A 283 Gr. D
12	Prelubrication Pipe Plug	Cast Iron	Commercial
16	Column Flange Gasket	Tag Board	D1170 Gr. 3111
18	Column Flange	Cast Iron	A48 Class 30
19	Top Shaft	Steel	AISI 1045
21	Top Column	Steel	See Note 2
31	Top Shaft Coupling	Steel	A108-Gr. 12L14
95	Foundation Plate	Cast Iron	A48 Class 30
None	Column Flange Capscrew	Steel	SAE J429 Gr. 2
None	Air Vent Plug	Cast Iron	Commercial

24LYA2363BV

**F DISCHARGE HEADS**

REFERENCE NUMBER	PART NAME	MATERIAL	SPECIFICATION (1)
1	Top Shaft Adjusting Nut	Steel	A108-Gr. 12L14
7	Discharge Head	Steel	See Note 2
16	Column Flange Gasket	Tag Board	D1170 Gr. 3111
18	Column Flange	Cast Iron	A48 Class 30
19	Top Shaft	Steel	AISI 1045
21	Top Column	Steel	See Note 2
31	Top Shaft Coupling	Steel	A108-Gr. 12L14
None	Column Flange Capscrew	Steel	SAE J429 Gr. 2

24LYA2363BJ

**UNDERGROUND DISCHARGE HEADS**

REFERENCE NUMBER	PART NAME	MATERIAL	SPECIFICATION (1)
1	Top Shaft Adjusting Nut	Steel	A108-Gr. 12L14
16	Column Flange Gasket	Tag Board	D1170 Gr. 3111
18	Column Flange	Cast Iron	A48 Class 30
19	Top Shaft	Steel	AISI 1045
21	Top Column	Steel	See Note 2
31	Top Shaft Coupling	Steel	A108-Gr. 12L14
52	U.G. Discharge Elbow	Steel	See Note 2
62	Motor Pedestal	Steel or Cast Iron	See Note 3
None	Column Flange Capscrew	Steel	SAE J429 Gr. 2

NOTE: 1. ALL MATERIAL SPECIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.

NOTE: 2. ALL CIRCULAR SECTIONS 1/8" THRU 4" DIAMETER ARE A120 AND 5" AND LARGER ARE A53 Gr.B. ALL FLAT SECTIONS ARE A283 Gr.D.

NOTE: 3. MOTOR PEDESTAL WILL BE CAST IRON A48 CLASS 30, OR STEEL PER NOTE: 2 ABOVE, AT MANUFACTURER'S OPTION.

**MATERIAL SPECIFICATIONS – STUFFING BOXES**

REFERENCE NUMBER	PART NAME	MATERIAL	SPECIFICATION (1)
6	Water Slinger	Rubber	Neoprene
8	Gland Bolt	Stainless Steel	18-8
8A	Gland Nut	Stainless Steel	18-8
9	Packing Box Gland	Cast Iron	A48 Class 30
11	Packing Box Gasket	Tag Board	D1170 Grade 3111
13	Top Shaft Sleeve	Stainless Steel	AISI 304
15	Packing	Graphited Synthetic	Commercial
15A	Water Seal Ring	Teflon	Teflon
17	Packing Box	Cast Iron	A48 Class 30
17A	Packing Box Bushing	Bronze	B505 Alloy 932
19	Top Shaft	Steel	AISI 1045
51A	Top Enclosing Tube	Steel	A120 Sched 80
53	Tube Adaptor	Bronze	B505 Alloy 932
63	Enclosing Tube Tension Nut	Bronze	B584 Alloy 836
63A	Tension Nut Gasket	Copper	B152 Alloy 110
None	Gland Nut Lockwasher	Steel	Commercial
None	Packing Box Capscrews	Steel	SAE J429 Grade 2
None	Tension Nut Plug	Bronze	Commercial

REFERENCE: ASSEMBLY DRAWING 25LYA3463A.

NOTE: 1. ALL MATERIAL SPECIFICATIONS ARE ASTM UNLESS OTHERWISE NOTED AND ARE FOR DESCRIPTION OF CHEMISTRY ONLY.

**TECHNICAL DATA – HEADS AND PACKING BOXES**

**Fabricated Heads**

ELBOW SIZE (INCHES)	WEIGHT LIMIT (LBS.)	PRESSURE LIMIT PSI	OILER TAP SIZE (INCHES)	UNDERGROUND ELBOW		
				AIR RELIEF VALVE SIZE (INCHES)	TYPE	LOCATION
8	4000	40	1/4	1 1/2	CRANE 3/4 OR EQUAL	RISER OF ELBOW
10	7500	40	1/4	1 1/2	CRANE 3/4 OR EQUAL	RISER OF ELBOW
12	12000	40	1/4	2	CRANE 3/4 OR EQUAL	RISER OF ELBOW
14	15000	40	1/4	2	CRANE 3/4 OR EQUAL	RISER OF ELBOW
16	17000	40	1/4	3	CRISPIN "R" OR EQUAL	PEDESTAL
20	26000	40	1/4	3	CRISPIN "R" OR EQUAL	PEDESTAL
24	32000	40	1/4	4	CRISPIN "R" OR EQUAL	PEDESTAL
30	46000	40	1/4	4	CRISPIN "R" OR EQUAL	PEDESTAL
36	60000	40	1/4	6	CRISPIN "R" OR EQUAL	PEDESTAL

**D and H Discharge Heads**

COLUMN & HEAD SIZE (INCHES)	CAST IRON HEAD BOX REGISTER	SHAFT SIZE (INCHES)	SHAFT SLEEVE O.D.	CAST IRON HEAD					PACKING BOX PRESSURE RATING PSI
				PACKING BOX I.D.	PACKING BOX DEPTH	PACKING SIZE & NUMBER	GLAND STUD SIZE	BEARING GREASE TAPPING	
8	4 3/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
10	4 3/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
12	4 3/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
14	4 3/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		1 11/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175

**TECHNICAL DATA – HEADS AND PACKING BOXES**

COLUMN & HEAD SIZE (INCHES)	FABRICATED HEAD BOX REGISTER	FABRICATED HEAD							PACKING BOX PRESSURE RATING PSI
		SHAFT SIZE (INCHES)	SHAFT SLEEVE O.D.	PACKING BOX I.D.	PACKING BOX DEPTH	PACKING SIZE & NUMBER	GLAND STUD SIZE	BEARING GREASE TAPPING	
8	43/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
10	43/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
12	43/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
14	43/4	1	13/16	115/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
		1 1/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		1 11/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
16	43/4	1 1/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		1 11/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
20	43/4	1 1/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		1 11/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
		1 15/16	21/8	27/8	15/8	3/8 (4)	1/2	1/4	175
24	43/4	1 11/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
		1 15/16	21/8	27/8	15/8	3/8 (4)	1/2	1/4	175
		23/16	23/8	31/8	15/8	3/8 (4)	1/2	1/4	175
30	43/4	27/16	25/8	35/8	21/4	1/2 (4)	1/2	1/4	175
		23/16	23/8	31/8	15/8	3/8 (4)	1/2	1/4	175
		27/16	25/8	35/8	21/4	1/2 (4)	1/2	1/4	175
30	71/4	215/16	33/16	43/16	21/4	1/2 (4)	5/8	1/4	175
36	43/4	27/16	25/8	35/8	21/4	1/2 (4)	1/2	1/4	175
	71/4	215/16	33/16	43/16	21/4	1/2 (4)	5/8	1/4	175

DRAWN																																						
BY	RET																																					
DATE	5/2/85	<p><b>MANUAL OILER</b></p>																																				
CHECKED	JCS																																					
DATE		<p><b>SOLENOID OILER</b></p>																																				
ENGINEERING APPROVAL	JCS																																					
DATE	6/8/85	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">BILL OF MATERIAL LIST</th> </tr> <tr> <th style="width: 5%;">REF.</th> <th style="width: 40%;">DESCRIPTION</th> <th style="width: 25%;">MATERIAL</th> <th style="width: 30%;">SPECIFICATION</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>OILER, RESERVOIR, &amp; BRKT.</td> <td>ALUMINUM</td> <td>COMMERCIAL</td> </tr> <tr> <td>2</td> <td>OIL DRIPPER ASSY. 1/8"</td> <td>PURCHASED</td> <td>COMMERCIAL</td> </tr> <tr> <td>3</td> <td>COPPER TUBING 1/4" x 24" LG.</td> <td>COPPER</td> <td>ASTM B280</td> </tr> <tr> <td>4</td> <td>COMPRESSION FITTING 1/4"</td> <td>BRASS</td> <td>COMMERCIAL</td> </tr> <tr> <td>5</td> <td>SOLENOID VALVE (NOTE 1)</td> <td>PURCHASED</td> <td>COMMERCIAL</td> </tr> <tr> <td>6</td> <td>PIPE NIPPLE 1/8" x 3/4" LG.</td> <td>STEEL</td> <td>ASTM A120</td> </tr> <tr> <td>7</td> <td>PIPE PLUG 1/4"</td> <td>MALLABLE IRON</td> <td>COMMERCIAL</td> </tr> </tbody> </table>	BILL OF MATERIAL LIST				REF.	DESCRIPTION	MATERIAL	SPECIFICATION	1	OILER, RESERVOIR, & BRKT.	ALUMINUM	COMMERCIAL	2	OIL DRIPPER ASSY. 1/8"	PURCHASED	COMMERCIAL	3	COPPER TUBING 1/4" x 24" LG.	COPPER	ASTM B280	4	COMPRESSION FITTING 1/4"	BRASS	COMMERCIAL	5	SOLENOID VALVE (NOTE 1)	PURCHASED	COMMERCIAL	6	PIPE NIPPLE 1/8" x 3/4" LG.	STEEL	ASTM A120	7	PIPE PLUG 1/4"	MALLABLE IRON	COMMERCIAL
BILL OF MATERIAL LIST																																						
REF.	DESCRIPTION	MATERIAL	SPECIFICATION																																			
1	OILER, RESERVOIR, & BRKT.	ALUMINUM	COMMERCIAL																																			
2	OIL DRIPPER ASSY. 1/8"	PURCHASED	COMMERCIAL																																			
3	COPPER TUBING 1/4" x 24" LG.	COPPER	ASTM B280																																			
4	COMPRESSION FITTING 1/4"	BRASS	COMMERCIAL																																			
5	SOLENOID VALVE (NOTE 1)	PURCHASED	COMMERCIAL																																			
6	PIPE NIPPLE 1/8" x 3/4" LG.	STEEL	ASTM A120																																			
7	PIPE PLUG 1/4"	MALLABLE IRON	COMMERCIAL																																			
MARKETING APPROVAL	JCS																																					
DATE	9/85	<p>NOTE 1: VOLTAGE AS REQUIRED.</p>																																				
DRAWING NUMBER	25LYA2918L																																					

ER2-12874

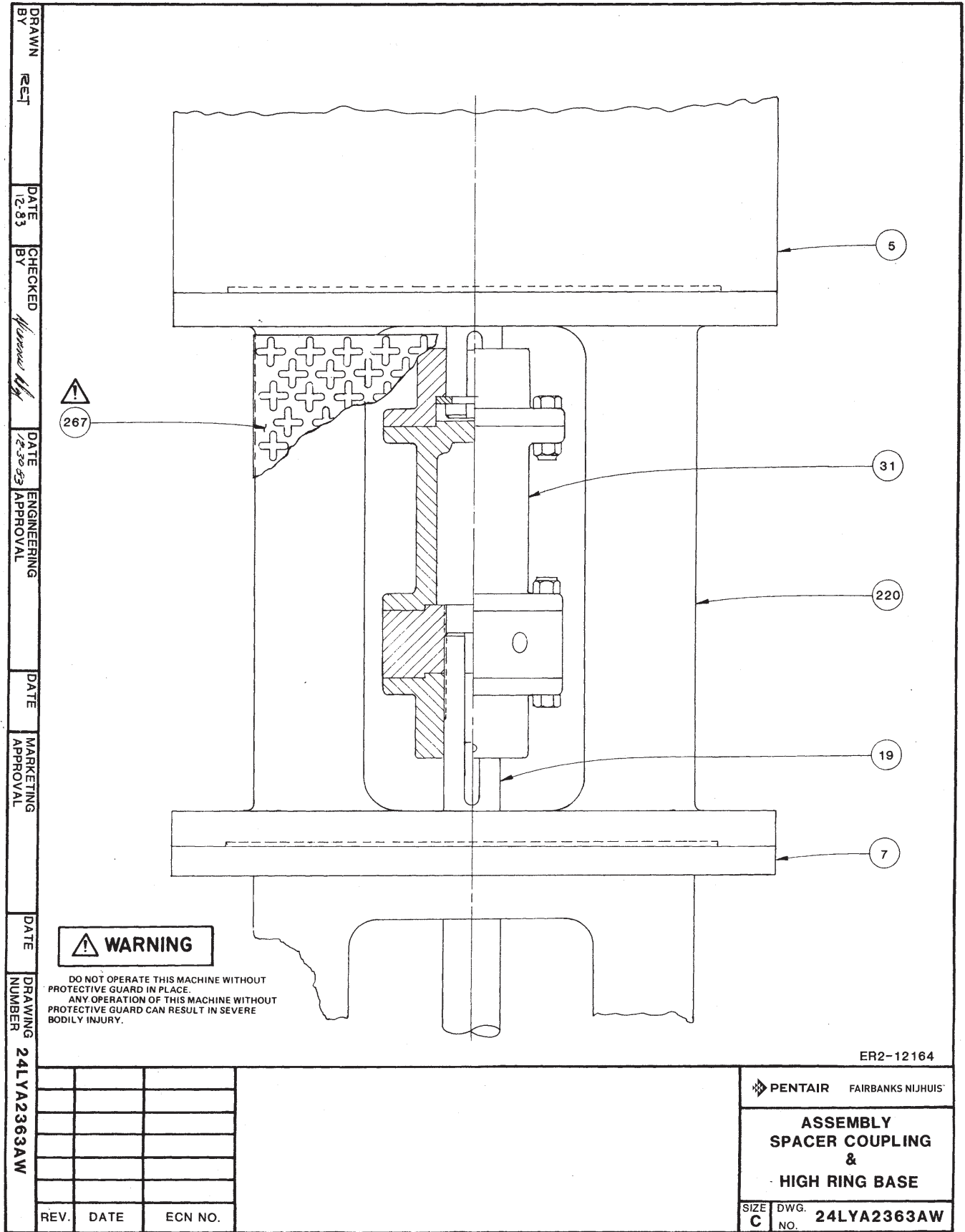
**PENTAIR** FAIRBANKS NIJHUIS

**VERTICAL TURBINE  
LINESHAFT OILER  
ASSEMBLIES**

SIZE DWG. NO. **25LYA2918L**

1	2/1/86	EC2-13179					
REV.	DATE	ECN NO.					





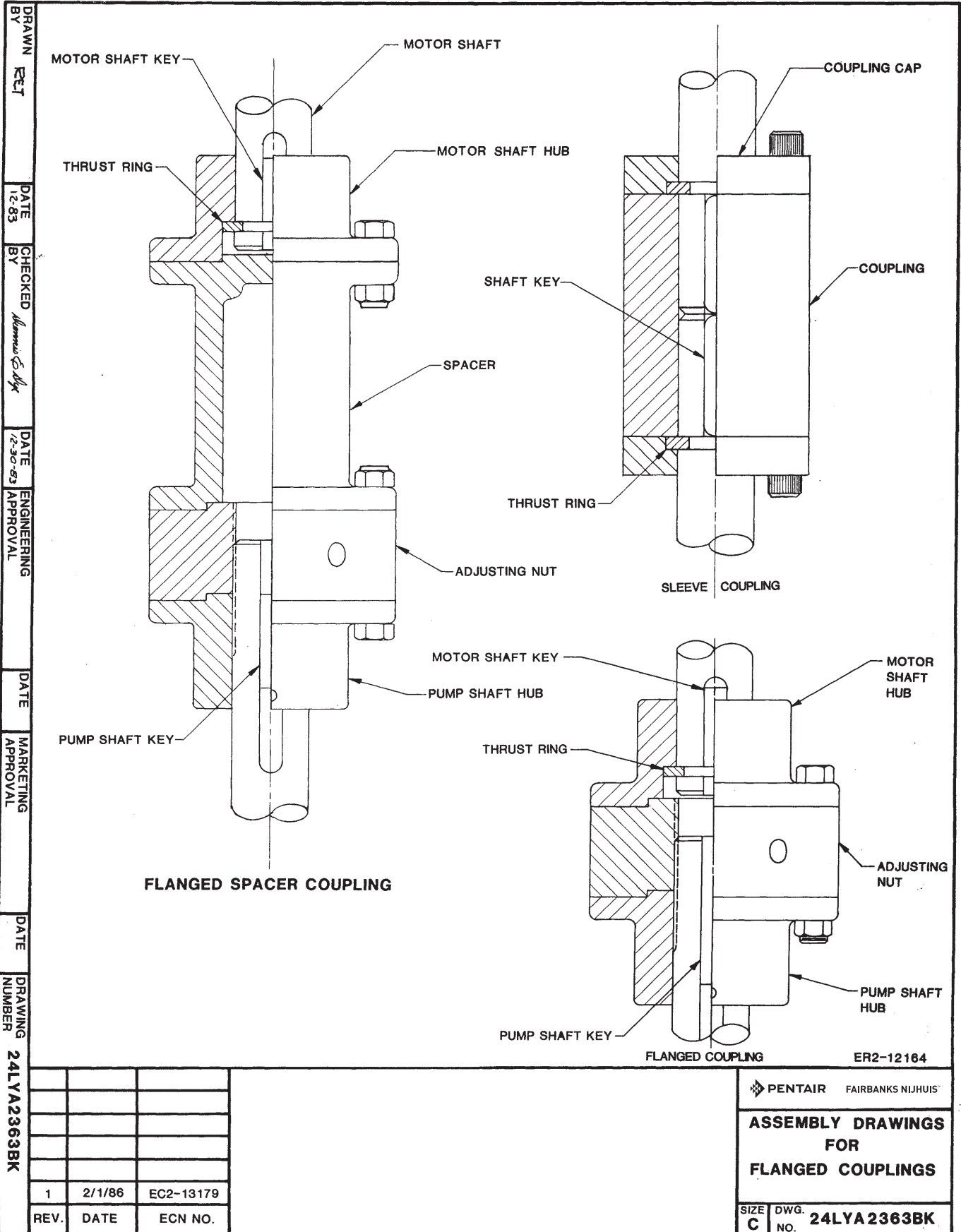
DATE	DATE	DATE	DATE	DATE
12-83	12-83	12-83		
CHECKED BY	ENGINEERING APPROVAL	MARKETING APPROVAL		
RET				
DRAWN BY				
DRAWING NUMBER 24LYA2363AW				
REV.	DATE	ECN NO.		

ER2-12164

**PENTAIR** FAIRBANKS NIJHUIS

**ASSEMBLY  
SPACER COUPLING  
&  
HIGH RING BASE**

SIZE **C** DWG. NO. **24LYA2363AW**



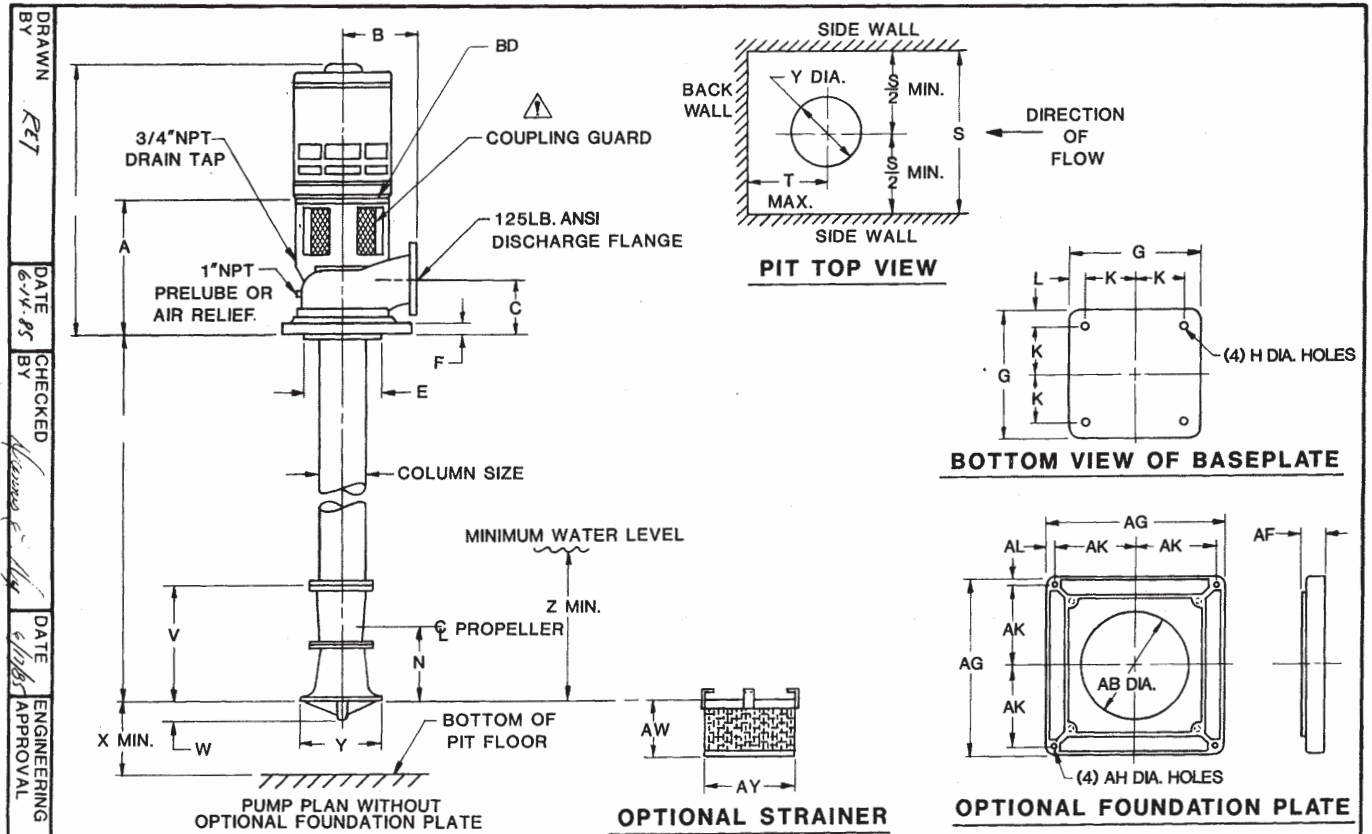
BY	RET	DATE	CHECKED	DATE	ENGINEERING	DATE	MARKETING	DATE	DRAWING
12-83		12-30-83	<i>Thomas G. Kelly</i>	12-30-83	APPROVAL		APPROVAL		NUMBER
									24LYA2363BK

REV.	DATE	ECN NO.
1	2/1/86	EC2-13179

**PENTAIR FAIRBANKS NIJHUIS**

**ASSEMBLY DRAWINGS  
FOR  
FLANGED COUPLINGS**

SIZE **C** DWG. NO. **24LYA2363BK**



DISCHARGE HEAD DIMENSIONS												
PUMP SIZE	COLUMN SIZE	A	B	C	E	F	G	H	K	L	BD	
8	8	21 1/2	11 3/8	8 1/2	14 3/4	7/8	20 1/2	7/8	8 3/8	1 7/8	16 1/2	12
10	10	21 1/2	13 3/8	9	14 3/4	7/8	20 1/2	7/8	8 3/8	1 7/8	16 1/2	20

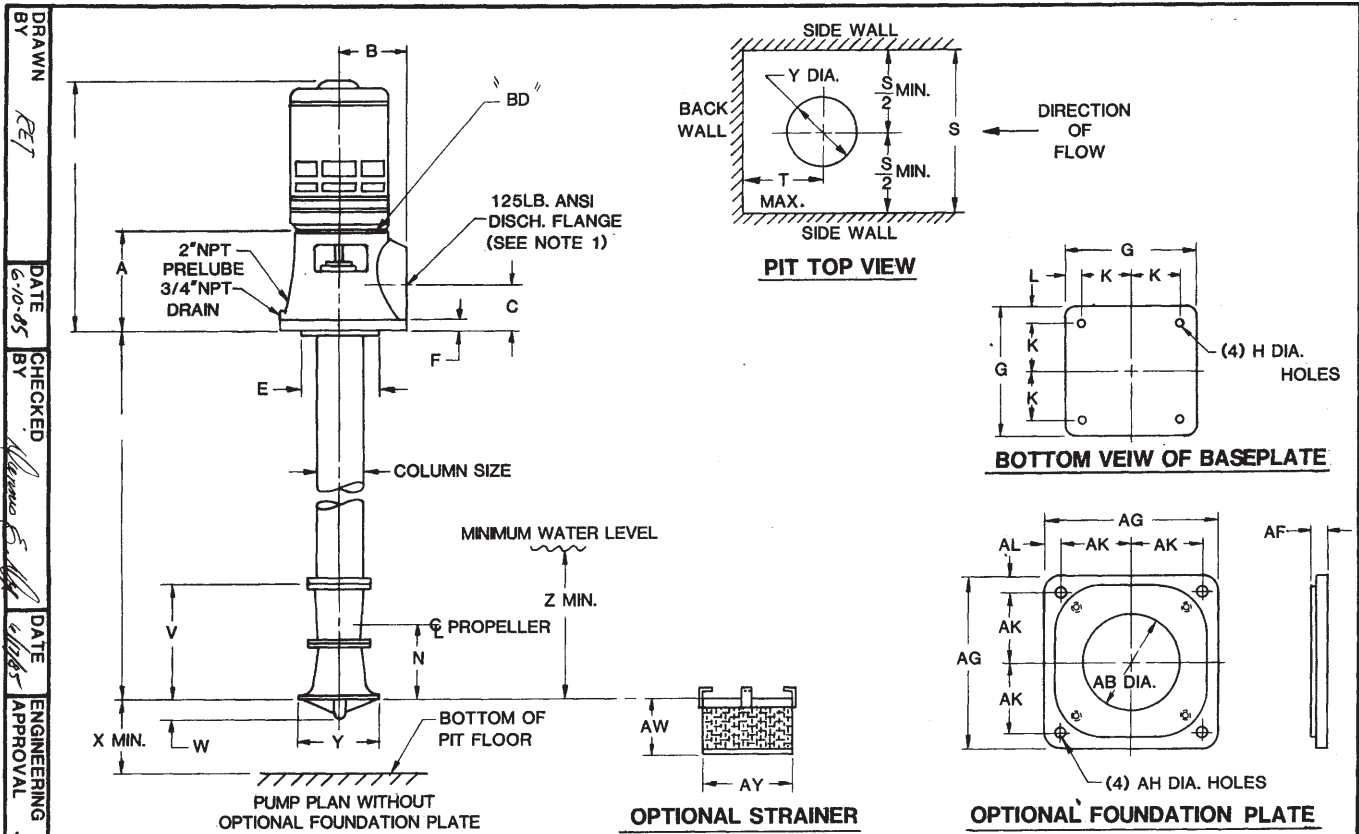
PUMP SIZE	PUMP DIMENSIONS										OPTIONAL FOUNDATION PLATE							
	N	S	T	V		W	X		Y	Z	STRAINER		AB	AF	AG	AH	AK	AL
				1 STG.	2 STG.		WITHOUT STRAINER	WITH STRAINER			AW	AY						
8	6 3/4	29 1/4	11 3/8	13 1/2	21 1/2	2 1/2	5	7	12 3/4	51	4	13	17 1/8	1 1/2	24	7/8	10 1/2	1 1/2
10	8 3/4	36	12 3/4	16 3/4	26	3 1/2	6	8	15 1/2	54	5	15 1/2	17 1/8	1 1/2	24	7/8	10 1/2	1 1/2

**WARNING**

NOTE 1: ALL DIMENSIONS ± 1/16"  
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARDS IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARDS CAN RESULT IN SEVERE BODILY INJURY.

ER2-12874

DRAWING NUMBER <b>24LYA2364J</b>	CUSTOMER		P.O.		<b>PENTAIR</b> FAIRBANKS NIJHUIS™  <b>SETTING PLAN</b> <b>FIGURE</b> <b>8211</b> <b>D DISCHARGE HEAD</b>			
	JOB NAME							
	PUMP SIZE & MODEL	STAGES	GPM	TDH		RPM	ROT	
	MOTOR	HP	FRAME	PHASE		HERTZ	VOLTS	ENCL
	CERTIFIED FOR		CERTIFIED BY			DATE		
REV.	DATE	ECN NO.	SIZE	DWG. NO.	<b>24LYA2364J</b>			



DISCHARGE HEAD DIMENSIONS											
PUMP SIZE	COLUMN SIZE	A	B	C	E	F	G	H	K	L	BD
12	12	19 3/4	13 7/8	9 7/8	17 5/8	7/8	27 3/4	7/8	10 1/4	3 5/8	24 1/2

PUMP SIZE	PUMP DIMENSIONS										OPTIONAL FOUNDATION PLATE							
	N	S	T	V		W	X		Y	Z	STRAINER		AB	AF	AG	AH	AK	AL
				1 STG.	2 STG.		WITHOUT STRAINER	WITH STRAINER			AW	AY						
12	10 1/4	42	14	19 1/2	30 1/4	3 1/2	7	12	18	54	9	18	21 3/8	1 1/2	29	1	12	2 1/2

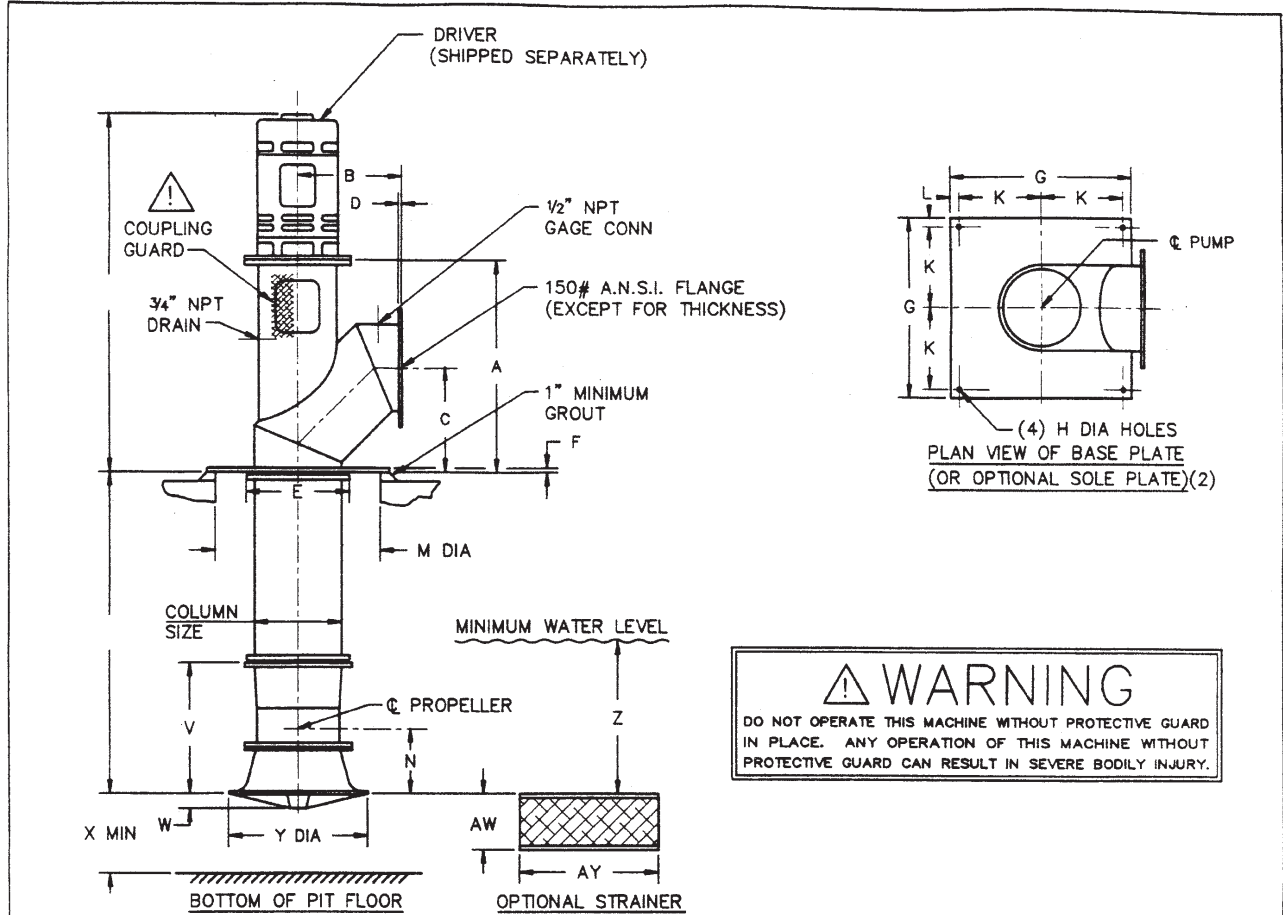
NOTE 1 : BOLT HOLES IN DISCHARGE FLANGE ARE TAPPED HOLES.  
NOTE 2 : ALL DIMENSIONS ±1/16".

ER2-12874

DRAWN BY: *FEJ*  
 DATE: 6/10/85  
 CHECKED BY: *W. J. ...*  
 DATE: 6/10/85  
 ENGINEERING APPROVAL: *W. J. ...*  
 DATE: 6/10/85  
 MARKETING APPROVAL: *DR*  
 DATE: 6/85  
 DRAWING NUMBER: 24LYA2364H

CUSTOMER		P.O.	
JOB NAME			
PUMP SIZE & MODEL	STAGES	GPM	TDH
MOTOR	HP	FRAME	PHASE
CERTIFIED FOR		CERTIFIED BY	
DATE	ECN NO.	DATE	

**PENTAIR** FAIRBANKS NIJHUIS  
**SETTING PLAN**  
**FIGURE 8211**  
**H DISCHARGE HEAD**  
 SIZE C DWG. NO. **24LYA2364H**



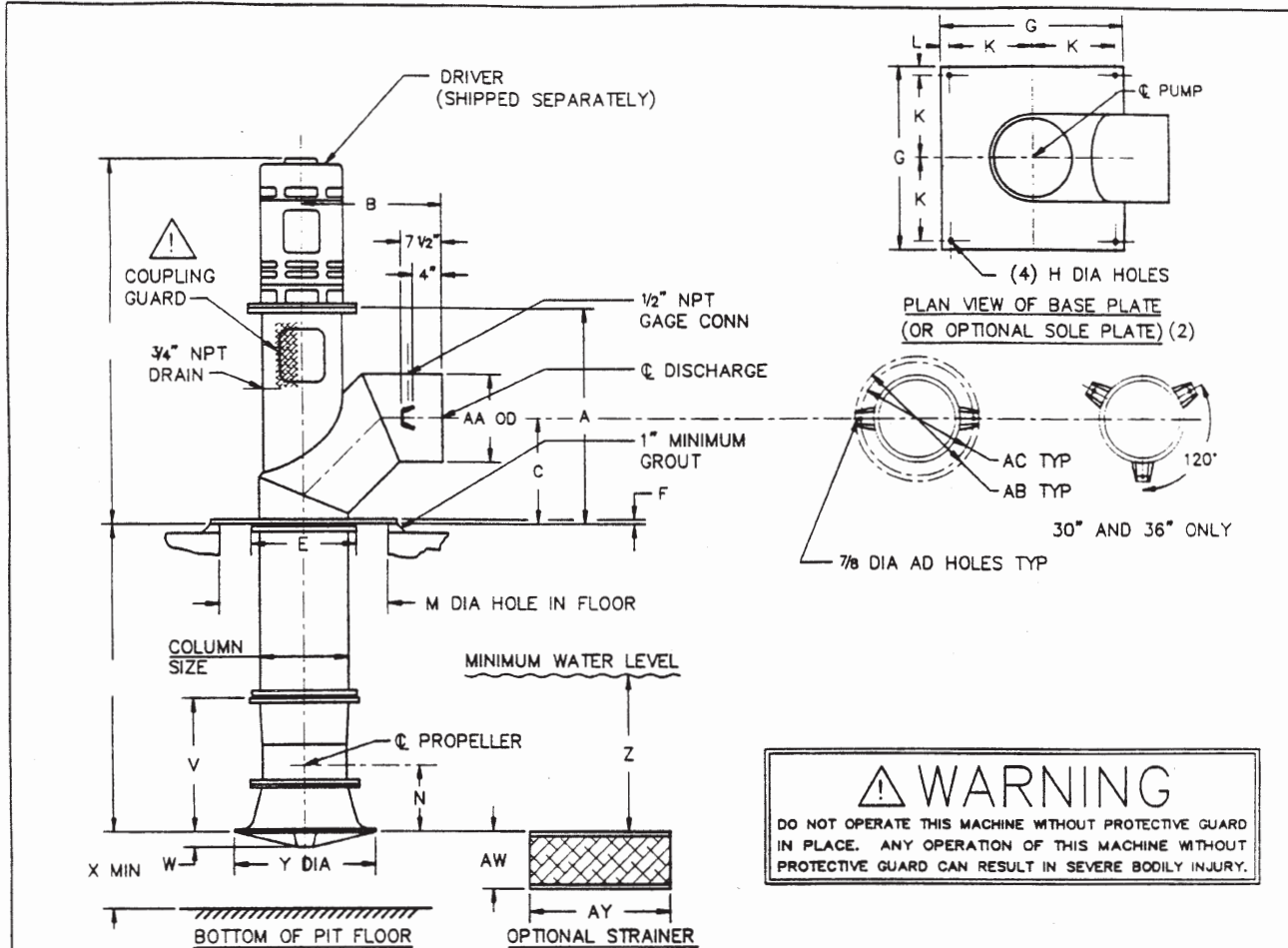
**WARNING**  
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

PUMP SIZE	DISCH SIZE	COL SIZE	DISCHARGE HEAD DIMENSIONS														
			A					B	C	D	E	F	G	H	K	L	M
			MTR BASE DIA														
			12	16 1/2	20	24 1/2	30 1/2										
8	8	8	30	---	---	---	---	11	10	3/4	11 1/2	3/4	21	7/8	8 1/2	2	15
10	10	10	33	---	---	---	---	13	12	3/4	13 3/4	3/4	23	7/8	9 1/2	2	18
12	12	12	35	36	---	---	---	15	15	3/4	16 1/4	1	26	7/8	11	2	21
20	20	20	42	43	49	50	56	24	24	3/4	23 3/4	1	44	1	20	2	38
24	24	24	---	47	53	54	62	29	29	3/4	28	1	50	1	23	2	43
30	30	30	---	---	59	60	68	36	36	3/4	34	1 1/4	54	1 1/8	25	2	45
36	36	36	---	---	65	66	74	43	43	3/4	40	1 1/4	66	1 1/8	31	2	57

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		8	6 3/4		13 1/2	21 1/2		2 1/2	5	
10	8 3/4	16 3/4	26	3 1/2	6	8	15 1/2	5	15 1/2	54
12	10 1/4	19 1/2	30 1/4	3 1/2	7	12	18	9	18	54
20	14 1/2	30 1/2	47	5	11	11	32	6	32	60
24	20 1/4	38	57 1/2	5	12	12	36	7	36	63
30	23	48	73	5	15	15	42	10	42	66
36	24 5/8	54	83	5	18	18	54	9	54	69

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER					P.O.					RELEASE NUMBER	EC2-15054	REV NO	1
JOB NAME					SERVICE					<b>PENTAIR</b> FAIRBANKS NIJHUIS™			
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT		<b>SETTING PLAN</b> <b>FIGURE 8211</b> <b>FLANGED DISCHARGE ABOVEGROUND HEAD</b> DWG. NO. <b>24LYA3523A</b>					
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL							
CERTIFIED FOR			CERTIFIED BY			DATE							



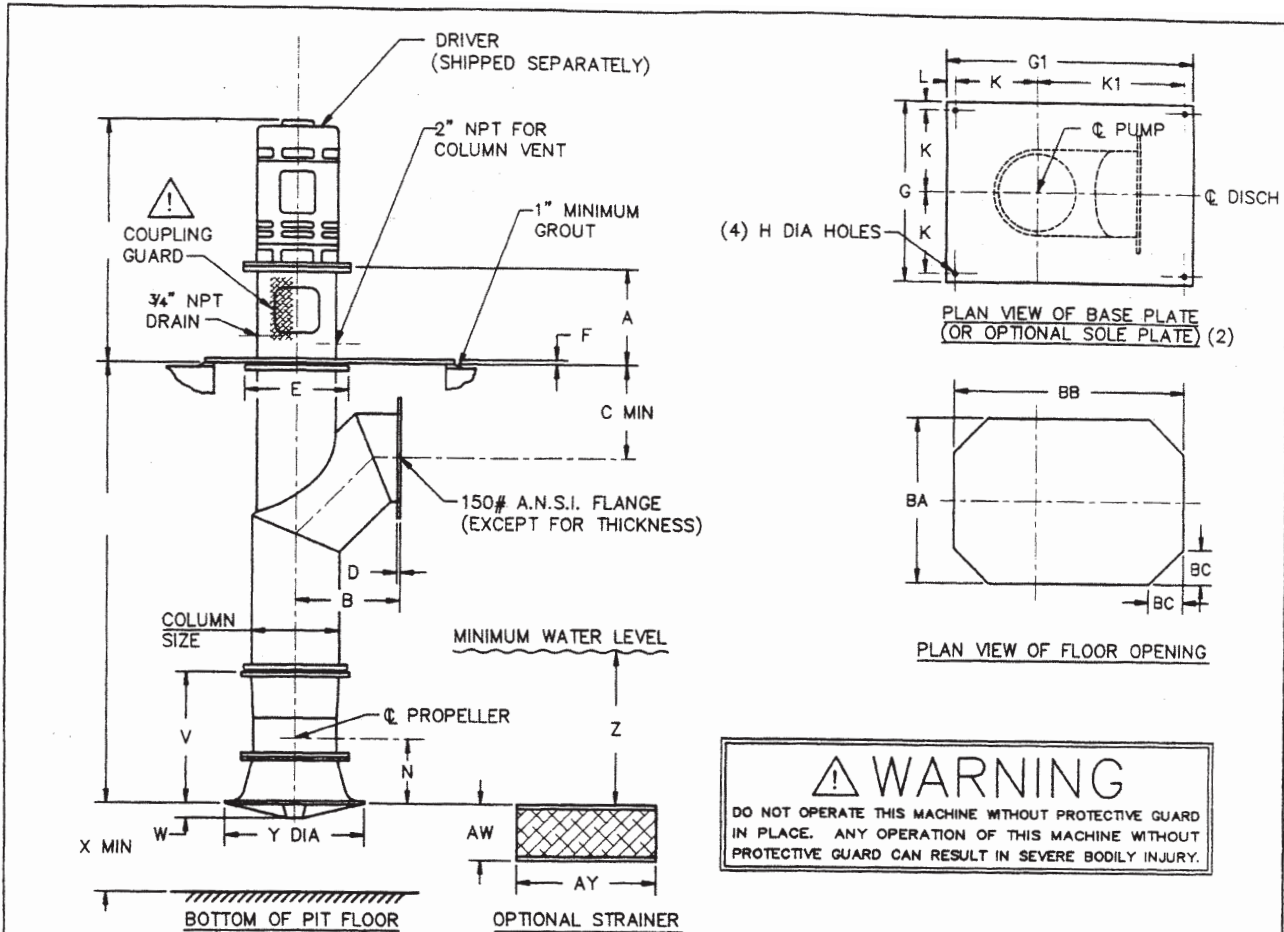
**⚠ WARNING**  
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

PUMP SIZE	DISCH SIZE	COL SIZE	DISCHARGE HEAD DIMENSIONS																		
			A					B	C	E	F	G	H	K	L	M	AA	AB	AC	AD	
			12	16 1/2	20	24 1/2	30 1/2														
8	8	8	30	---	---	---	---	17	10	11 1/2	3/4	21	7/8	8 1/2	2	15	8 5/8	17 1/8	14 5/8	2	
10	10	10	33	---	---	---	---	18	12	13 3/4	3/4	23	7/8	9 1/2	2	18	10 3/4	19 1/4	16 3/4	2	
12	12	12	35	36	---	---	---	21	15	16 1/4	1	26	7/8	11	2	21	12 3/4	21 1/2	19	2	
20	20	20	42	43	49	50	56	30	24	23 3/4	1	44	1	20	2	38	20	29	26 1/2	2	
24	24	24	---	---	47	53	54	62	34	29	28	1	50	1	23	2	43	24	33	30 1/2	2
30	30	30	---	---	59	60	68	40	36	34	1 1/4	54	1 1/8	25	2	45	30	39	36 1/2	3	
36	36	36	---	---	65	66	74	46	43	40	1 1/4	66	1 1/8	31	2	57	36	45	42 1/2	3	

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		8	6 3/4		13 1/2	21 1/2		2 1/2	5	
10	8 3/4	16 3/4	26	3 1/2	6	8	15 1/2	5	15 1/2	54
12	10 1/4	19 1/2	30 1/4	3 1/2	7	12	18	9	18	54
20	14 1/2	30 1/2	47	5	11	11	32	6	32	60
24	20 1/4	38	57 1/2	5	12	12	36	7	36	63
30	23	48	73	5	15	15	42	10	42	66
36	24 5/8	54	83	5	18	18	54	9	54	69

1. THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.  
2. BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER				P.O.				RELEASE NUMBER EC2-15054		REV NO 1	
JOB NAME				SERVICE				<b>PENTAIR</b> FAIRBANKS NIJHUIS™			
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT		SETTING PLAN FIGURE 8211 PLAIN END DISCHARGE ABOVEGROUND HEAD DWG. NO. 24LYA3523B			
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL					
CERTIFIED FOR			CERTIFIED BY			DATE					

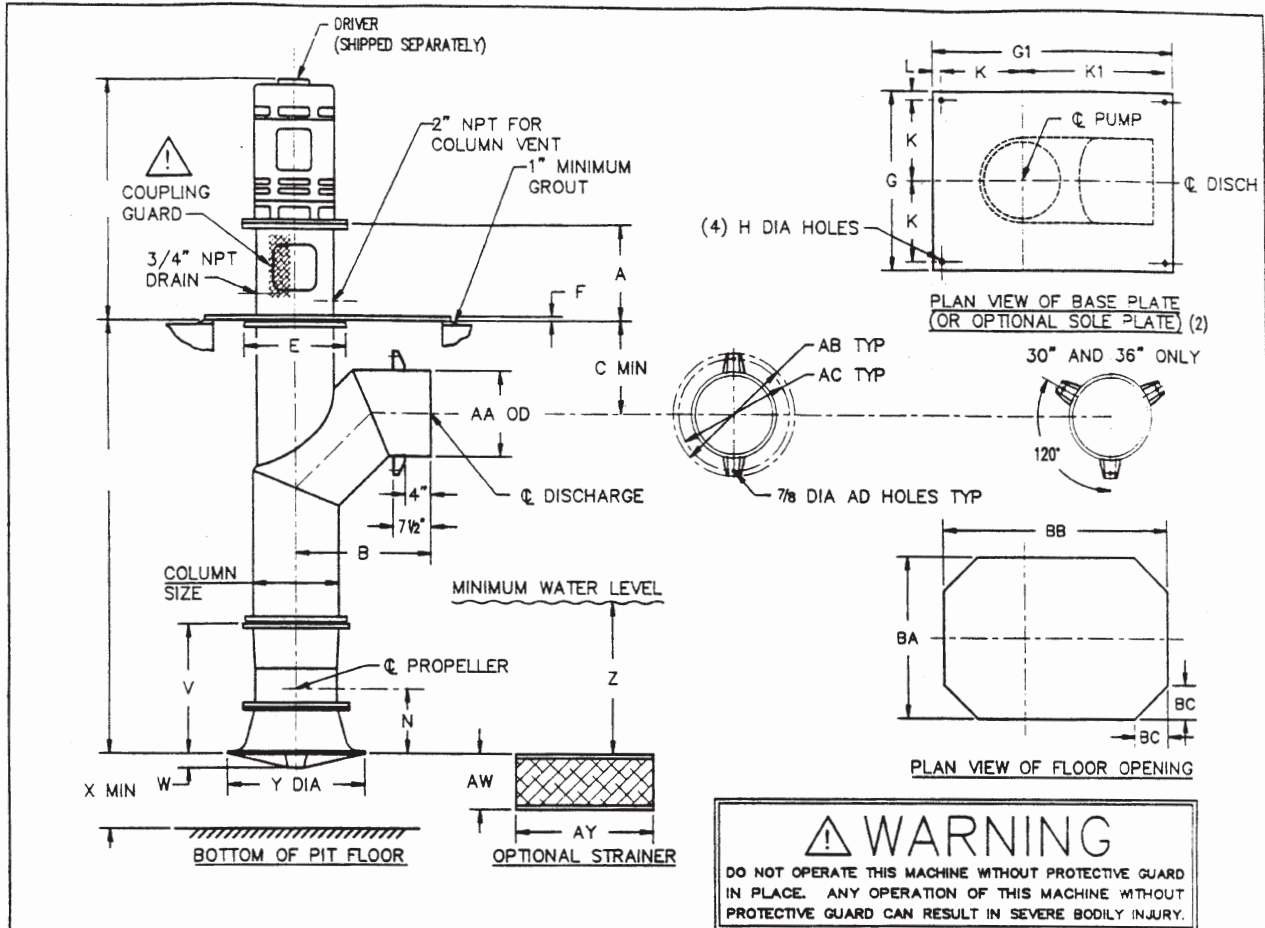


PUMP SIZE	DISCH SIZE	COL SIZE	PEDESTAL AND ELBOW DIMENSIONS													FLOOR OPENING DIMENSIONS					
			A					B	C	D	E	F	G	G1	H	K	K1	L	BA	BB	BC
			12	16 1/2	20	24 1/2	30 1/2														
8	8	8	20	---	---	---	---	11	9	3/4	11 1/2	3/4	21	33	7/8	8 1/2	20 1/2	2	15	27	4
10	10	10	20	---	---	---	---	13	10	3/4	13 3/4	3/4	23	35	7/8	9 1/2	21 1/2	2	18	30	5
12	12	12	20	20	---	---	---	15	11	3/4	16 1/4	1	26	40	7/8	11	25	2	21	35	6
20	20	20	20	20	24	24	30	24	15	3/4	23 3/4	1 1/4	44	60	1	20	36	2	38	54	11
24	24	24	---	20	24	24	30	29	17	3/4	28	1 1/4	50	68	1	23	41	2	43	61	12
30	30	30	---	---	24	24	30	36	20	3/4	34	1 1/2	54	80	1 1/8	25	51	2	45	71	13
36	36	36	---	---	24	24	30	43	24	3/4	40	1 3/4	66	94	1 1/8	31	59	2	57	85	16

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		8	6 3/4		13 1/2	21 1/2		2 1/2	5	
10	8 3/4	16 3/4	26	3 1/2	6	8	15 1/2	5	15 1/2	54
12	10 1/4	19 1/2	30 1/4	3 1/2	7	12	18	9	18	54
20	14 1/2	30 1/2	47	5	11	11	32	6	32	60
24	20 1/4	38	57 1/2	5	12	12	36	7	36	63
30	23	48	73	5	15	15	42	10	42	66
36	24 3/8	54	83	5	18	18	54	9	54	69

CUSTOMER				P.O.				RELEASE NUMBER EC2-15054		REV NO 1	
JOB NAME				SERVICE				PENTAIR FAIRBANKS NIJHUIS			
PUMP SIZE & MODEL		STAGES		GPM		TDH		RPM		ROT	
MOTOR		HP		FRAME		PHASE		HERTZ		VOLTS ENCL	
CERTIFIED FOR				CERTIFIED BY				DATE			
SETTING PLAN FIGURE 8211 FLANGED DISCHARGE UNDERGROUND HEAD											
DWG. NO. 24LYA3523C											



PEDESTAL AND ELBOW DIMENSIONS																	FLOOR OPENING DIMENSIONS							
PUMP SIZE	DISCH SIZE	COL SIZE	A					B	C	E	F	G	G1	H	K	K1	L	AA	AB	AC	AD	BA	BB	BC
			12	16 1/2	20	24 1/2	30 1/2																	
8	8	8	20	--	--	--	17	9	11 1/2	3/4	21	33	7/8	8 1/2	20 1/2	2	8 5/8	17 1/8	14 5/8	2	15	27	4	
10	10	10	20	20	--	--	18	10	13 3/4	3/4	23	35	7/8	9 1/2	21 1/2	2	10 3/4	19 1/4	16 3/4	2	18	30	5	
12	12	12	20	20	24	--	21	11	16 1/4	1	26	40	7/8	11	25	2	12 3/4	21 1/2	19	2	21	35	6	
20	20	20	20	20	24	24	30	30	23 3/4	1 1/4	44	60	1	20	36	2	20	29	26 1/2	2	38	54	11	
24	24	24	--	20	24	24	30	34	28	1 1/4	50	68	1	23	41	2	24	33	30 1/2	2	43	61	12	
30	30	30	--	--	24	24	30	40	34	1 1/2	54	80	1 1/8	25	51	2	30	39	36 1/2	3	45	71	13	
36	36	36	--	--	24	24	30	46	40	1 3/4	66	94	1 1/8	31	59	2	36	45	42 1/2	3	57	85	16	

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		8	6 3/4		13 1/2	21 1/2		2 1/2	5	
10	8 3/4	16 3/4	26	3 1/2	6	8	15 1/2	5	15 1/2	54
12	10 1/4	19 1/2	30 1/4	3 1/2	7	12	18	9	18	54
20	14 1/4	30 1/2	47	5	11	11	32	6	32	60
24	20 1/4	38	57 1/2	5	12	12	36	7	36	63
30	23	48	73	5	15	15	42	10	42	66
36	24 5/8	54	83	5	18	18	54	9	54	69

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER					P.O.					RELEASE NUMBER EC2-15054		REV NO 1		
JOB NAME					SERVICE					<b>PENTAIR</b> FAIRBANKS NIJHUIS				
PUMP SIZE & MODEL			STAGES	GPM	TDH	RPM	ROT							
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS	ENCL							
CERTIFIED FOR			CERTIFIED BY			DATE		SETTING PLAN FIGURE 8211 PLAIN END DISCHARGE UNDERGROUND HEAD DWG. NO. 24LYA3523D						



DATE 6/7/85 BY *Ret*

CHECKED *McGowan & Co*

DATE 6/17/85 BY *Ret*

ENGINEERING APPROVAL *DS*

DATE 6/85 BY *Ret*

MARKETING APPROVAL *DBR*

DATE 6/85 BY *Ret*

DRAWING NUMBER 24LYA2364N

**DISCHARGE HEAD DIMENSIONS**

PUMP SIZE	COLUMN SIZE	A	B	C	E	F	G	H	K	L	BD
10	10	21 1/2	13 7/8	9	14 3/4	7/8	20 1/2	7/8	8 3/8	1 7/8	16-1/2 / 20

PUMP SIZE	N	S	T	V		W	X		Y	Z	STRAINER		AB	AF	AG	AH	AK	AL
				1 STG.	2 STG.		WITHOUT STRAINER	WITH STRAINER			AW	AY						
				10	7 1/4		36	13 3/4			17 1/2	30 3/8						

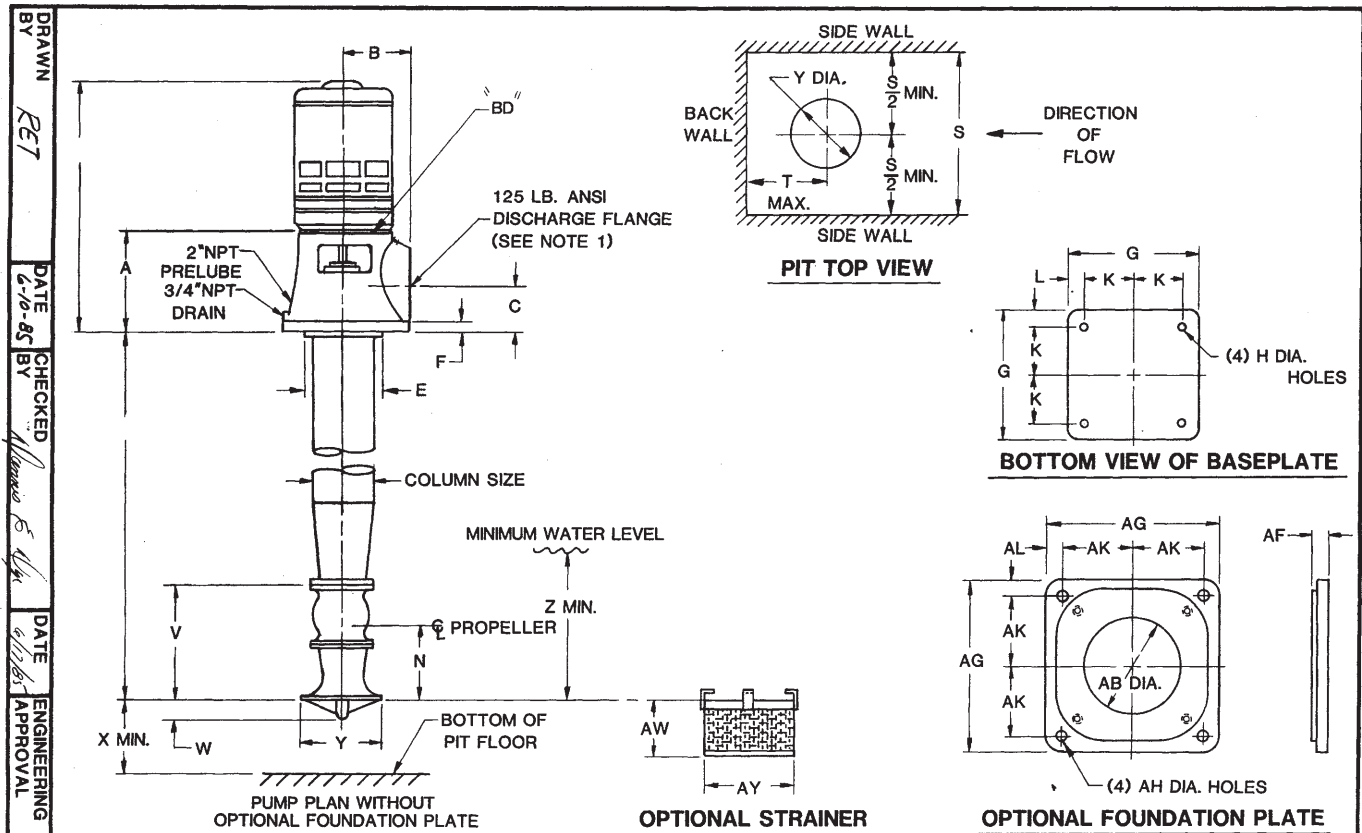
**WARNING**

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARDS IN PLACE.  
ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARDS CAN RESULT IN SEVERE BODILY INJURY.

NOTE 1: ALL DIMENSIONS  $\pm 1/16"$ .

ER2-12874

CUSTOMER										P.O.				PENTAIR FAIRBANKS NIJHUIS <b>SETTING PLAN</b> <b>FIGURE 8312</b> <b>D DISCHARGE HEAD</b>			
JOB NAME																	
PUMP SIZE & MODEL			STAGES		GPM		TDH		RPM		ROT						
MOTOR			HP		FRAME		PHASE		HERTZ		VOLTS						ENCL
CERTIFIED FOR					CERTIFIED BY					DATE							
REV.	DATE	ECN NO.												SIZE C	DWG. NO.	24LYA2364N	



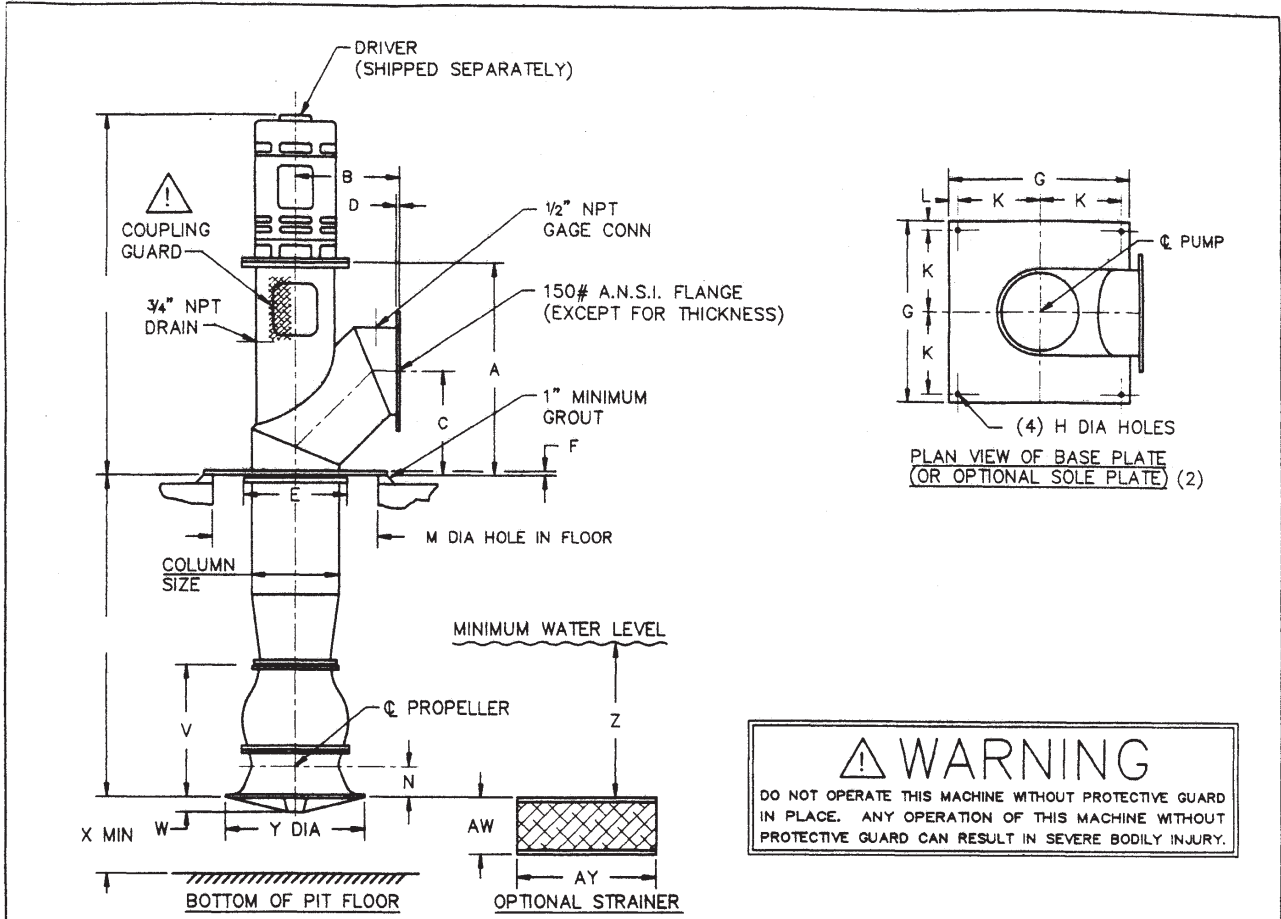
PUMP SIZE	COLUMN SIZE	DISCHARGE HEAD DIMENSIONS										OPTIONAL FOUNDATION PLATE					
		A	B	C	E	F	G	H	K	L	AB	AF	AG	AH	AK	AL	BD
10,12	12	19 3/4	13 7/8	9 7/8	17 5/8	7/8	27 3/4	7/8	10 1/4	3 5/8	21 3/8	1 1/2	29	1	12	2 1/2	24 1/2
12,14	14	22 3/4	16 7/8	10 7/8	21	3/4	33 3/4	15/16	12 3/8	4 1/2	25 1/8	1 7/8	35	1 1/8	14 1/2	3	24 1/2

PUMP SIZE	N	S	T	V		W	X		Y	Z	STRAINER	
				1 STG.	2 STG.		WITHOUT STRAINER	WITH STRAINER			AW	AY
				10	7 1/4		36	13 3/4			17 1/2	30 3/8
12	9	42	15 3/4	21 1/2	37	3 1/2	6	12	18	54	9	18
14	11	48	19 1/2	26	44 1/2	4	7	11	21	54	8	20 3/4

NOTE 1 : BOLT HOLES IN DISCHARGE FLANGE ARE TAPPED HOLES.  
NOTE 2 : ALL DIMENSIONS ± 1/16".

ER2-12874

DRAWING NUMBER <b>24LYA2364M</b>	DATE		CUSTOMER		P.O.		PENTAIR FAIRBANKS NIJHUIS	
	DATE		JOB NAME		PUMP SIZE & MODEL		STAGES	
	DATE		GPM		TDH		RPM	
	DATE		ROT		MOTOR		HP	
	DATE		ENCL		FRAME		PHASE	
DATE		HERTZ		VOLTS		ENCL		
DATE		CERTIFIED FOR		CERTIFIED BY		DATE		
DATE		ECN NO.		SIZE C		DWG. NO. <b>24LYA2364M</b>		



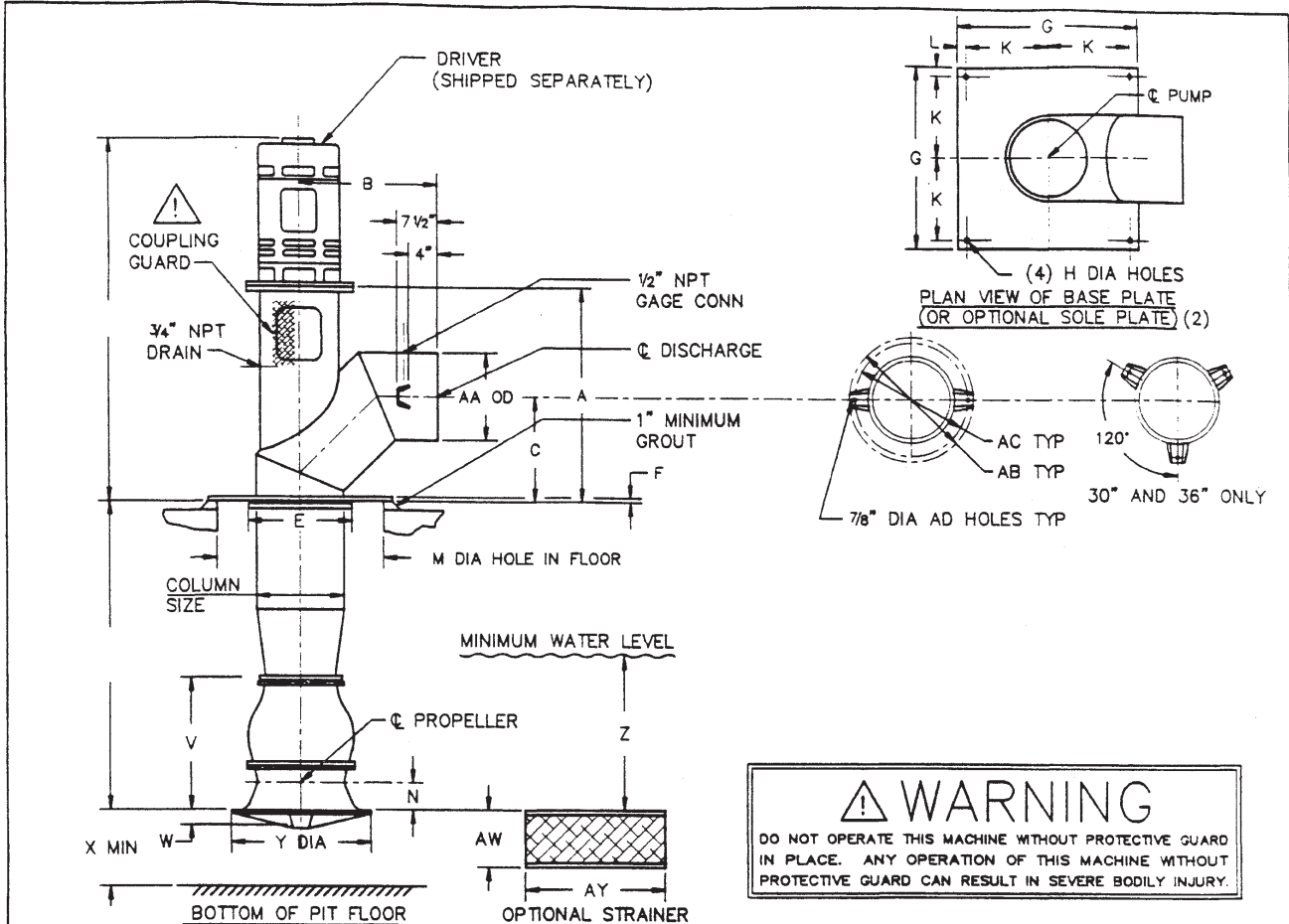
**WARNING**  
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

PUMP SIZE	DISCH SIZE	COL SIZE	DISCHARGE HEAD DIMENSIONS														
			A					B	C	D	E	F	G	H	K	L	M
			MTR BASE DIA														
10	10	10	33	16 1/2	20	24 1/2	30 1/2	13	12	3/4	13 3/4	3/4	23	7/8	9 1/2	2	18
10,12	12	12	35	36	---	---	---	15	15	3/4	16 1/4	1	26	7/8	11	2	21
12,14	14	14	36	37	41	---	---	17	17	3/4	17 1/2	1	29	7/8	12 1/2	2	24
14,16	16	16	39	40	43	---	---	20	20	3/4	19 1/2	1	32	1	14	2	27
16,20	20	20	42	43	49	50	56	24	24	3/4	23 3/4	1	44	1	20	2	38
20,24	24	24	---	47	53	54	62	29	29	3/4	28	1	50	1	23	2	43
24,30	30	30	---	---	59	60	68	36	36	3/4	34	1 1/4	54	1 1/8	25	2	45
30	36	36	---	---	65	66	74	43	43	3/4	40	1 1/4	66	1 1/8	31	2	57

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		10	7 1/4		17 1/2	30 3/8		3	6	
12	9	21 1/2	37	3 1/2	6	12	18	9	18	54
14	11	26	44 1/2	4	7	11	21	8	20 3/4	54
16	12	30	51 1/2	4 1/4	8	10	24 1/2	7	24	57
20	16	38 1/2	66	6	12	12	35	9	35	60
24	19	43 3/8	74 3/8	6 1/2	14	14	40	8	40	60
30	22	51 3/4	89	7 1/2	14	14	42	11	42	64

CUSTOMER				P.O.				RELEASE NUMBER EC2-15054		REV NO 1	
JOB NAME				SERVICE				<b>PENTAIR</b> FAIRBANKS NIJHUIS			
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT		SETTING PLAN FIGURE 8312 FLANGED DISCHARGE ABOVEGROUND HEAD DWG. NO. 24LYA3523E			
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL					
CERTIFIED FOR			CERTIFIED BY			DATE					



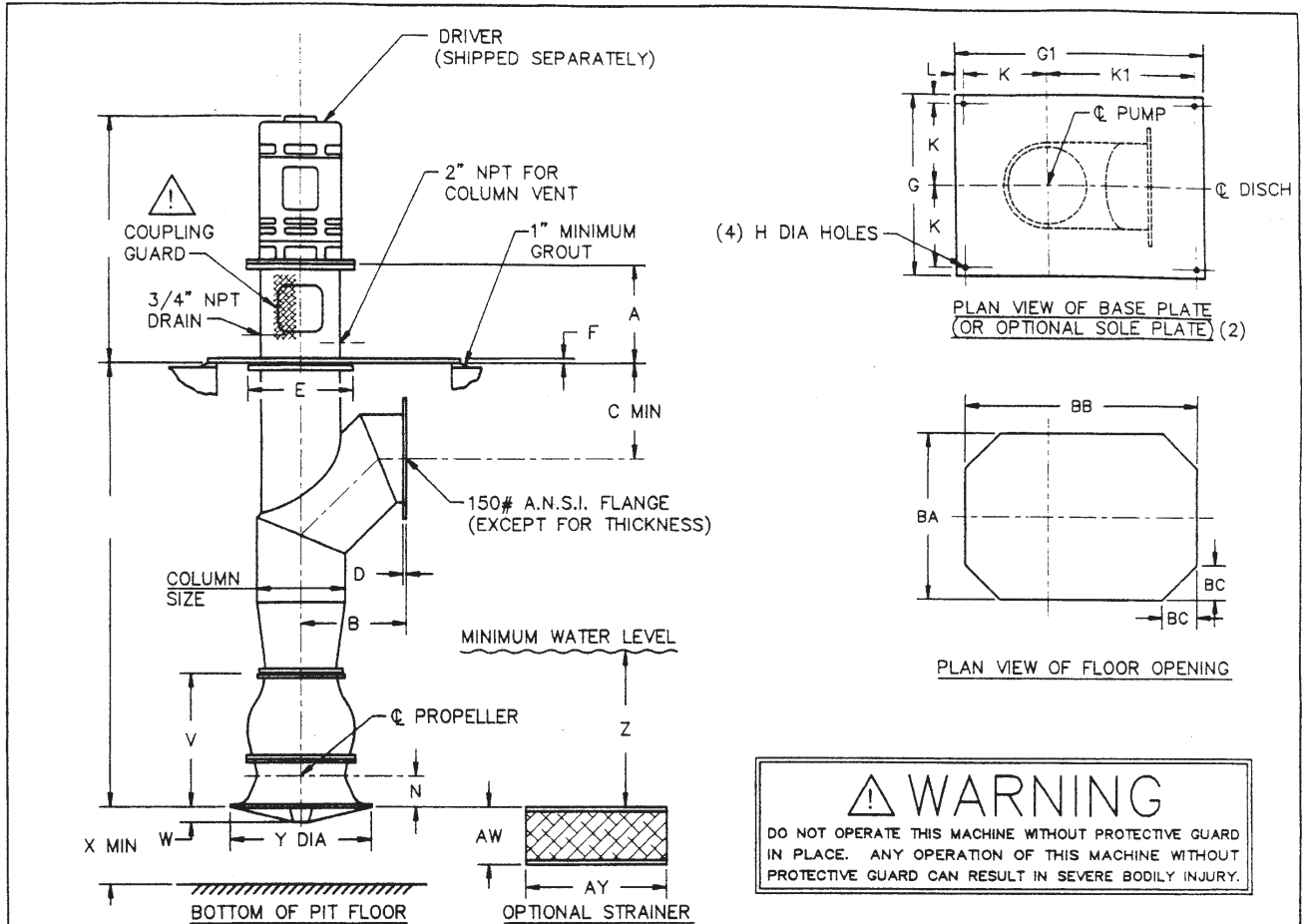
**⚠ WARNING**  
 DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

DISCHARGE HEAD DIMENSIONS																				
PUMP SIZE	DISCH SIZE	COL SIZE	A					B	C	E	F	G	H	K	L	M	AA	AB	AC	AD
			12	16 1/2	20	24 1/2	30 1/2													
10	10	10	33	---	---	---	18	12	13 3/4	3/4	23	7/8	9 1/2	2	18	10 3/4	19 1/4	16 3/4	2	
10,12	12	12	35	36	---	---	21	15	16 1/4	1	26	7/8	11	2	21	12 3/4	21 1/2	19	2	
12,14	14	14	36	37	41	---	23	17	17 1/2	1	29	7/8	12 1/2	2	24	14	22 3/4	20 1/4	2	
14,16	16	16	39	40	43	---	25	20	19 1/2	1	32	1	14	2	27	16	24 3/4	22 1/4	2	
16,20	20	20	42	43	49	50	30	24	23 3/4	1	44	1	20	2	38	20	29	26 1/2	2	
20,24	24	24	---	47	53	54	34	29	28	1	50	1	23	2	43	24	33	30 1/2	2	
24,30	30	30	---	---	59	60	40	36	34	1 1/4	54	1 1/8	25	2	45	30	39	36 1/2	3	
30	36	36	---	---	65	66	46	43	40	1 1/4	66	1 1/8	31	2	57	36	45	42 1/2	3	

PUMP DIMENSIONS										
PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
10	7 1/4	17 1/2	30 3/8	3	6	8	15 1/2	5	15 1/2	51
12	9	21 1/2	37	3 1/2	6	12	18	9	18	54
14	11	26	44 1/2	4	7	11	21	8	20 3/4	54
16	12	30	51 1/2	4 1/4	8	10	24 1/2	7	24	57
20	16	38 1/2	66	6	12	12	35	9	35	60
24	19	43 5/8	74 3/8	6 1/2	14	14	40	8	40	60
30	22	51 3/4	89	7 1/2	14	14	42	11	42	64

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER				P.O.				RELEASE NUMBER EC2-15054		REV NO 1	
JOB NAME				SERVICE				PENTAIR FAIRBANKS NIJHUIS			
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT		SETTING PLAN FIGURE 8312 PLAIN END DISCHARGE ABOVEGROUND HEAD DWG. NO. 24LYA3523F			
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS	ENCL				
CERTIFIED FOR			CERTIFIED BY			DATE					

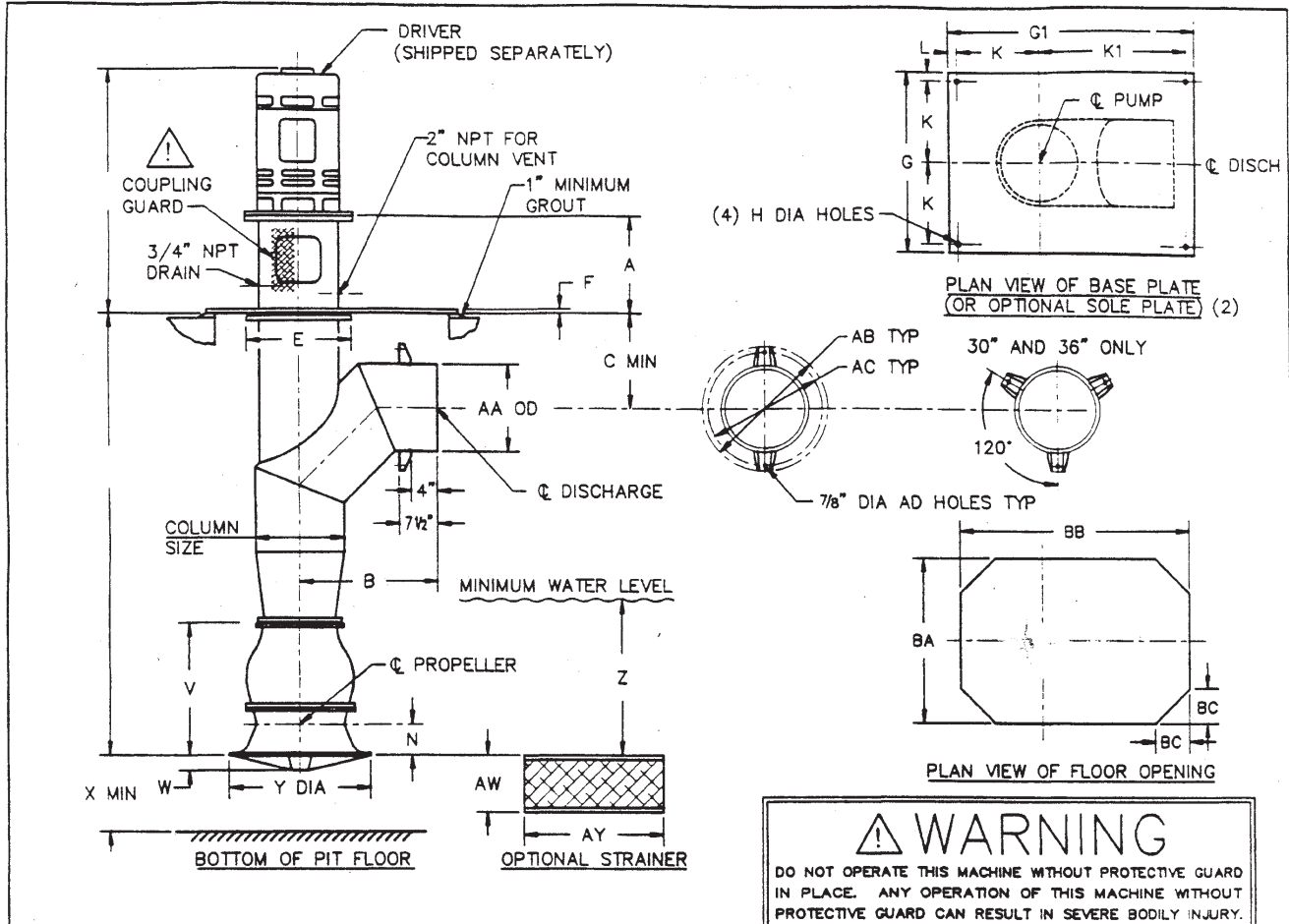


PUMP SIZE	DISCH SIZE	COL SIZE	PEDESTAL AND ELBOW DIMENSIONS													FLOOR OPENING DIMENSIONS					
			A					B	C	D	E	F	G	G1	H	K	K1	L	BA	BB	BC
			MTR BASE DIA																		
10	10	10	20	20	20	24	24	13	10	3/4	13 3/4	3/4	23	35	7/8	9 1/2	21 1/2	2	18	30	5
10,12	12	12	20	20	20	24	24	15	11	3/4	16 1/4	1	26	40	7/8	11	25	2	21	35	6
12,14	14	14	20	20	20	24	24	17	12	3/4	17 1/2	1	29	43	7/8	12 1/2	26 1/2	2	24	38	7
14,16	16	16	20	20	20	24	24	20	13	3/4	19 1/2	1	32	48	1	14	30	2	27	43	8
16,20	20	20	20	20	20	24	24	24	15	3/4	23 3/4	1 1/4	44	60	1	20	36	2	38	54	11
20,24	24	24	20	20	20	24	24	29	17	3/4	28	1 1/4	50	68	1	23	41	2	43	61	12
24,30	30	30	20	20	20	24	24	36	20	3/4	34	1 1/2	54	80	1 1/8	25	51	2	45	71	13
30	36	36	20	20	20	24	24	43	24	3/4	40	1 3/4	66	94	1 1/8	31	59	2	57	85	16

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		10	7 1/4		17 1/2	30 3/8		3	6	
12	9	21 1/2	37	3 1/2	6	12	18	9	18	54
14	11	26	44 1/2	4	7	11	21	8	20 3/4	54
16	12	30	51 1/2	4 1/4	8	10	24 1/2	7	24	57
20	16	38 1/2	66	6	12	12	35	9	35	60
24	19	43 5/8	74 3/8	6 1/2	14	14	40	8	40	60
30	22	51 3/4	89	7 1/2	14	14	42	11	42	64

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER				P.O.				RELEASE NUMBER EC2-15054				REV NO 1			
JOB NAME						SERVICE						<b>PENTAIR</b> FAIRBANKS NIJHUIS™			
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT	SETTING PLAN FIGURE 8312 FLANGED DISCHARGE UNDERGROUND HEAD DWG. NO. 24LYA3523G								
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS							ENCL		
CERTIFIED FOR			CERTIFIED BY			DATE									



**WARNING**  
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

PEDESTAL AND ELBOW DIMENSIONS																	FLOOR OPENING DIMENSIONS							
PUMP SIZE	DISCH SIZE	COL SIZE	A					B	C	E	F	G	G1	H	K	K1	L	AA	AB	AC	AD	BA	BB	BC
			MTR BASE DIA																					
			12	16 1/2	20	24 1/2	30 1/2																	
10	10	10	---	---	---	---	---	18	10	13 3/4	3/4	23	35	7/8	9 1/2	21 1/2	2	10 3/4	19 1/4	16 3/4	2	18	30	5
10,12	12	12	20	---	---	---	---	21	11	16 1/4	1	26	40	7/8	11	25	2	12 3/4	21 1/2	19	2	21	35	6
12,14	14	14	20	20	24	---	---	23	12	17 1/2	1	29	43	7/8	12 1/2	26 1/2	2	14	22 3/4	20 1/4	2	24	38	7
14,16	16	16	20	20	24	---	---	25	13	19 1/2	1	32	48	1	14	30	2	16	24 3/4	22 1/4	2	27	43	8
16,20	20	20	20	20	24	24	30	30	15	23 3/4	1 1/4	44	60	1	20	36	2	20	29	26 1/2	2	38	54	11
20,24	24	24	---	20	24	24	30	34	17	28	1 1/4	50	68	1	23	41	2	24	33	30 1/2	2	43	61	12
24,30	30	30	---	---	24	24	30	40	20	34	1 1/2	54	80	1 1/8	25	51	2	30	39	36 1/2	3	45	71	13
30	36	---	---	---	24	24	30	46	24	40	1 3/4	66	94	1 1/8	31	59	2	36	45	42 1/2	3	57	85	16

PUMP SIZE	N	V		W	X			Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR	AW		AY		
10	7 1/4	17 1/2	30 3/8	3	6	8	15 1/2	5	15 1/2	51	
12	9	21 1/2	37	3 1/2	6	12	18	9	18	54	
14	11	26	44 1/2	4	7	11	21	8	20 3/4	54	
16	12	30	51 1/2	4 1/4	8	10	24 1/2	7	24	57	
20	16	38 1/2	66	6	12	12	35	9	35	60	
24	19	43 5/8	74 3/8	6 1/2	14	14	40	8	40	60	
30	22	51 3/4	89	7 1/2	14	14	42	11	42	64	

- THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
- BASE PLATE (OR OPTIONAL SOLE PLATE) MUST BE SUPPORTED ON ALL FOUR (4) SIDES.

CUSTOMER					P.O.					RELEASE NUMBER EC2-15054					REV NO 1																			
JOB NAME										SERVICE																								
PUMP SIZE & MODEL					STAGES					GPM					TDH															RPM				
MOTOR					HP					FRAME					PHASE					HERTZ					VOLTS					ENCL				
CERTIFIED FOR										CERTIFIED BY										DATE														
SETTING PLAN FIGURE 8312 PLAIN END DISCHARGE UNDERGROUND HEAD															DWG. NO. 24LYA3523H																			