



PROPELLER PUMPS

8000 SERIES

FM-01-5002 (10-15-2022)

DATA SPECIFICATIONS GUIDE

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CONSTRUCTION FEATURES

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	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	12" , One Piece Cast, Locked in Coupling by Ends of Column Pipe	x	
	20" Through 36" Fabricated, Welded in Column Pipe	x	
Discharge Head	12" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied where Required to Allow Complete Unit Withdrawal	x	
	12" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	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

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	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	12" Cast Iron, Above Ground, Flanged Discharge Connection, Separate Base Plate Supplied where Required to Allow Complete Unit Withdrawal	x	
	12" Fabricated Steel, Above Ground, Flanged or Plain End Discharge Connection, Integral Base Plate to Allow Complete Unit Withdrawal		x
	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

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

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	

TYPICAL SPECIFICATIONS

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.

TYPICAL SPECIFICATIONS

- 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.

TYPICAL SPECIFICATIONS

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.

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- 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.

TYPICAL SPECIFICATIONS

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.

TYPICAL SPECIFICATIONS

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.

TYPICAL SPECIFICATIONS

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.

TYPICAL SPECIFICATIONS

- 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.

TYPICAL SPECIFICATIONS

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

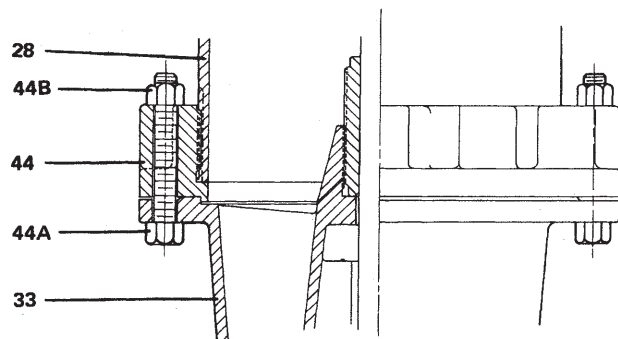
- A. Manufacturers
 - 1. Pump(s) shall be the product of Fairbanks Nijhuis™.
 - 2. Manufacturer shall have installations of like or similar application with a minimum of 5 years service for this pump size.
 - B. Design
 - 1. Rotation
 - a. The pump will be counterclockwise rotation when viewed from the 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.

TYPICAL SPECIFICATIONS

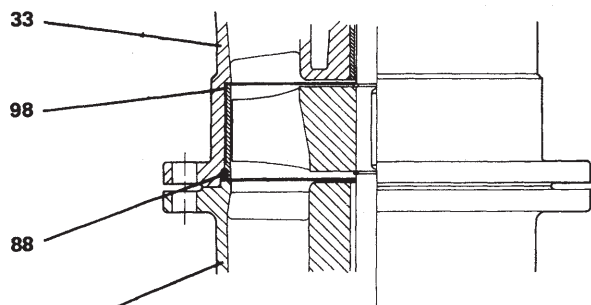
5. Column
 - a. Column pipe shall be not less than ____ inches nominal diameter and weigh not less than ____ pounds per foot.
 - b. Column pipe shall be flanged and furnished in sections not over ten feet in length.
 6. Lineshafts
 - a. Lineshafting shall be of ample size to transmit the torque and operate 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.

BOWL ASSEMBLIES

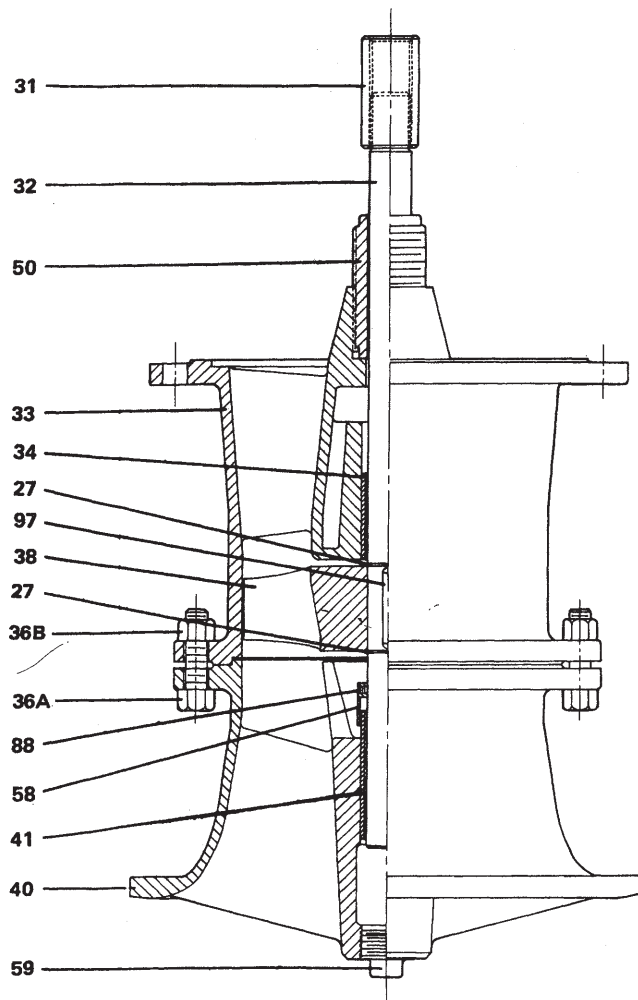
SECTIONAL DRAWINGS – 8211 BOWL ASSEMBLY



**THREADED COLUMN CONNECTION
12" 8211, 12" COLUMN**



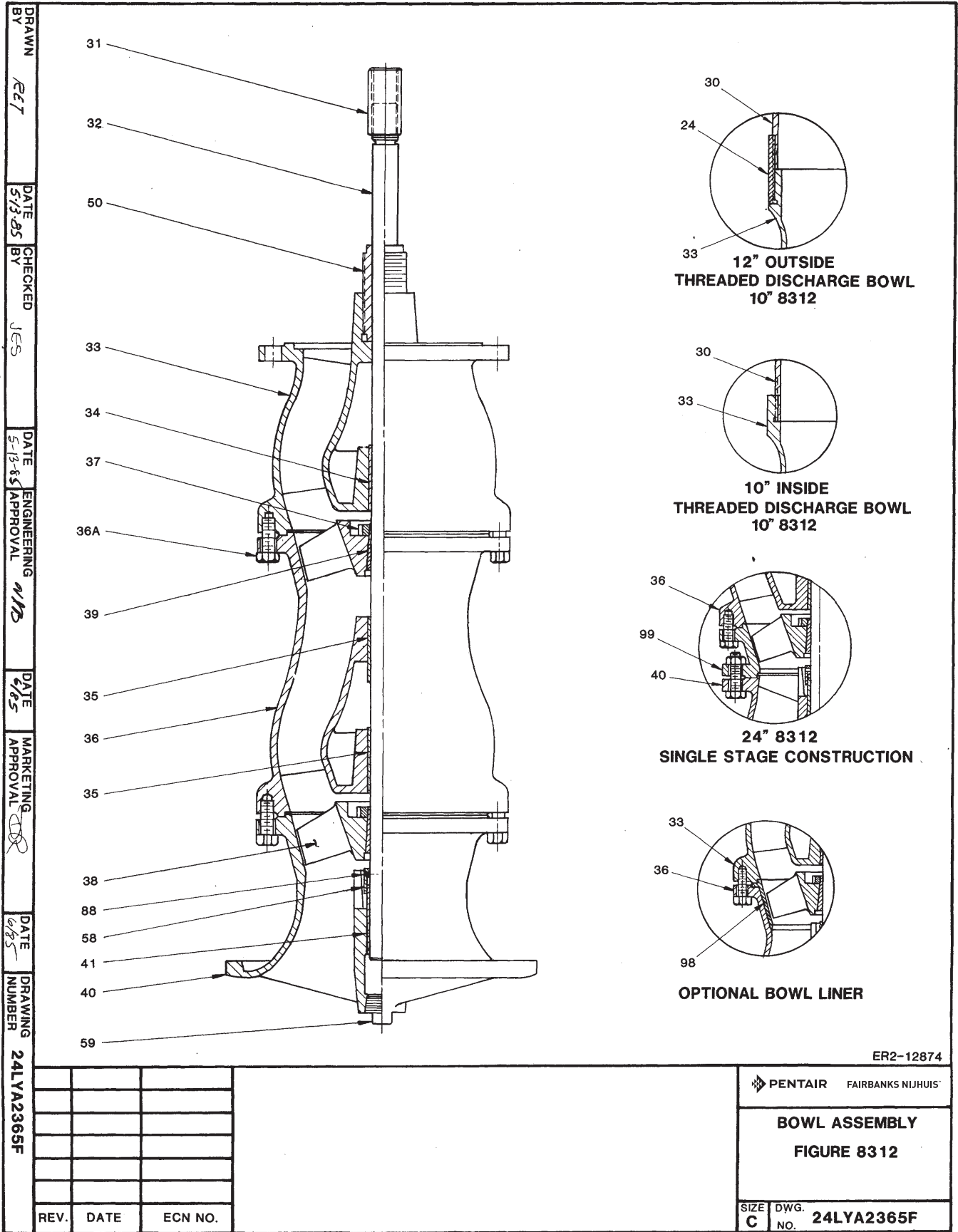
OPTIONAL BOWL LINER



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

BOWL ASSEMBLIES



BOWL ASSEMBLIES

8211

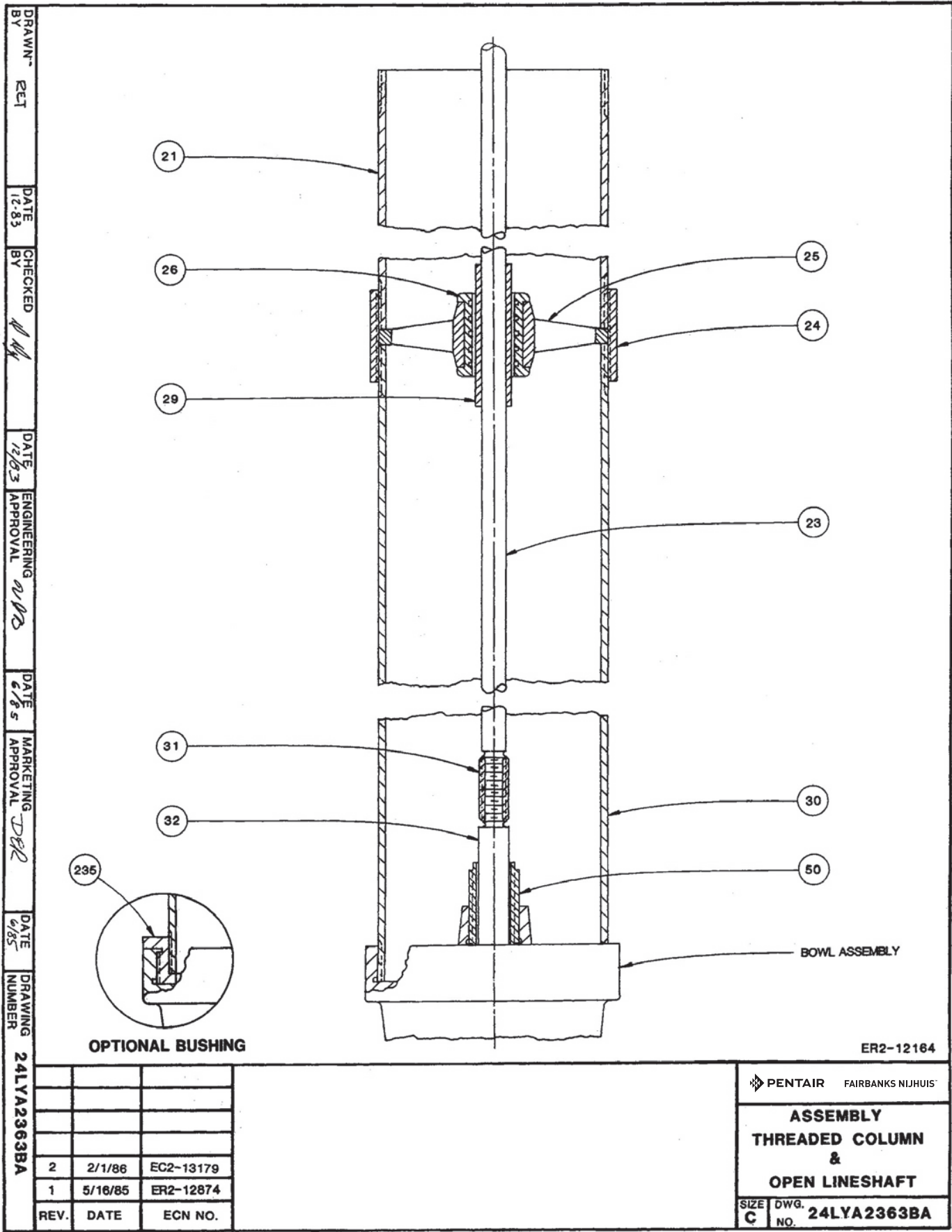
REF. NO.	DESCRIPTION	MATERIAL	SPECIFICATION (1)
27	SNAP RING	STAINLESS STEEL	A564-(632)
28	COLUMN PIPE	STEEL	A53-Gr.B
31	SHAFT COUPLING	STEEL	A108-Gr12L14
32	PUMP SHAFT	416 STAINLESS STEEL	A582-416
33	DISCHARGE BOWL	CAST IRON	A48-CLASS 30
34	DISCHARGE BOWL BEARING	BRONZE	B505-(932)
35	INTERMEDIATE BOWL 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.

COLUMN, TUBE AND SHAFT



DRAWN BY: RET
 DATE: 12-83
 CHECKED BY: [Signature]
 DATE: 12/83
 ENGINEERING APPROVAL: [Signature]
 DATE: 6/85
 MARKETING APPROVAL: [Signature]
 DATE: 6/85
 DRAWING NUMBER: 24LYA2363BA

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

ER2-12164

PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY
 THREADED COLUMN
 &
 OPEN LINESHAFT**

SIZE C DWG. NO. 24LYA2363BA

COLUMN, TUBE AND SHAFT

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

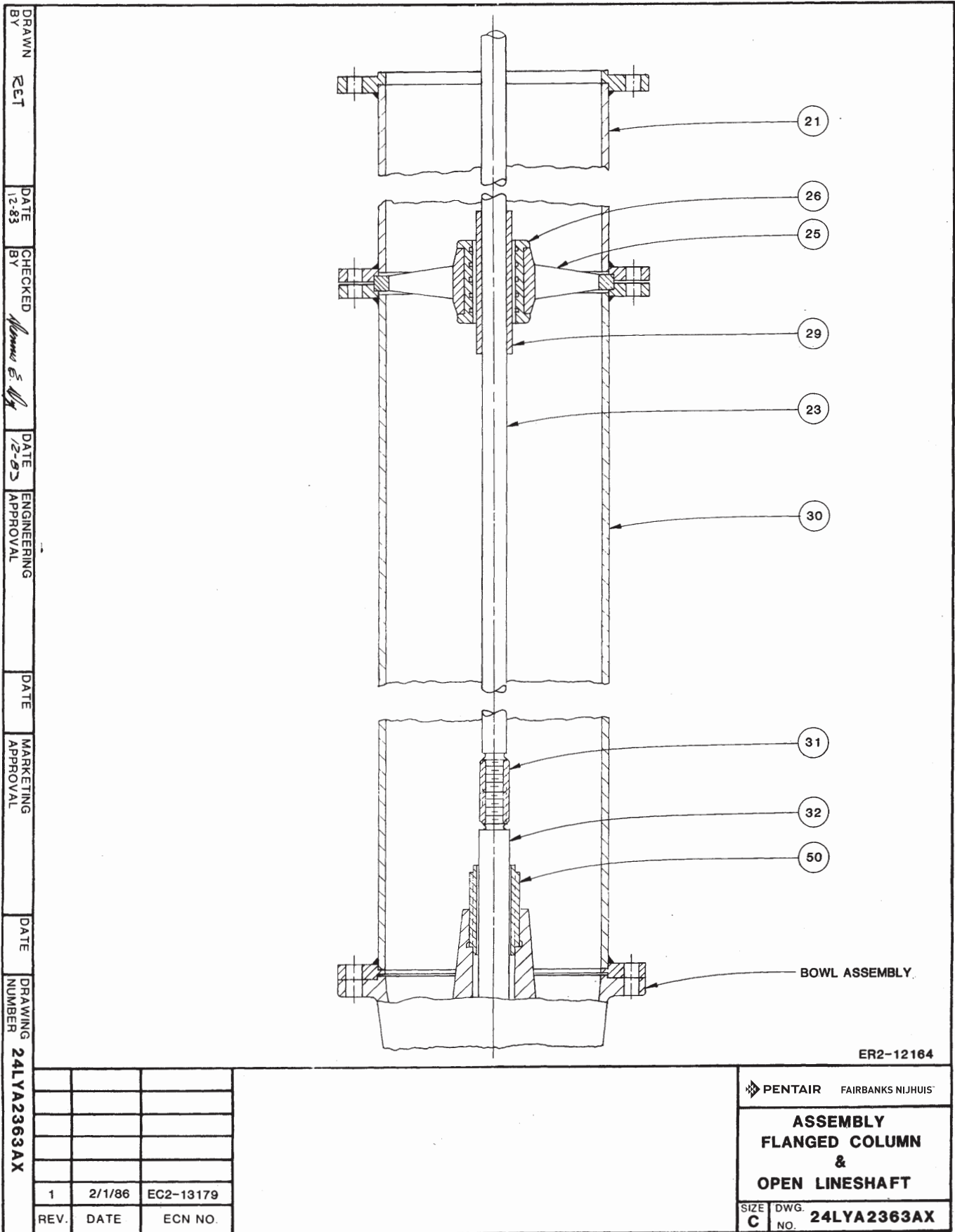
OPTIONAL BUSHING

ER2-12164

ASSEMBLY THREADED COLUMN & ENCLOSED LINESHAFT		
SIZE C	DWG. NO.	24LYA2363AZ

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

COLUMN, TUBE AND SHAFT



ER2-12164

PENTAIR FAIRBANKS NIJHUIS
**ASSEMBLY
 FLANGED COLUMN
 &
 OPEN LINESHAFT**
 SIZE C DWG. NO. **24LYA2363AX**

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

COLUMN, TUBE AND SHAFT

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

COLUMN, TUBE AND SHAFT

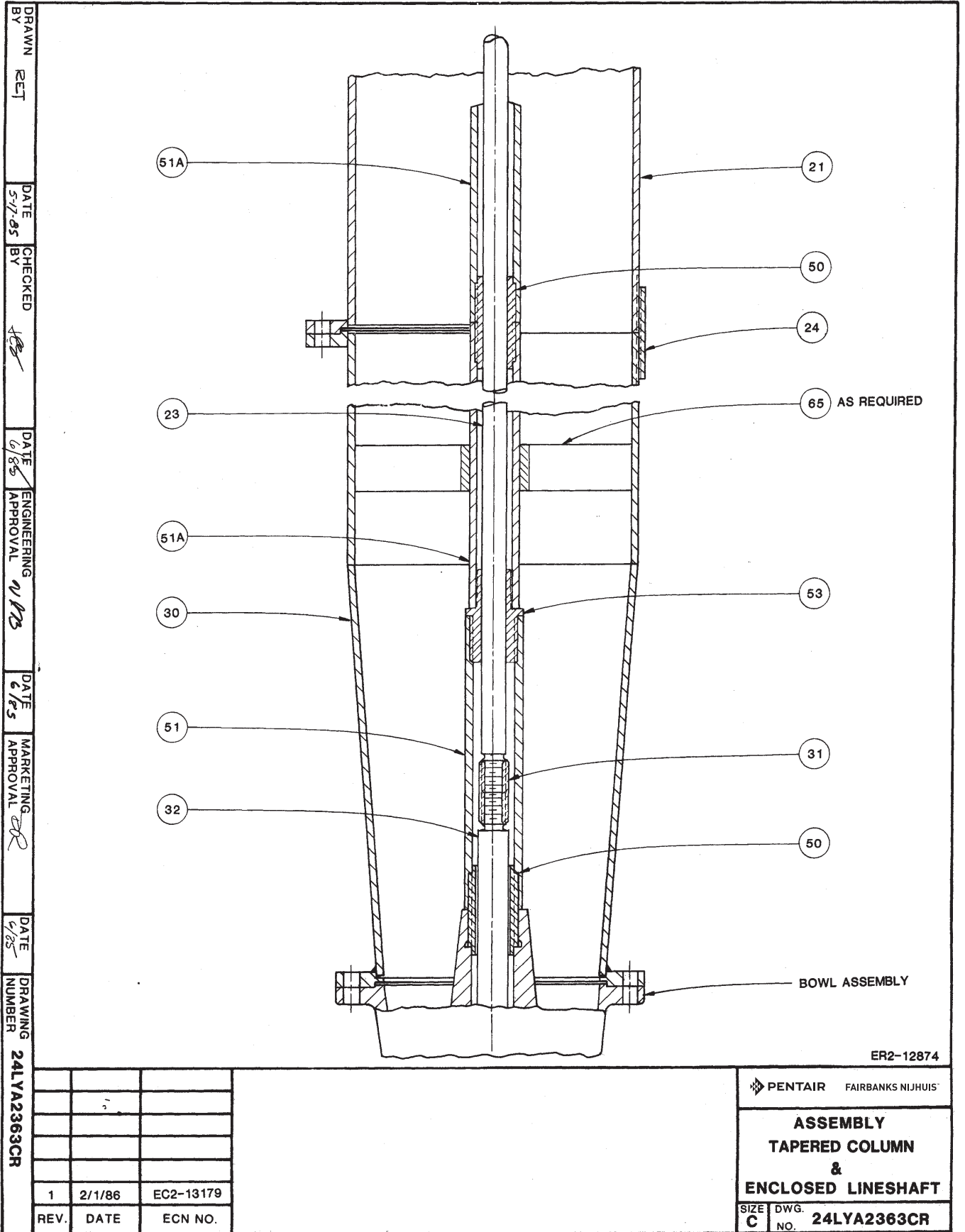
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ER2-12874

PENTAIR FAIRBANKS NIJHUIS	
ASSEMBLY TAPERED COLUMN & OPEN LINESHAFT	
SIZE C	DWG NO 24LYA2363CP

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

COLUMN, TUBE AND SHAFT



DRAWN BY	RECT	DATE	5-17-85	CHECKED BY	[Signature]	DATE	6/85	ENGINEERING APPROVAL	[Signature]	DATE	6/85	MARKETING APPROVAL	[Signature]	DATE	4/85	DRAWING NUMBER	24LYA2363CR
	DATE		5-17-85				6/85		4/85								

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

ER2-12874

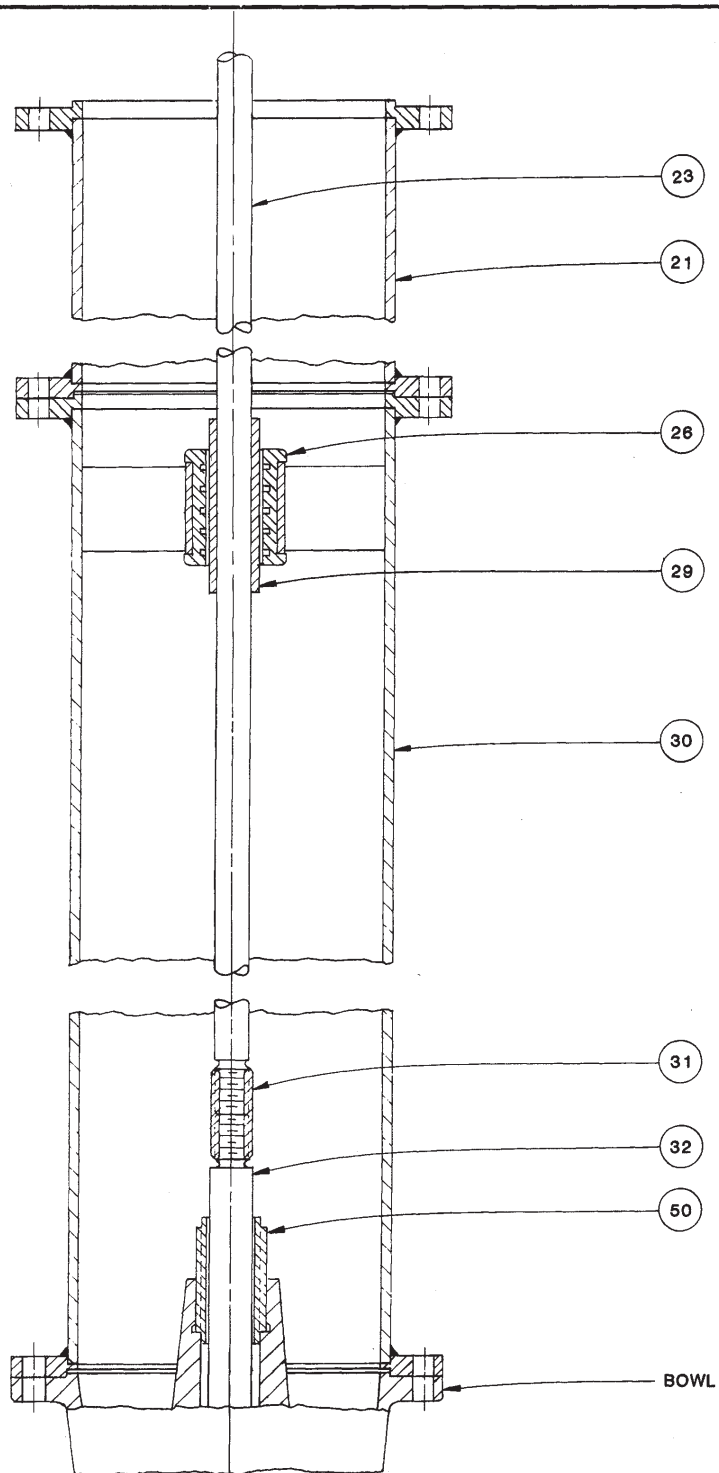
PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY
TAPERED COLUMN
&
ENCLOSED LINESHAFT**

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

COLUMN, TUBE AND SHAFT

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



ER2-12164

PENTAIR FAIRBANKS NIJHUIS

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

SIZE **C** DWG. NO. **24LYA2363AY**

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

COLUMN, TUBE AND SHAFT

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.

COLUMN, TUBE AND SHAFT

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.

COLUMN, TUBE AND SHAFT

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.

COLUMN, TUBE AND SHAFT

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 ⁹ / ₁₆	5 ³ / ₈	24
10	10.75	.279	-	31.20	11 ¹¹ / ₁₆	5 ⁷ / ₈	33
12	12.75	.330	30	43.77	13 ⁷ / ₈	6 ¹ / ₈	47
14	14.00	.375	30	54.57	15 ¹ / ₈	6 ⁷ / ₈	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 ³ / ₄	30	4
10	10.75	.279	31.20	13 ³ / ₈	37	7
12	12.75	.330	43.77	16 ³ / ₈	56	10
14	14.00	.375	54.57	17 ⁵ / ₈	61	16
16	16.00	.250	42.05	20	54	18
20	20.00	.250	52.73	24 ¹ / ₄	74	23
24	24.00	.250	63.41	28 ¹ / ₂	92	31
30	30.00	.375	119.00	34 ¹ / ₂	114	35
36	36.00	.375	143.34	40 ¹ / ₂	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 ¹ / ₂	1	1.900	.200	80	3.63	1.5	3.88
2	1 ¹ / ₄	2.375	.218	80	5.02	3	4.75
2 ¹ / ₂	1 ¹ / ₂ -1 ¹¹ / ₁₆	2.875	.276	80	7.66	5	5.00
3	1 ¹⁵ / ₁₆ - 2 ³ / ₁₆	3.500	.300	80	10.25	7.5	5.25
3 ¹ / ₂	2 ⁷ / ₁₆	4.000	.318	80	12.50	9	5.50
5	2 ¹⁵ / ₁₆	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 ¹ / ₄	4.18	ANSI	.093	5.00
1 ¹ / ₂	6.01	858.1	.093	5.00
1 ¹¹ / ₁₆	7.60	Sections	.093	5.00
1 ¹⁵ / ₁₆	10.02	A4.2.3	.093	5.00
2 ³ / ₁₆	12.78	Or	.093	5.75
2 ⁷ / ₁₆	15.87	A4.3.3	.122	5.75
2 ¹⁵ / ₁₆	23.04		.122	5.75

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

DISCHARGE HEADS

DRAWN BY DENNIS E. DYE	DATE 1/29/85	CHECKED BY <i>WJ</i>	DATE 7/25/85	ENGINEERING APPROVAL 2/9/85	DATE 6/1/85	MARKETING APPROVAL <i>DR</i>	DATE 9/5	DRAWING NUMBER 24LYA2363BL
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ER2-12164

PENTAIR FAIRBANKS NIJHUIS		
ASSEMBLY D STYLE DISCHARGE HEAD		
SIZE C	DWG. NO.	24LYA2363BL

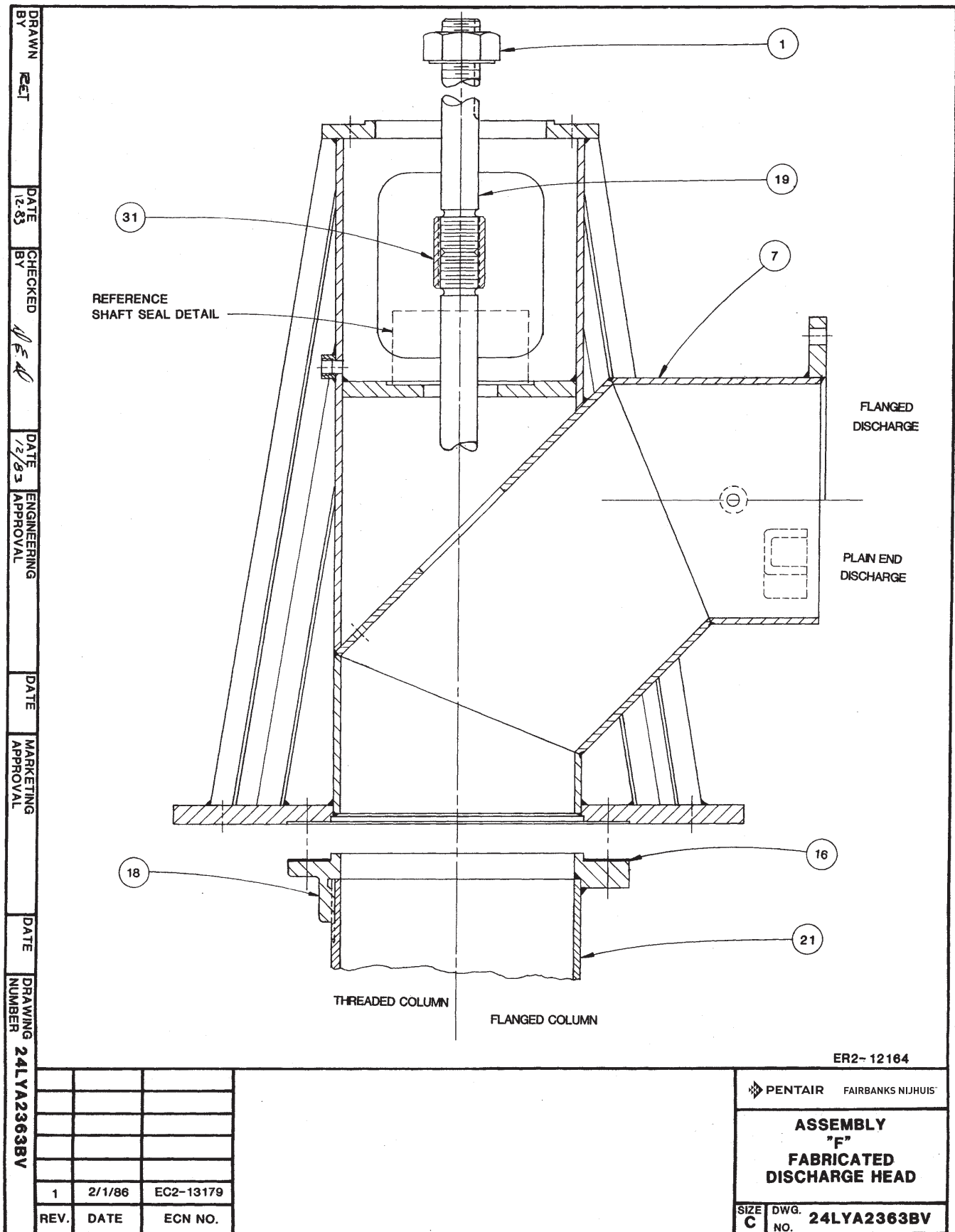
REV.	DATE	ECN NO.
1	2/1/86	EC2-13179

DISCHARGE HEADS

DRAWN BY <i>J. Miller</i>	DATE 6/4/85	CHECKED BY <i>JBR</i>	DATE 	ENGINEERING APPROVAL <i>W. 1/73</i>	DATE 6/85	MARKETING APPROVAL <i>DR</i>	DATE 6/85	DRAWING NUMBER
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			ER2-12164				
			PENTAIR FAIRBANKS NIJHUIS				
			H DISCHARGE HEAD ASSEMBLY				
REV.	DATE	ECN NO.	SIZE	DWG.	NO.		
1	2/1/86	EC2-13179	C		24LYA2363BF		

DISCHARGE HEADS



DRAWN BY: RET
 DATE: 12/83
 CHECKED BY: [Signature]
 DATE: 1/2/83
 ENGINEERING APPROVAL:
 MARKETING APPROVAL:
 DATE:
 DRAWING NUMBER: 24LYA2363BV

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

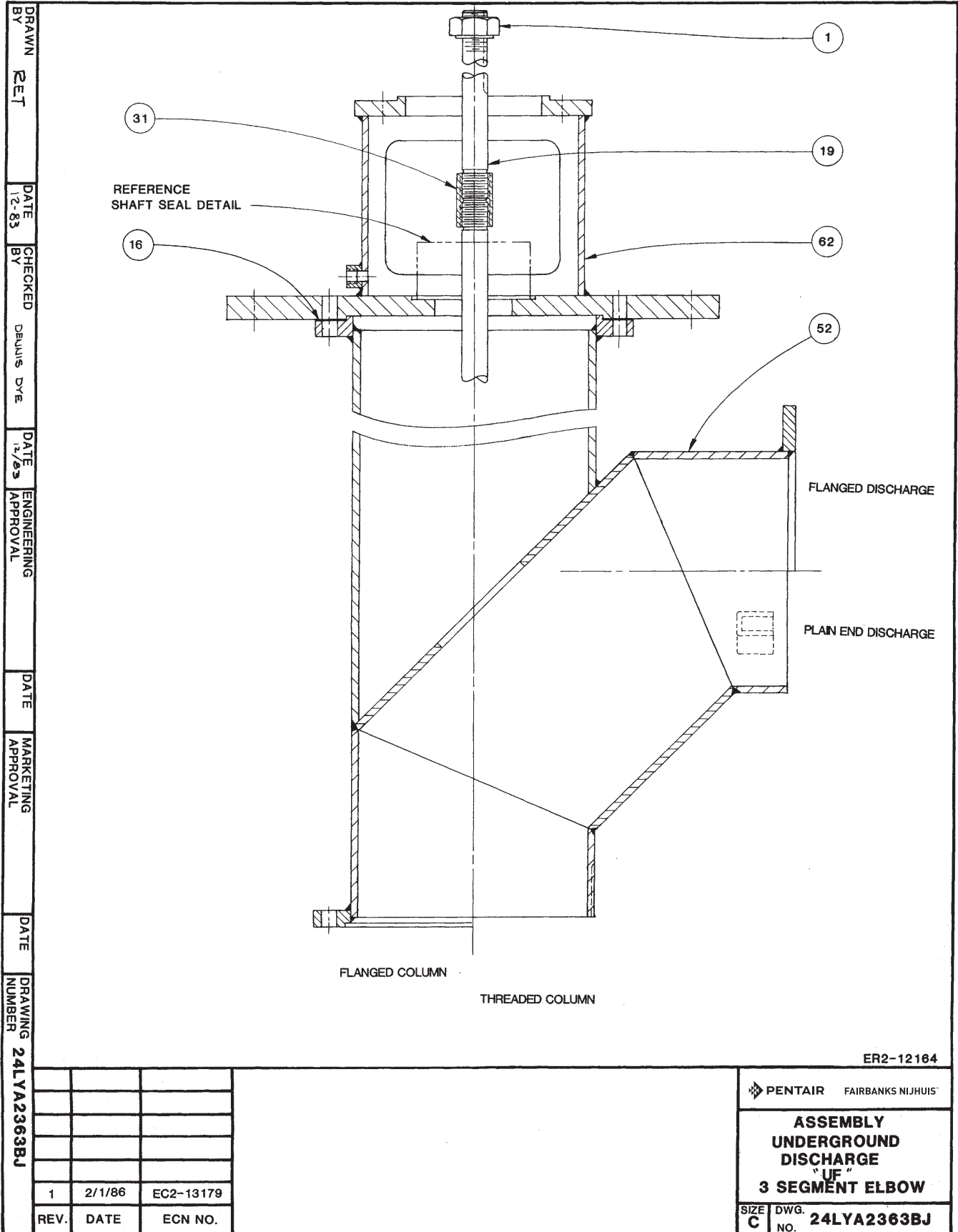
ER2- 12164

PENTAIR FAIRBANKS NIJHUIS

**ASSEMBLY
 "F"
 FABRICATED
 DISCHARGE HEAD**

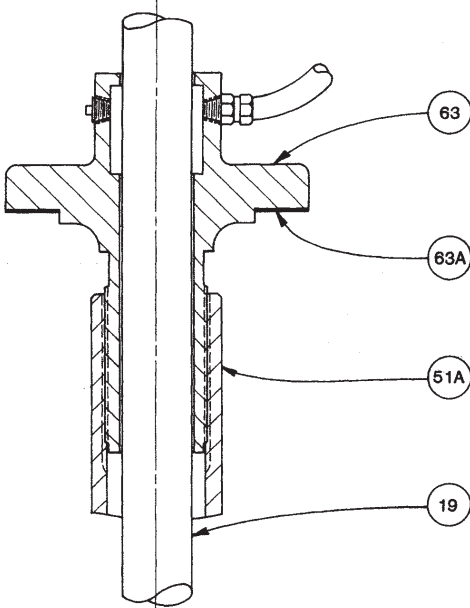
SIZE C DWG. NO. **24LYA2363BV**

DISCHARGE HEADS

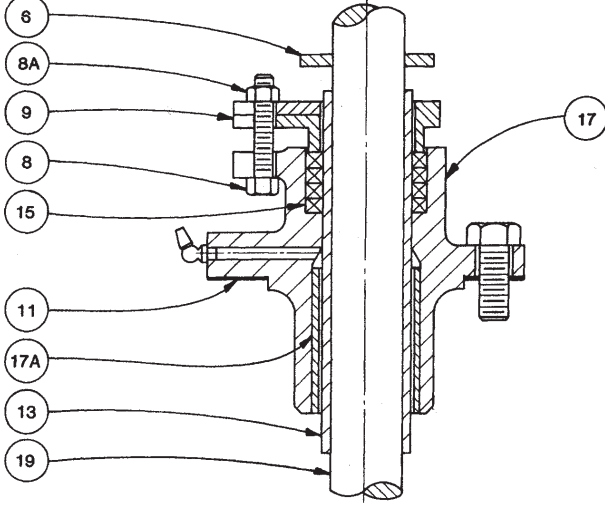


DISCHARGE HEADS

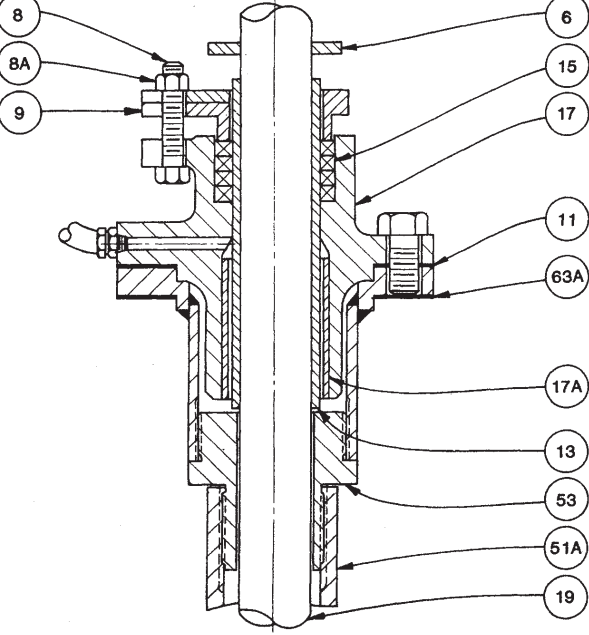
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DATE	4/1/85	ENGINEERING APPROVAL		DATE	
MARKETING APPROVAL		DRAWING NUMBER		DATE	
REV.	DATE	ECN NO.			
1	2/1/86	EC2-13179			



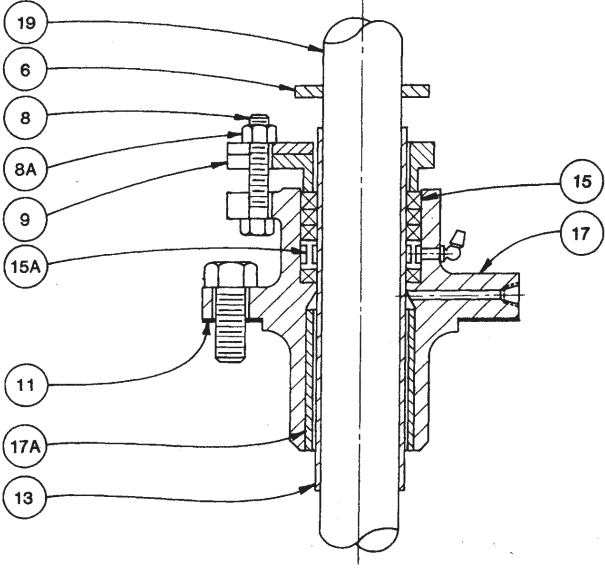
TENSION NUT
(OIL LUBRICATED)



PACKING BOX
(175 PSI RATING)



PACKING BOX
(WATER FLUSH)



PACKING BOX
(175 PSI W/BY-PASS)
(400 PSI RATING)

NOTE: 400 PSI PACKING BOX REQUIRES SIX BOLTS

PENTAIR FAIRBANKS NJHUIS	
SHAFT SEAL DETAIL ASSEMBLY	
SIZE C	DWG. NO. 25LYA3463A

DISCHARGE HEADS

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.

DISCHARGE HEADS

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.

DISCHARGE HEADS

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 34 1/2 OR EQUAL	RISER OF ELBOW
10	7500	40	1/4	1 1/2	CRANE 34 1/2 OR EQUAL	RISER OF ELBOW
12	12000	40	1/4	2	CRANE 34 1/2 OR EQUAL	RISER OF ELBOW
14	15000	40	1/4	2	CRANE 34 1/2 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	1 3/16	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	1 3/16	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 7/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175

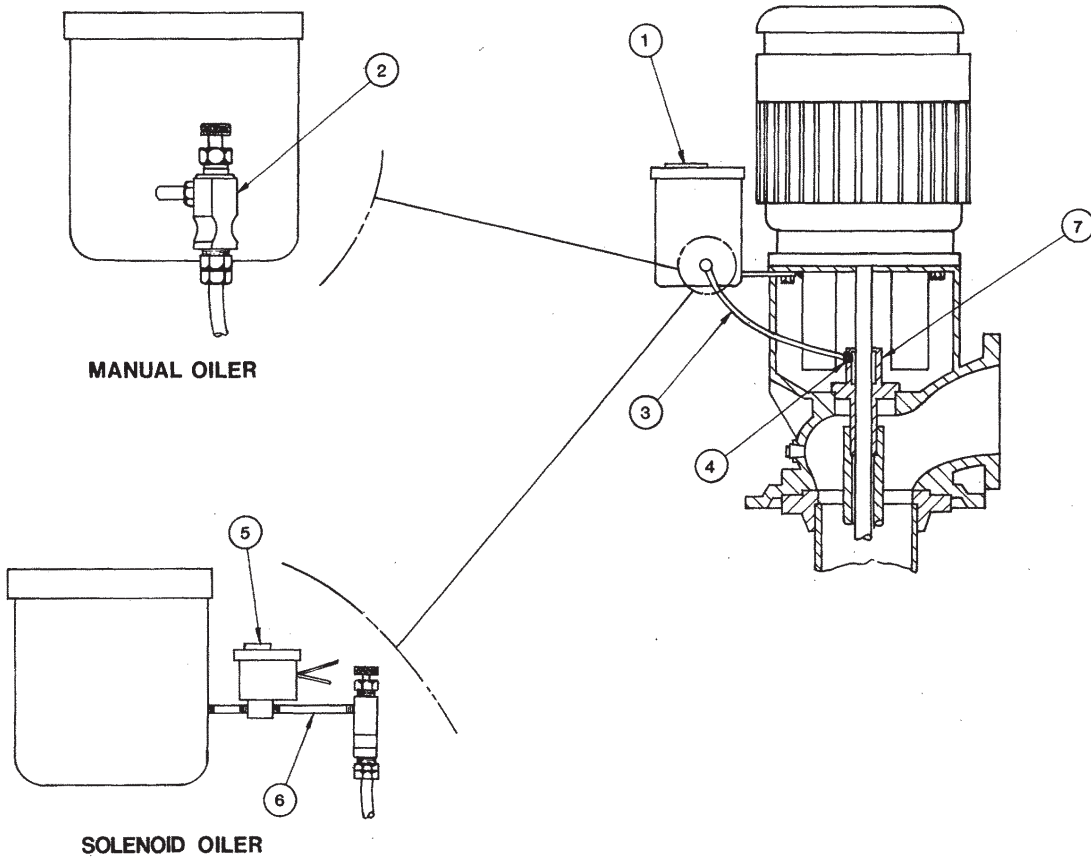
DISCHARGE HEADS

TECHNICAL DATA – HEADS AND PACKING BOXES

COLUMN & HEAD SIZE (INCHES)	FABRICATED HEAD BOX REGISTER	FABRICATED HEAD							
		SHAFT SIZE (INCHES)	SHAFT SLEEVE O.D.	PACKING BOX I.D.	PACKING BOX DEPTH	PACKING SIZE & NUMBER	GLAND STUD SIZE	BEARING GREASE TAPPING	PACKING BOX PRESSURE RATING PSI
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
		11/4	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
		11/4	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
		11/4	17/16	23/16	15/8	3/8 (4)	1/2	1/4	175
		11/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		111/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
16	43/4	11/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		111/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
20	43/4	11/2	111/16	27/16	15/8	3/8 (4)	1/2	1/4	175
		111/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
		115/16	21/8	27/8	15/8	3/8 (4)	1/2	1/4	175
24	43/4	111/16	17/8	25/8	15/8	3/8 (4)	1/2	1/4	175
		115/16	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

DISCHARGE HEADS

DRAWN BY *KE7* DATE *5-2-85* CHECKED BY *JES* DATE *6/85* ENGINEERING APPROVAL *[Signature]* MARKETING APPROVAL *[Signature]* DATE *9/85* DRAWING NUMBER **25LYA2918L**



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

NOTE 1: VOLTAGE AS REQUIRED.

ER2-12874

PENTAIR FAIRBANKS NIJHUIS

**VERTICAL TURBINE
LINESHAFT OILER
ASSEMBLIES**

SIZE DWG. NO. **25LYA2918L**

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

DISCHARGE HEADS

DRAWN	REJ	DATE	CHECKED				
BY	BY	12-83	<i>[Signature]</i>	DATE	ENGINEERING	DATE	MARKETING
				12-83	APPROVAL	APPROVAL	APPROVAL

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.

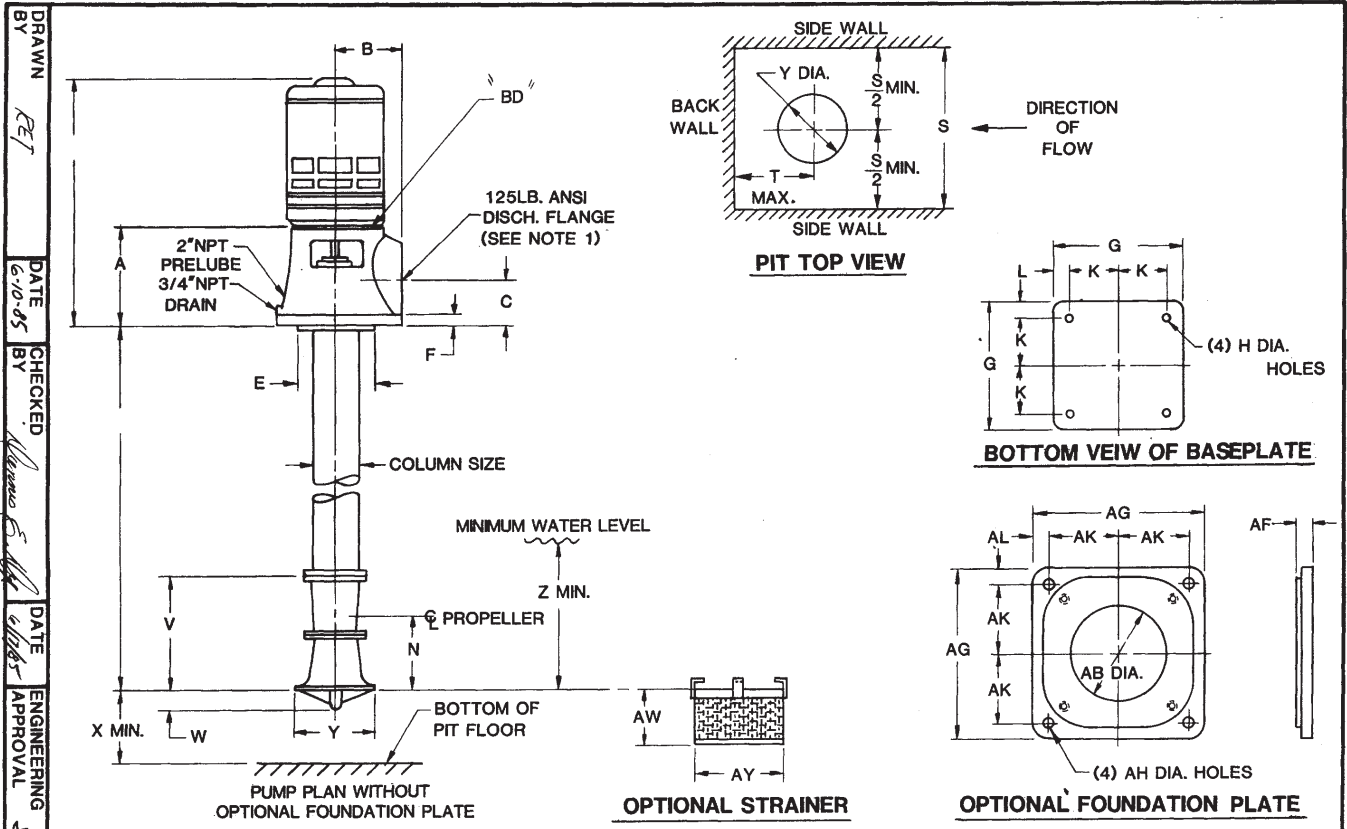
REV.	DATE	ECN NO.					ER2-12164
							PENTAIR FAIRBANKS NIJHUIS
ASSEMBLY SPACER COUPLING & HIGH RING BASE							SIZE C DWG. NO. 24LYA2363AW

DISCHARGE HEADS

DRAWN RET	MOTOR SHAFT KEY MOTOR SHAFT THRUST RING MOTOR SHAFT HUB SPACER ADJUSTING NUT PUMP SHAFT KEY PUMP SHAFT HUB THRUST RING MOTOR SHAFT KEY MOTOR SHAFT HUB THRUST RING ADJUSTING NUT PUMP SHAFT HUB PUMP SHAFT KEY		DATE 12-83	CHECKED BY <i>Alvina S. Hix</i>	DATE 1-2-90-83	ENGINEERING APPROVAL	DATE	MARKETING APPROVAL	DATE	DRAWING NUMBER 24LYA2363BK	DATE	DRAWING NUMBER 24LYA2363BK	DATE	DRAWING NUMBER 24LYA2363BK
FLANGED SPACER COUPLING														
SLEEVE COUPLING														
FLANGED COUPLING														
ER2-12164														
PENTAIR FAIRBANKS NJHUIS														
ASSEMBLY DRAWINGS FOR FLANGED COUPLINGS														
REV.	DATE	ECN NO.												
1	2/1/86	EC2-13179												
			SIZE	DWG. NO.	24LYA2363BK									

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DIMENSION DRAWINGS



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

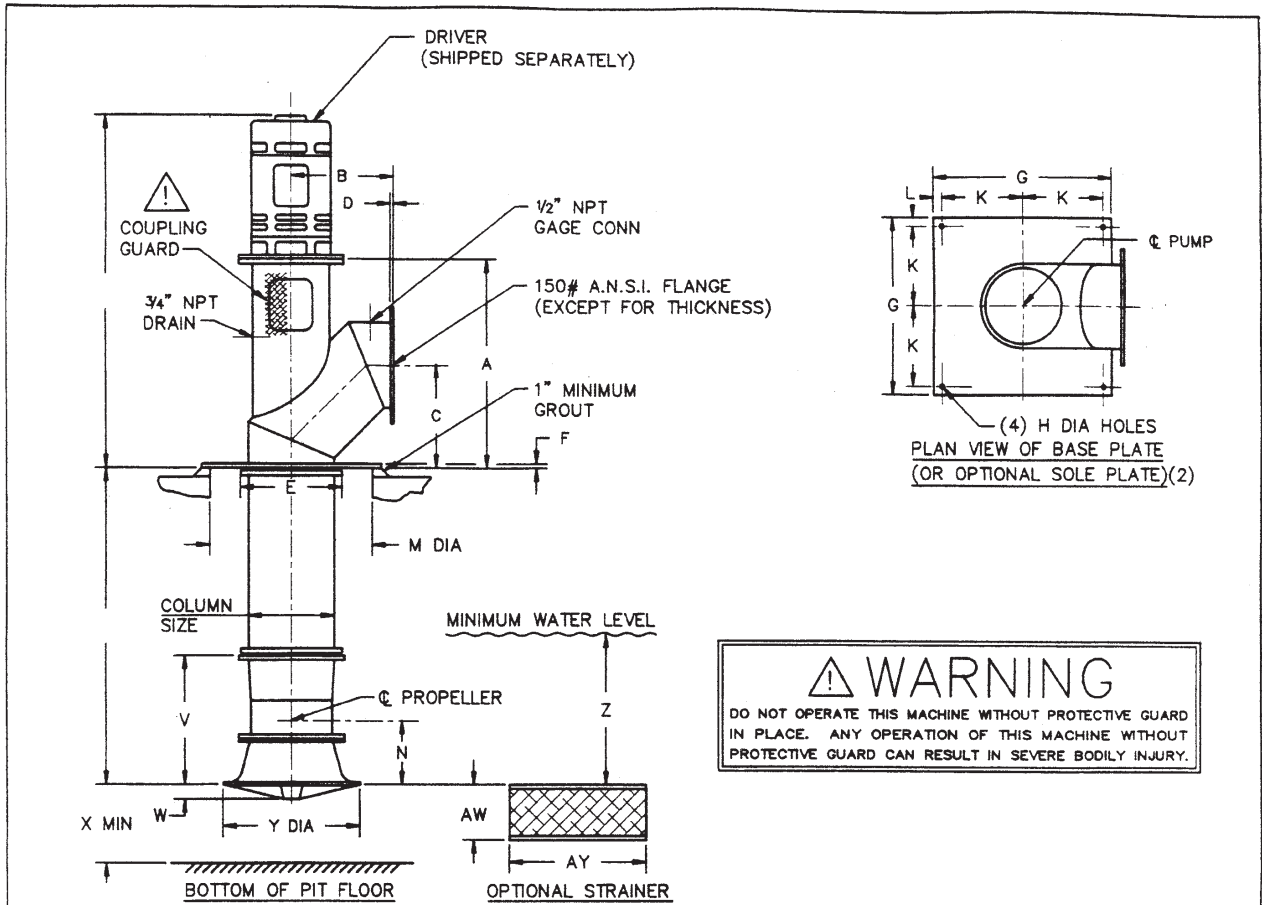
NOTE 1 : BOLT HOLES IN DISCHARGE FLANGE ARE TAPPED HOLES.
 NOTE 2 : ALL DIMENSIONS ± 1/16".

ER2-12874

DRAWN BY RET
 DATE 6-10-85
 CHECKED BY [Signature]
 DATE 6/85
 ENGINEERING APPROVAL [Signature]
 DATE 6/85
 MARKETING APPROVAL [Signature]
 DATE 6/85
 DRAWING NUMBER 24LYA2364H

CUSTOMER		P.O.		PENTAIR FAIRBANKS NIJHUIS	
JOB NAME				SETTING PLAN	
PUMP SIZE & MODEL		STAGES	GPM	TDH	ROT
MOTOR		HP	FRAME	PHASE	HERTZ
VOLTS		ENCL		H DISCHARGE HEAD	
1	2/1/86	EC2-13179		FIGURE 8211	
CERTIFIED FOR		CERTIFIED BY		DATE	
REV.	DATE	ECN NO.		SIZE C	DWG. NO. 24LYA2364H

DIMENSION DRAWINGS



⚠ 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.

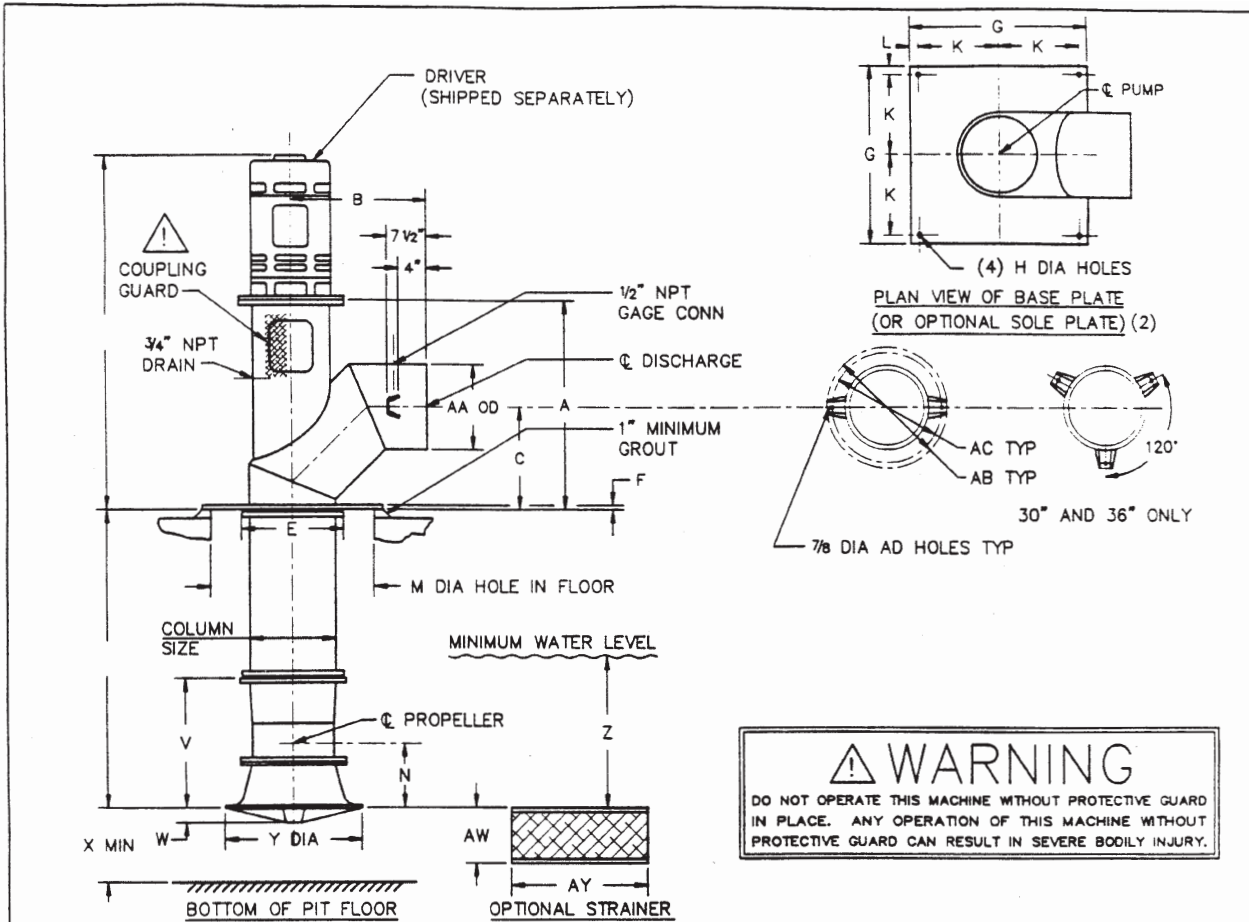
DISCHARGE HEAD DIMENSIONS																	
PUMP SIZE	DISCH SIZE	COL SIZE	A					B	C	D	E	F	G	H	K	L	M
			MTR BASE DIA														
			12	16 1/2	20	24 1/2	30 1/2										
12	12	12	35	36	---	---	---	15	15	3/4	16 1/4	1	26	7/8	11	2	21
20	20	20	42	43	49	50	56	24	24	3/4	23 3/4	1	44	1	20	2	38
24	24	24	---	47	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 DIMENSIONS										
PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
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

- 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 8211 FLANGED DISCHARGE ABOVEGROUND HEAD			
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL					
CERTIFIED FOR			CERTIFIED BY			DATE					
								DWG. NO. 24LYA3523A			

DIMENSION DRAWINGS



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.

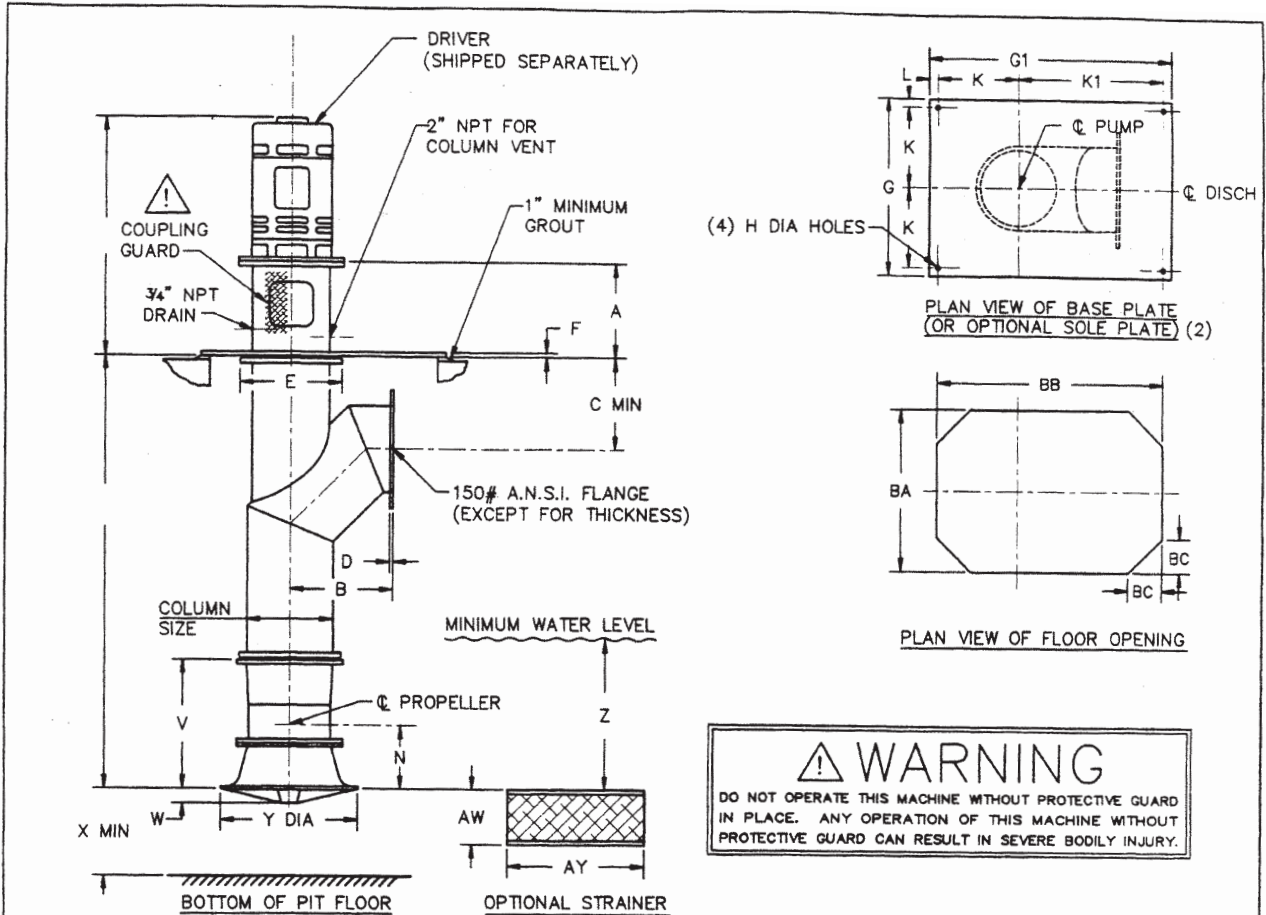
PUMP SIZE	DISCH SIZE	COL SIZE	DISCHARGE HEAD DIMENSIONS																	
			A					B	C	E	F	G	H	K	L	M	AA	AB	AC	AD
			12	16 1/2	20	24 1/2	30 1/2													
12	12	12	35	36	---	---	21	15	16 1/4	1	26	7/8	11	2	21	12 3/4	21 1/2	19	2	
20	20	20	42	43	49	50	30	24	23 3/4	1	44	1	20	2	38	20	29	26 1/2	2	
24	24	24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

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- 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	
		12	10 1/4		19 1/2	30 1/4		3 1/2	7	
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	SETTING PLAN FIGURE 8211 PLAIN END DISCHARGE ABOVEGROUND HEAD			
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL				
CERTIFIED FOR		CERTIFIED BY			DATE					
							DWG. NO.	24LYA3523B		

DIMENSION DRAWINGS



⚠ 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.

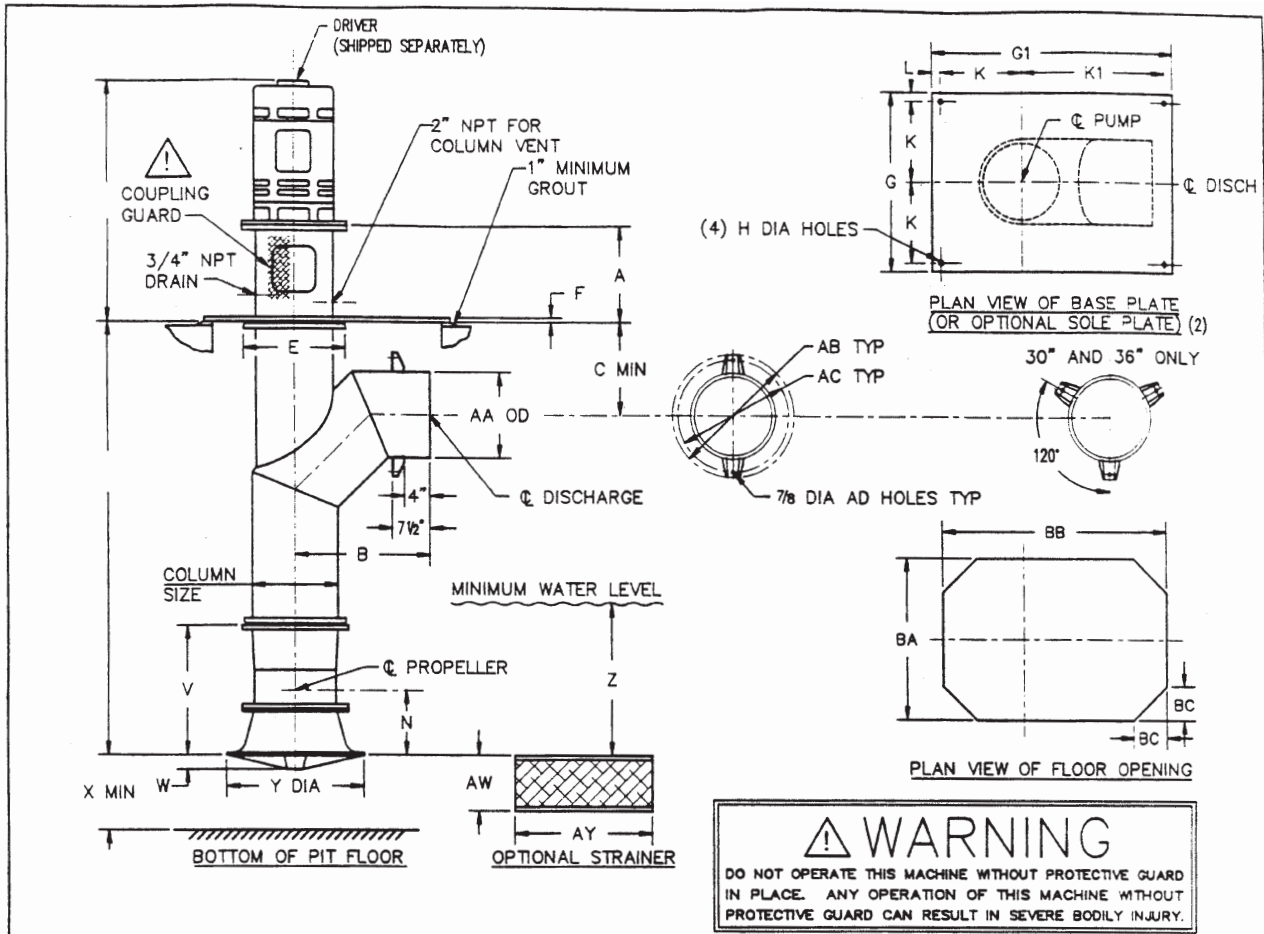
PUMP SIZE	DISCH SIZE	COL SIZE	PEDESTAL AND ELBOW DIMENSIONS														FLOOR OPENING DIMENSIONS				
			A					B	C	D	E	F	G	G1	H	K	K1	L	BA	BB	BC
			12	16 1/2	20	24 1/2	30 1/2														
12	12	12	20	20	--	--	15	11	3/4	16 1/4	1	26	40	7/8	11	25	2	21	35	6	
20	20	20	20	20	24	24	30	24	15	3/4	23 3/4	1 1/4	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

PUMP SIZE	N	V		W	X		Y	STRAINER		Z
		1 STG	2 STG		W/O STR	WITH STR		AW	AY	
		12	10 1/4		19 1/2	30 1/4		3 1/2	7	
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

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- 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					
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL					
CERTIFIED FOR			CERTIFIED BY			DATE		SETTING PLAN FIGURE 8211 FLANGED DISCHARGE UNDERGROUND HEAD DWG. NO. 24LYA3523C			

DIMENSION DRAWINGS



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.

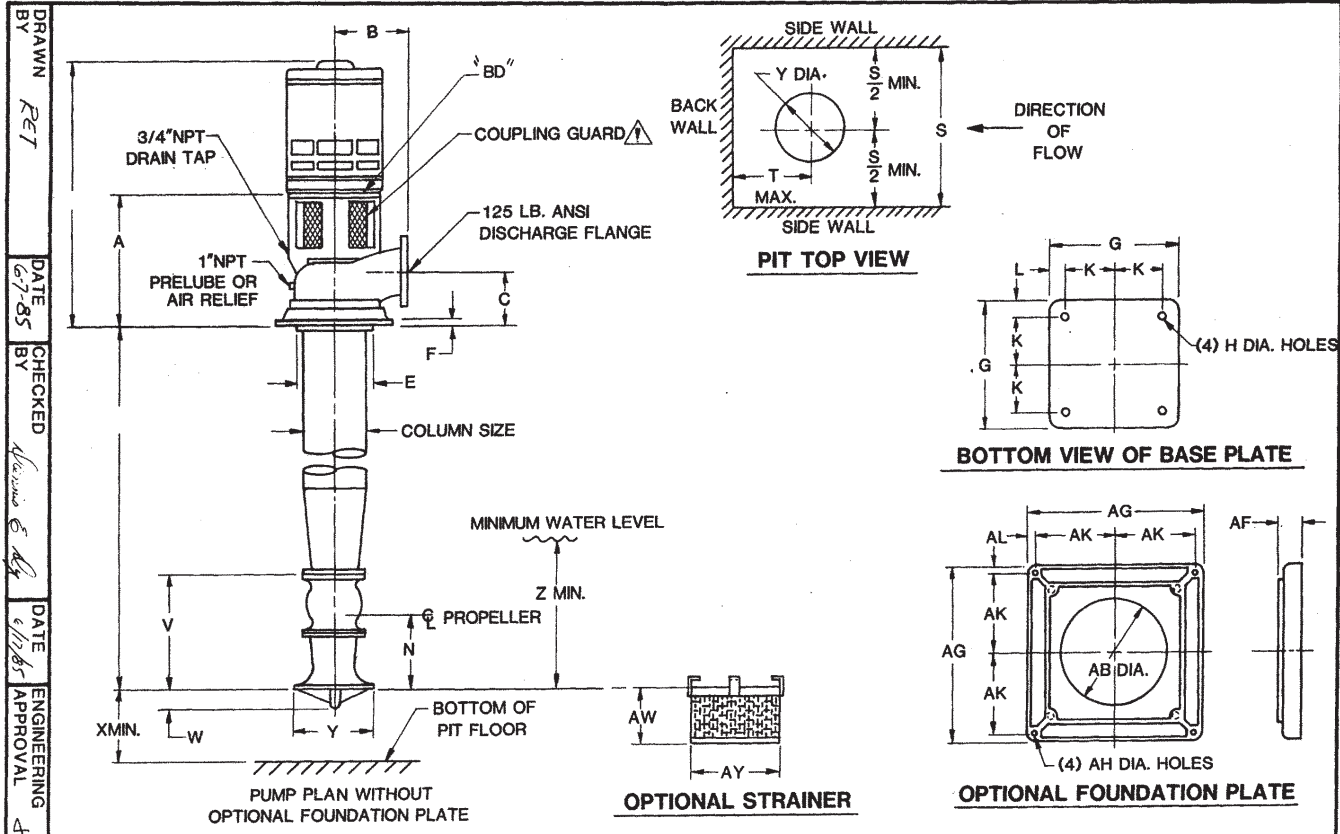
PEDESTAL AND ELBOW DIMENSIONS																	FLOOR OPENING DIMENSIONS							
PUMP SIZE	DISCH SIZE	COL SIZE	A					B	C	E	F	G	G1	H	K	K1	L	AA	AB	AC	AD	BA	BB	BC
			12	16 1/2	20	24 1/2	30 1/2																	
12	12	12	20	20	24	---	---	21	11	16 1/4	1	26	40	7/8	11	25	2	12 3/4	21 1/2	19	2	21	35	6
20	20	20	20	20	24	24	30	30	15	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	17	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	20	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	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	
		12	10 1/4		19 1/2	30 1/4		3 1/2	7	
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

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- 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 8211 PLAIN END DISCHARGE UNDERGROUND HEAD DWG. NO. 24LYA3523D					
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS	ENCL						
CERTIFIED FOR			CERTIFIED BY			DATE							

DIMENSION DRAWINGS



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	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						
10	7 1/4	36	13 3/4	17 1/2	30 3/8	3	6	8	15 1/2	51	5	15 1/2	17 1/8	1 1/2	24	7/8	10 1/2	1 1/2

WARNING

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

DRAWN BY RET			DATE 6-7-85			CHECKED BY McGowan & Co			DATE 6/85			MARKETING APPROVAL DBL			DATE 6/85			DRAWING NUMBER 24LYA2364N		
CUSTOMER						P.O.						PENTAIR FAIRBANKS NIJHUIS								
JOB NAME												SETTING PLAN FIGURE 8312 D DISCHARGE HEAD								
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																	

DIMENSION DRAWINGS

DRAWN BY **RET**

DATE **6-10-85**

CHECKED BY *Alvin S. L...*

DATE **6/10/85**

ENGINEERING APPROVAL *AS*

DATE **6/10/85**

MARKETING APPROVAL *DBR*

DATE **6/10/85**

DRAWING NUMBER **24LYA2364M**

PUMP PLAN WITHOUT OPTIONAL FOUNDATION PLATE

PIT TOP VIEW

BOTTOM VIEW OF BASEPLATE

OPTIONAL STRAINER

OPTIONAL FOUNDATION PLATE

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	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

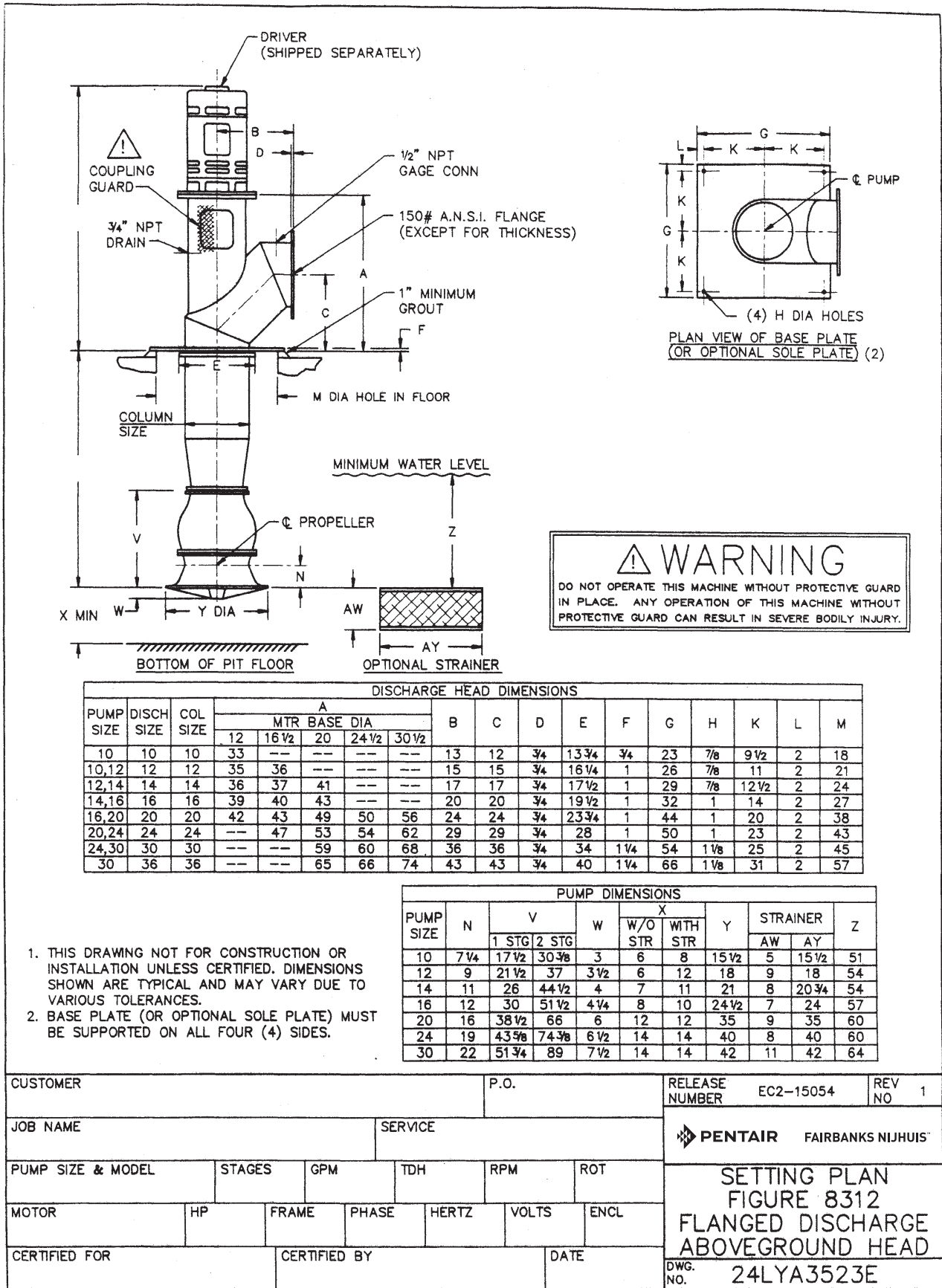
NOTE 1 : BOLT HOLES IN DISCHARGE FLANGE ARE TAPPED HOLES.

NOTE 2 : ALL DIMENSIONS $\pm 1/16"$.

ER2-12874

CUSTOMER		P.O.				
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. 24LYA2364M			

DIMENSION DRAWINGS



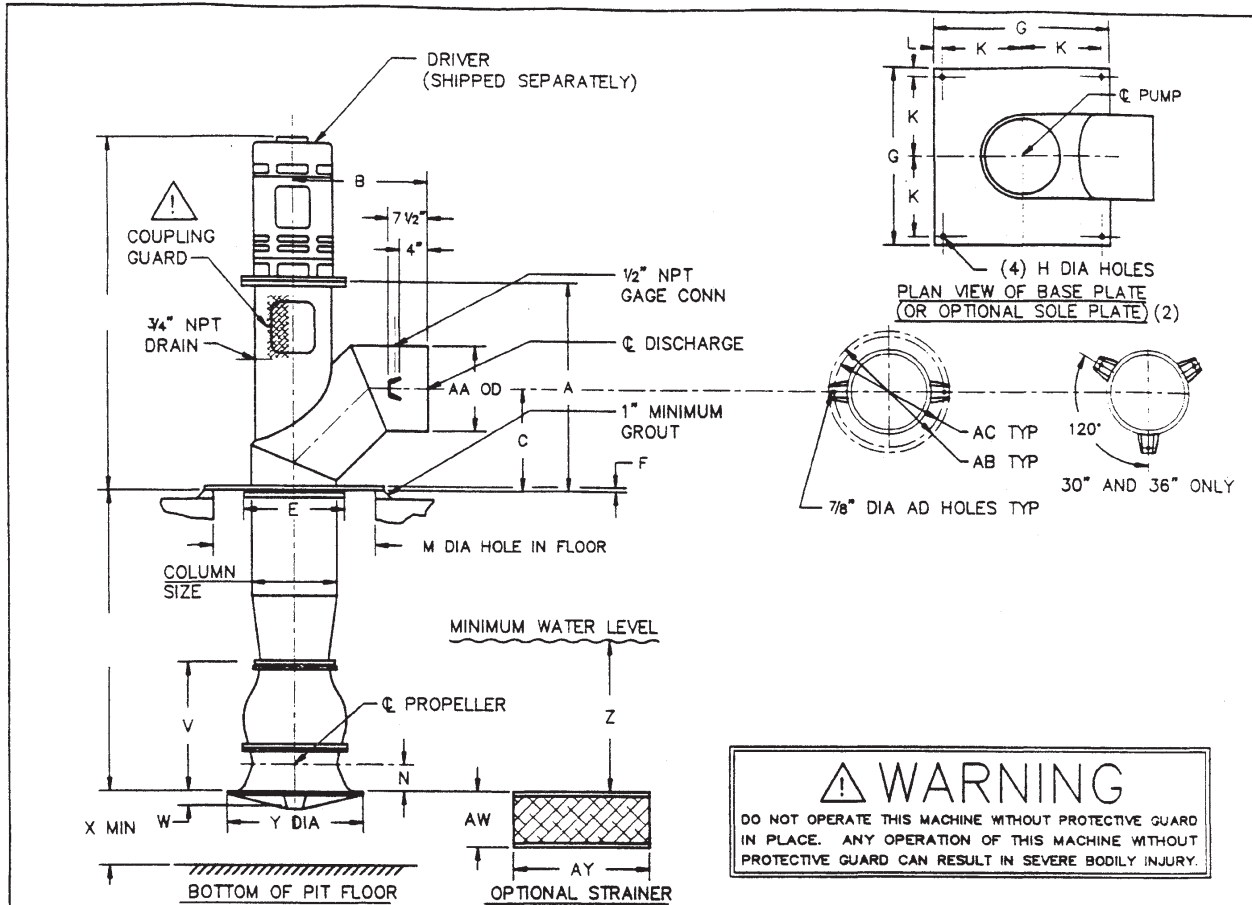
DISCHARGE HEAD DIMENSIONS																	
PUMP SIZE	DISCH SIZE	COL SIZE	A				B	C	D	E	F	G	H	K	L	M	
			12	16 1/2	20	24 1/2											30 1/2
10	10	10	33	---	---	---	13	12	3/4	13 3/4	3/4	23	7/8	9 1/2	2	18	
10,12	12	12	35	36	---	---	15	15	3/4	16 1/4	1	26	7/8	11	2	21	
12,14	14	14	36	37	41	---	17	17	3/4	17 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	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

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 FLANGED DISCHARGE ABOVEGROUND HEAD DWG. NO. 24LYA3523E			
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS	ENCL				
CERTIFIED FOR			CERTIFIED BY			DATE					

DIMENSION DRAWINGS



⚠ 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.

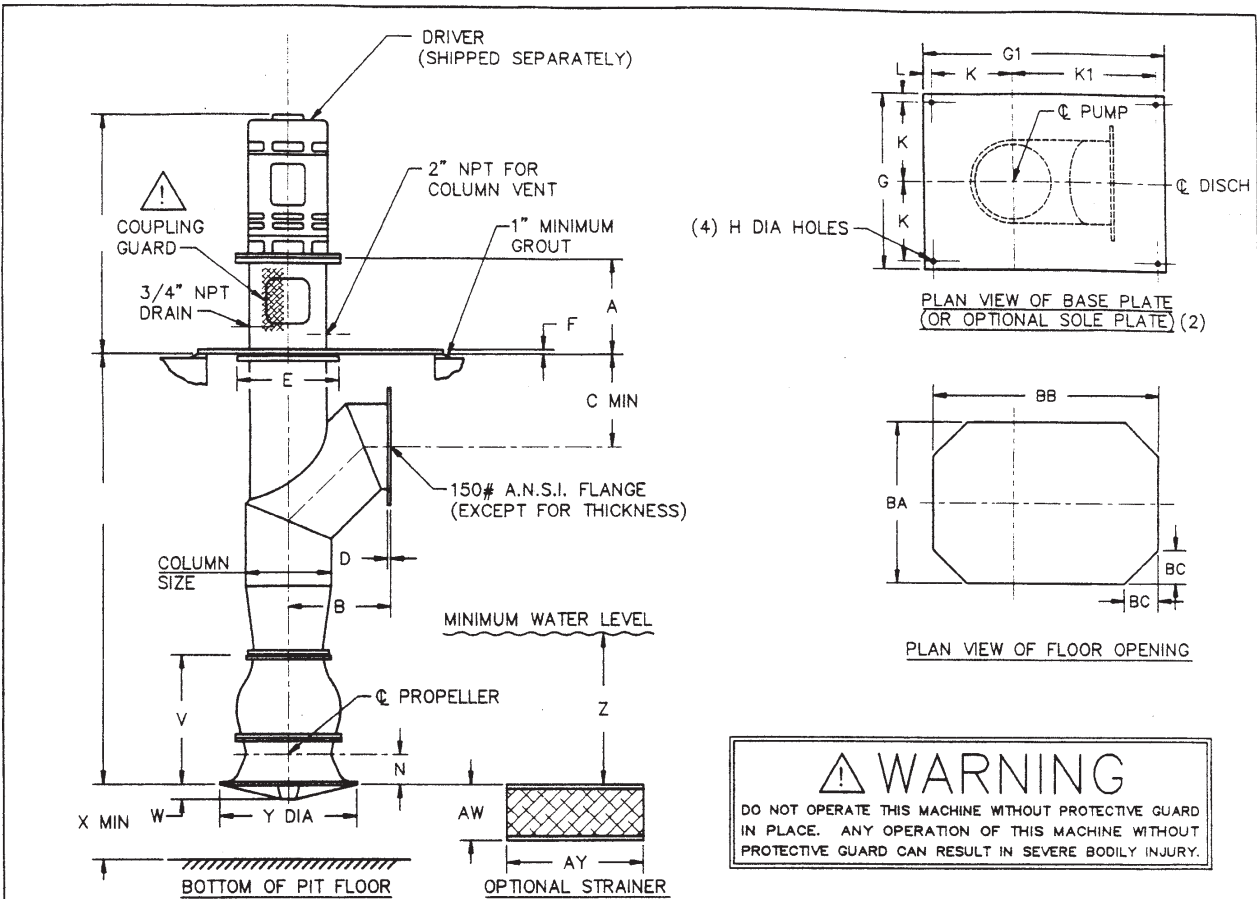
DISCHARGE HEAD DIMENSIONS																			
PUMP SIZE	DISCH SIZE	COL SIZE	A				B	C	E	F	G	H	K	L	M	AA	AB	AC	AD
			12	16 1/2	20	24 1/2													
10	10	10	33	---	---	---	18	12	13 3/4	3/4	23	7/8	9 1/2	2	18	10 3/4	19 1/4	16 3/4	2
10,12	12	12	35	36	---	---	21	15	16 1/4	1	26	7/8	11	2	21	12 3/4	21 1/2	19	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 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	

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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 8312 PLAIN END DISCHARGE ABOVEGROUND HEAD DWG. NO. 24LYA3523F			

DIMENSION DRAWINGS



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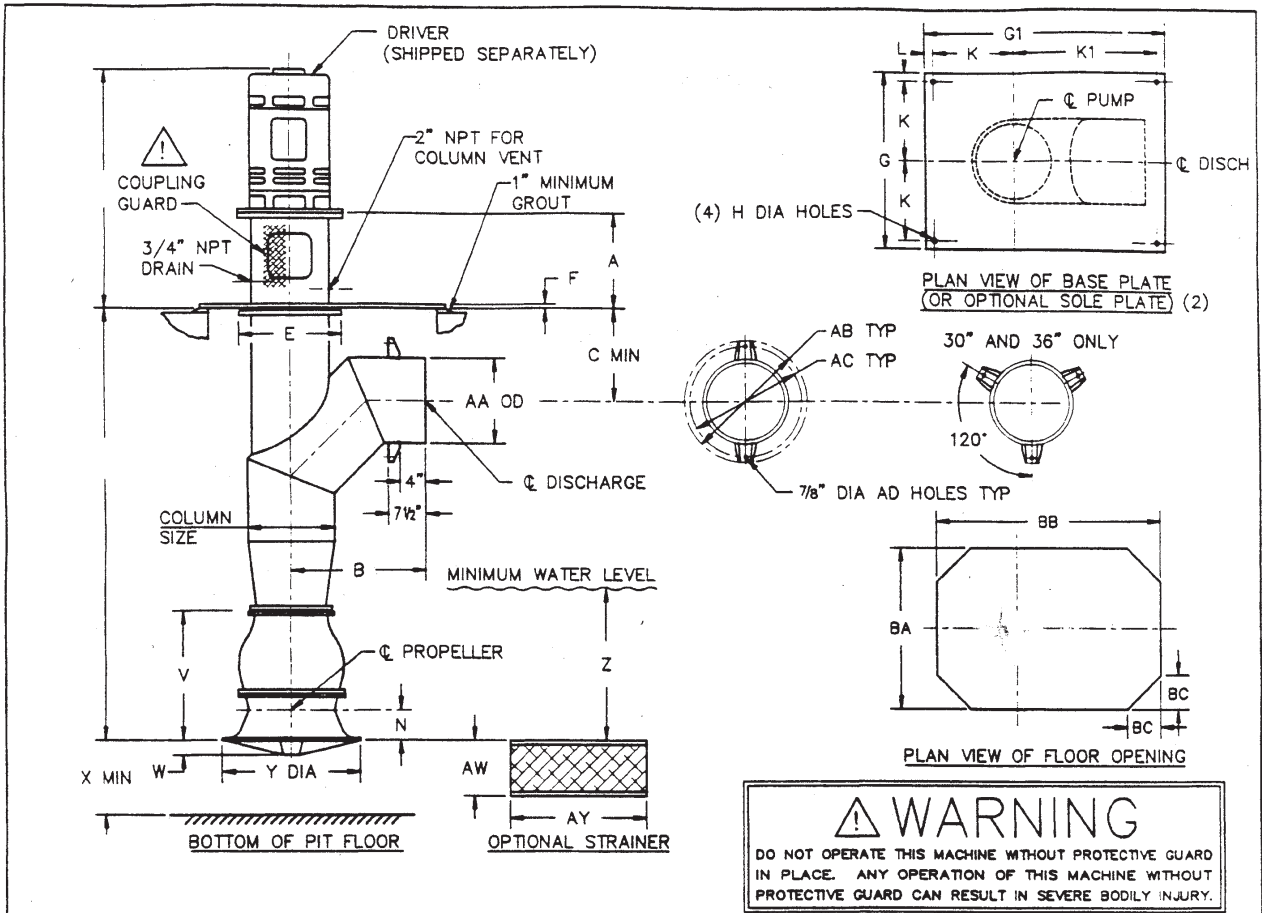
PUMP SIZE	DISCH SIZE	COL SIZE	PEDESTAL AND ELBOW DIMENSIONS													FLOOR OPENING DIMENSIONS					
			A					B	C	D	E	F	G	G1	H	K	K1	L	BA	BB	BC
			12	16 1/2	20	24 1/2	30 1/2														
10	10	10	20	---	---	---	---	13	10	3/4	13 3/4	3/4	23	35	7/8	9 1/2	21 1/2	2	18	30	5
10,12	12	12	20	20	---	---	---	15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

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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				PENTAIR FAIRBANKS NIJHUIS				
PUMP SIZE & MODEL		STAGES	GPM	TDH	RPM	ROT	SETTING PLAN FIGURE 8312 FLANGED DISCHARGE UNDERGROUND HEAD					
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS						ENCL
CERTIFIED FOR			CERTIFIED BY			DATE						
										DWG. NO. 24LYA3523G		

DIMENSION DRAWINGS



PUMP SIZE	DISCH SIZE	COL SIZE	PEDESTAL AND ELBOW DIMENSIONS																FLOOR OPENING DIMENSIONS						
			A						B	C	E	F	G	G1	H	K	K1	L	AA	AB	AC	AD	BA	BB	BC
			MTR BASE DIA																						
10	10	10	20	20	20	24	24	30	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	20	20	24	24	30	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	24	30	30	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	24	30	30	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	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	20	20	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	36	20	20	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	

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PUMP SIZE	PUMP DIMENSIONS									
	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

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 UNDERGROUND HEAD			
MOTOR		HP	FRAME	PHASE	HERTZ	VOLTS	ENCL				
CERTIFIED FOR		CERTIFIED BY			DATE						
								DWG. No. 24LYA3523H			

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FM-01-5002 (10-15-22)