Dean Pump Division

Heavy Duty, High

Temperature Process Pumps

R4140 Telescoping Guard

R4140 C-Face Motor Support
Dean Pump Series R
Centrifugal Process Pumps

- Capacities to 5000 GPM (1135 m³/hr)
- Heads to 800 feet (245 m)
- Pumping temperatures to 850°F (454°C)
- Working pressures to 500 PSIG (3445 kPa)

Experience
Dean Pump is recognized as the industry leader in the design and manufacture of horizontal hot oil/hot water centrifugal process pumps used extensively in the following industries: chemical and petrochemical plants, power plants, plastics, heat transfer OEMs, commercial (hospitals, universities, laboratories), government facilities, pharmaceutical, and food processing.

Dean Series R centrifugal process pumps are designed to insure long, continuous service life at low cost. Each phase in the production of these pumps is meticulously monitored by an independent quality control department.

Pump Sizes
The Dean Series R pump is an end-suction, center line supported, back pull out design regularly available in 27 sizes and divided into four size classifications:

- the R4140 Series in 17 sizes
- the R440 Series in 3 sizes
- the R450 Series in 5 sizes
- the R480 Series in 2 sizes

Materials
Standard materials of construction include carbon steel and 316SS. (Standard Materials of Construction chart is available on Page 3).

Parts Interchangeability
The Series R provides the ultimate in standardization. With wide parts interchangeability among pump sizes, fewer parts are required for inventory. A complete stock of spare parts is readily available from Dean Pump or its network of stocking distributors, thereby reducing shipping time to a minimum.

Shaft Sealing
Dean Pump offers a broad line of mechanical seals and standard packing sets to solve the most difficult sealing problems. Jacketed standard bore (stuffing box), and large taper bore, seal chambers are available for specific applications.
MECHANICAL DESIGN SPECIFICATIONS

**Direction of Rotation (Viewed from Coupling End)**: CCW

**Casing Corrosion Allowance**: 1/8"

**Impeller** — Standard: Single Plane Balanced

Optional Extra: Dynamically Balanced

**Flanges** — ASME/ANSI B16.5 Rating: Class 300

**Facing**: Standard Raised Face

**Finish**

- Seal Chamber Pressure
- Suction Pressure
- Maximum Working Pressure
- Less Pump Developed Head

**Flanges — ASME/ANSI B16.5 Rating**: Class 300

**Seal Chamber Pressure**

- Suction Pressure, Maximum: . . . Max. Working Pressure Less Pump Developed Head

**Flanges — ASME/ANSI B16.5 Rating**: Class 300

**With Balance Holes**

- Seal Chamber Pressure
- Suction Pressure
- Plus .06 x Pump Developed Head

**Without Balance Holes**

- Seal Chamber Pressure
- Suction Pressure
- Plus .06 x Pump Developed Head

* Pumps are normally furnished with balance holes

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### STANDARD MATERIALS OF CONSTRUCTION

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>PART NAME</th>
<th>CARBON STEEL (CL. 40)</th>
<th>316 SS (CL. 50)</th>
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<td>*25A</td>
<td>Thrust Bearing</td>
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<td>Bearing Housing</td>
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<td>Mechanical Seal Rotary</td>
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<td>*109</td>
<td>Oil Cooler Assembly</td>
<td>SS Tubing with Steel</td>
<td>Fin &amp; Steel Fittings</td>
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### SEAL CHAMBER TEMPERATURE VS. PUMPING TEMPERATURE

With respect to the GPM of cooling water flowing through the cooling jacket surrounding the seal chamber.

**GPM Flow Rate of Cooling Water Based on 70°F (21°C) Inlet Temp**

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**MATERIAL SPECIFICATIONS (REFER TO NUMBERS IN PARENTHESES)**

[1] Cast Iron
[2] AISI 1050
[3] AISI 1045
[4] AISI 1040 — ASTM A574 Grade CBFM
[5] AISI 4140, AISI 4140-B7 Steel
[6] AISI 4140 — ASTM A770 Grade 807
[7] AISI H-11 Grade 2 Steel
[8] AISI H-11 Grade 4 Steel
[9] ASTM A270 Grade 316 Welded Steel (20 & 80°F)
[12] Solid 55 27 26 23
[13] Sleeved 101 44 78 36

† Carbon Steel with Cast Iron trim. Also available with 316SS trim.
9. HEAVY DUTY SHAFT AND BEARINGS
Carbon steel pump shaft (316SS optional) is designed for a maximum deflection of less than 0.002” (0.05mm) at the mechanical seal faces. The duplex mounted angular contact thrust bearings and the single row, deep groove, radial bearing are sized for a 2 year minimum life and a 10 year average life.

10. STANDARD Labyrinth SEALS (R4140 ONLY)
Rugged bronze construction with Viton® o-rings. Available as an option on the R440, R450, and R480 pumps. Magnetic face seals are also an option for all pumps.

11. LUBRICATION OPTIONS
Oil bath lubrication is standard. The extra large oil reservoir is designed for cooler bearing operation. The bearing housing is set up to accommodate oil mist lubrication and grease lubrication as available options. The finned tube oil cooler is provided as standard, to directly cool the oil for lower bearing temperature.

12. Fill Plug (R4140 ONLY)
Easy access to fill plugs supplied on both sides of the bearing housing. Designed to minimize the possibility of overfilling. The R440, R450, and R480 pumps are filled through an automatic (bottle) oiler.

13. ONE INCH OIL SIGHT GLASS (R4140 ONLY)
Allows for simple and easy monitoring of oil level and condition. The sight glass can be installed on either side of the bearing housing, in the field, for best location and ease of viewing. A combination automatic (bottle) oiler/sight glass is an available option on the R4140. The R440, R450, and R480 pumps are standard with an automatic (bottle) oiler.

14. BREATHER VENT
A filtered bearing housing breather is standard. An optional expansion chamber is available that is used with the optional magnetic oil seals when a sealed bearing housing is desired.

15. PILOT AND BOLT HOLES
The bearing housing of the R4140 is supplied with a pilot fit and four bolt holes at the motor end. The holes allow for mounting of the telescoping coupling guard. The pilot fit also allows for use of an optional “C-Face” motor support. The support permits self-aligning of the motor shaft to the pump shaft.
1. CASING COVER
   Jacketed standard bore or large taper bore. Designed to provide the best environment for the specific application and service conditions.

2. INTEGRAL ONE-PIECE CASING FLANGES
   Flanges dimensioned according to ASME/ANSI B16.5 Class 300. Raised face flanges are standard. Ring type joint flanges (Class 300) are available as an option.

3. SEALING FLEXIBILITY
   Choice of packed box or mechanical seal. Wide range of sealing arrangements (inside/outside, single/double, balanced/unbalanced, etc.) available to meet specific application and service conditions.

4. CLOSED IMPELLER
   Allows thermal expansion of the pump shaft at high pumping temperatures without interference of the impeller with the casing or the casing cover. Keyed to shaft with positive locking device. Replaceable wear rings optional.

5. SHAFT SLEEVE
   Replaceable “hook type” shaft sleeves provided as standard. Allows replacement of the wearing surface without having to replace the pump shaft or the bearings. The design allows the shaft sleeve to expand thermally, independent of the pump shaft. The standard sleeve material is 316SS. Sleeves of alloy construction, hard-facing, hardened chrome 11-13%, or ceramic coatings are available as options. Solid sleeveless shafts are also available.

6. CENTERLINE CASING SUPPORT
   The pump is supported at the horizontal centerline of the casing so that the thermal expansion of the casing will not affect the shaft alignment.

7. CASING FEET
   Three different foot designs are available. The standard is a “yoke” design which allows the pump to fit on an ASME/ANSI B73.1 baseplate (as well as Dean’s “Economy” baseplates).
   The second “pedestal” design allows for mounting on API-type baseplates.
   The last design is a “water-cooled” pedestal design (as shown) used specifically for severe service conditions and applications.

8. COOLING PIPING
   Optional tubing (as shown) connects the “water-cooled” pedestal design with the casing cover jacket.
   Also available is optional tubing that connects the casing cover jacket with the finned tube oil cooler, and/or tubing that connects the cooled pedestal feet with the casing cover jacket.
THE R400 & R4000 WITH SEAL CHAMBER COOLING AND BEARING FRAME COOLING

- Double volute casings on larger sizes
- Optional impeller wear ring shown (Casing wear rings are standard)
- Positive impeller locking device
- Class 300, raised face flanges
- Fully confined compression gasket (spiral wound, controlled compression gasket is an option)
- End-suction, top centerline discharge
- Labyrinth seals standard on R4140 sizes, optional on R440, R450, and R480 sizes. Magnetic seals optional for all pump sizes
- Top mounted, filtered breather vent
- Hydraulically balanced enclosed impeller, keyed to "Hock-Type" shaft sleeve
- Hook-type shaft sleeve
- Duplex mounted angular contact thrust bearings
- Bearing frame finned tube oil cooler
- Centerline mounted water-cooled pedestal are optionals
- Highly efficient seal chamber cooling jacket concentrated around the mechanical seal
- JACKETED STANDARD BORE (STUFFING BOX) SEAL CHAMBER

Lubrication and cooling systems are designed for reliable operation.
THE R400 & R4000 WITH LARGE TAPER BORE SEAL CHAMBER

Double volute casings on larger sizes
Optional impeller wear ring shown (Casing wear rings are standard)
Positive impeller locking device
Class 300, raised face flanges
Fully confined compression gasket (spiral wound, controlled compression gasket is standard on R4140 sizes, R4500, and R4800 sizes)
Magnetic seals optional for all pump sizes.
Centerline mounted water cooled pedestals are optional
Labyrinth seals standard on R4140 sizes, optional on R440, R450, and R480 sizes
Self-venting large taper bore seal chamber
Hydraulically balanced enclosed impeller, keyed to shaft sleeve
End-suction, top centerline discharge
Top mounted, filtered breather vent
"Hook-type" shaft sleeve
Bearing frame finned tube oil cooler
Duplex mounted angular contact thrust bearing
LARGE TAPER BORE SEAL CHAMBER
THE R4140 WITH SEAL CHAMBER COOLING AND "C-FACE" FLANGED MOTOR SUPPORT

- Double volute casings on larger sizes
- Optional impeller wear ring shown (Casing wear rings are standard)
- Positive impeller locking device
- Class 300, raised face flanges
- Fully confined compression gasket (spiral wound, controlled compression gasket is an option)
- Centerline mounted (water cooled pedestals are optional)
- Hydraulically balanced enclosed impeller, keyed to "Hook-type" shaft sleeve
- Labyrinth seals standard on R4140 sizes, optional on R440, R450, and R480 sizes. Magnetic seals optional for all pump sizes.
- Bearing frame finned tube oil
- Duplex mounted angular contact thrust bearing
- "C-FACE" MOTOR SUPPORT
- Top mounted, filtered breather vent
- "Hook-type" shaft sleeve
- End-suction, top centerline discharge
- Highly efficient seal chamber cooling jacket concentrated around the mechanical seal. Large taper bore also available.

"C-FACE" MOTOR SUPPORT

Optional "C-Face" motor support, provides self-aligning of the motor shaft to the pump shaft.
Casing covers with jackets and large taper bore seal cavities are available on all pumps. Bearing housings with finned tube oil coolers are standard on all pumps.
JACKETED STANDARD BORE (STUFFING BOX) SEAL CHAMBER

- Designed to remove heat from the sealing device only.

LARGE TAPER BORE SEAL CHAMBER

- Designed to remove heat and vapor out of the seal chamber and away from the seal faces.

EXTENDED SEAL LIFE AND FLEXIBILITY

WORKING PRESSURE VS TEMPERATURE

used to determine the allowable working pressure at any allowable process fluid temperature for the material of construction selected.
### Dimensions of R4140 with “Economy” Baseplate

#### All Dimensions in inches.

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<th>Pump Size</th>
<th>Discharge</th>
<th>Suction</th>
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