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Sulzer Pumps

MSD Multi-Stage Dual Volute Pumps

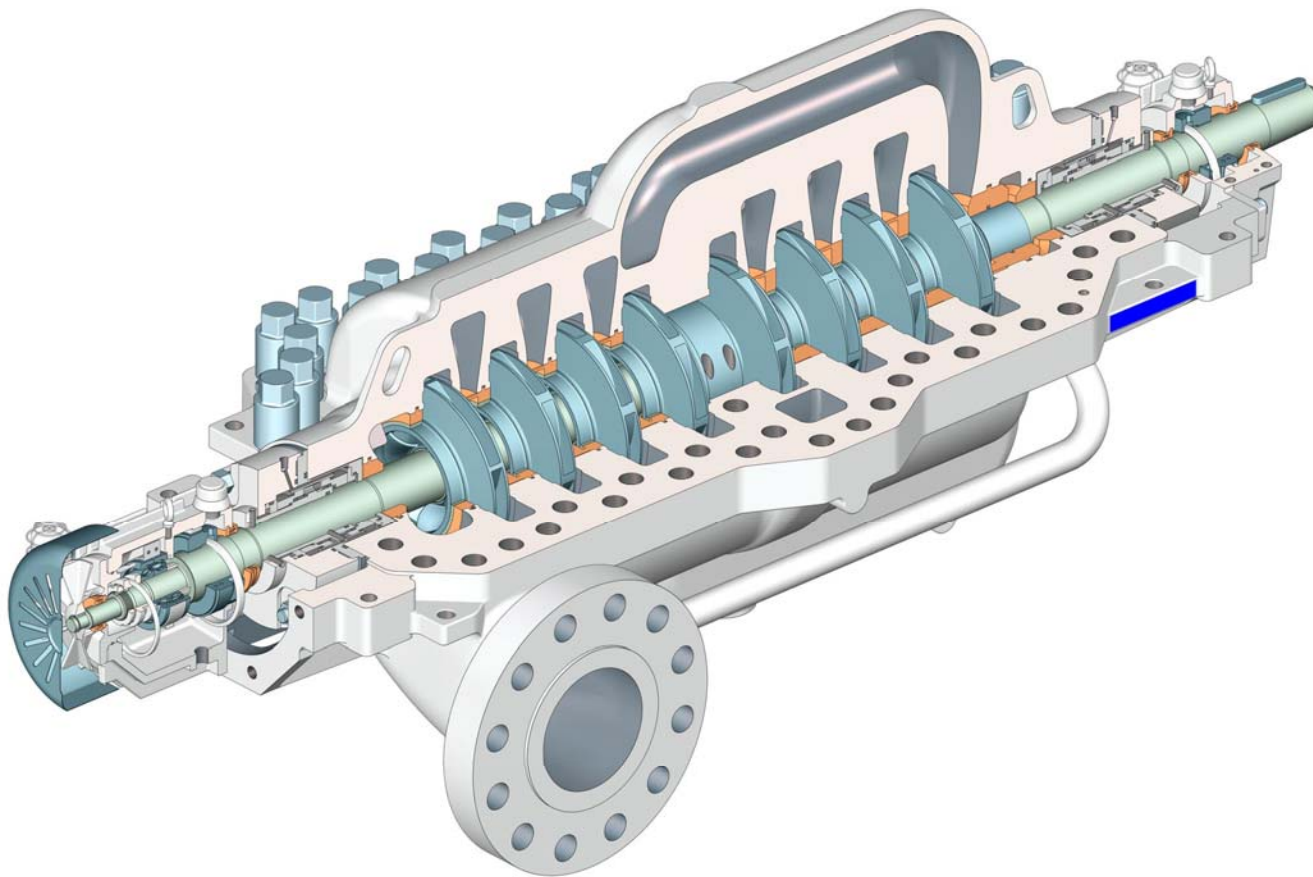


The Heart of Your Process

MSD Multi-Stage Dual Volute ISO 13709 (API 610) Pumps

SULZER

Sulzer Pumps



MSD Applications

- High pressure pumps in all applications where ISO 13709 (API 610) standards of construction are required such as
 - Refineries
 - Petrochemical plants
 - Oil production facilities
 - Gas processing plants
- Boiler feed pumps
- HP pumps in reverse osmosis plants
- Power recovery turbines



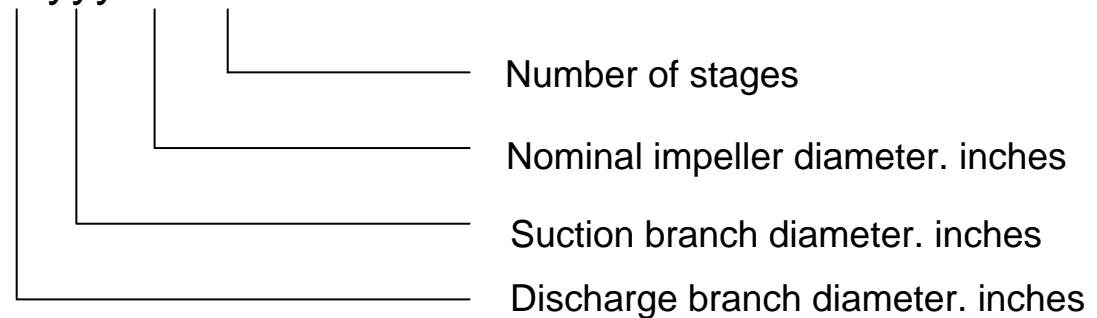
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Size Designation

- API type BB3

Axially split, horizontal multistage

- Sulzer designation MSD xx-yyy-zzz n

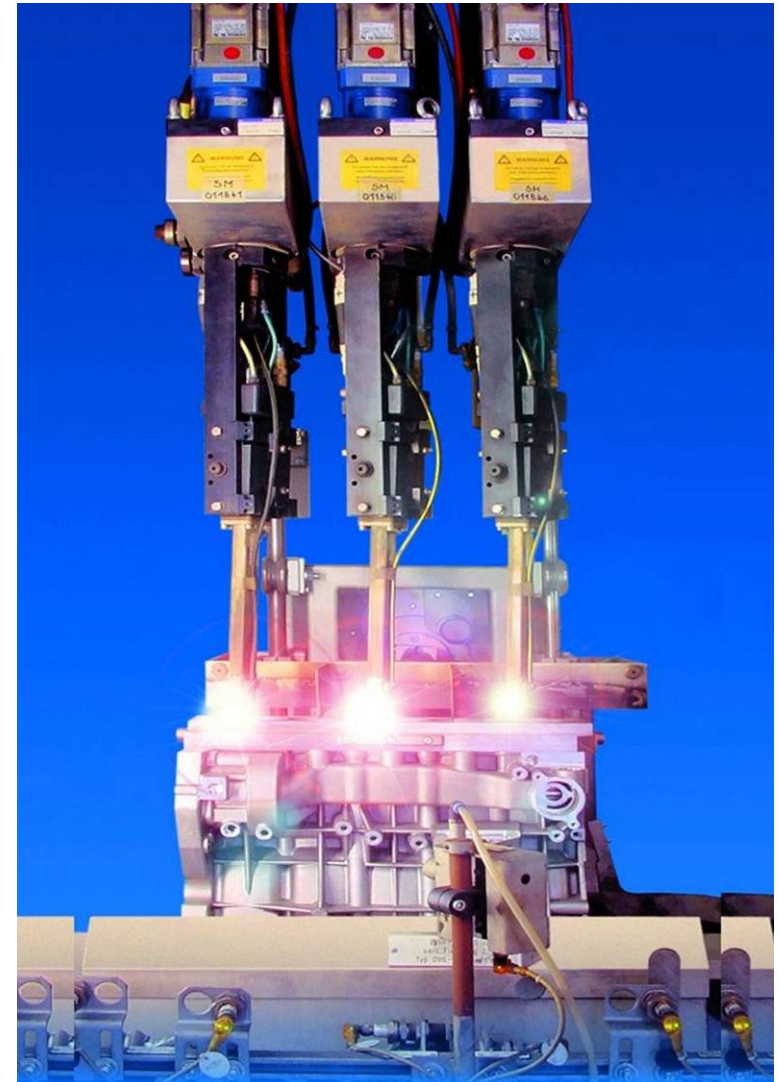


It is available in alternate configurations to suit different applications and operating requirements.

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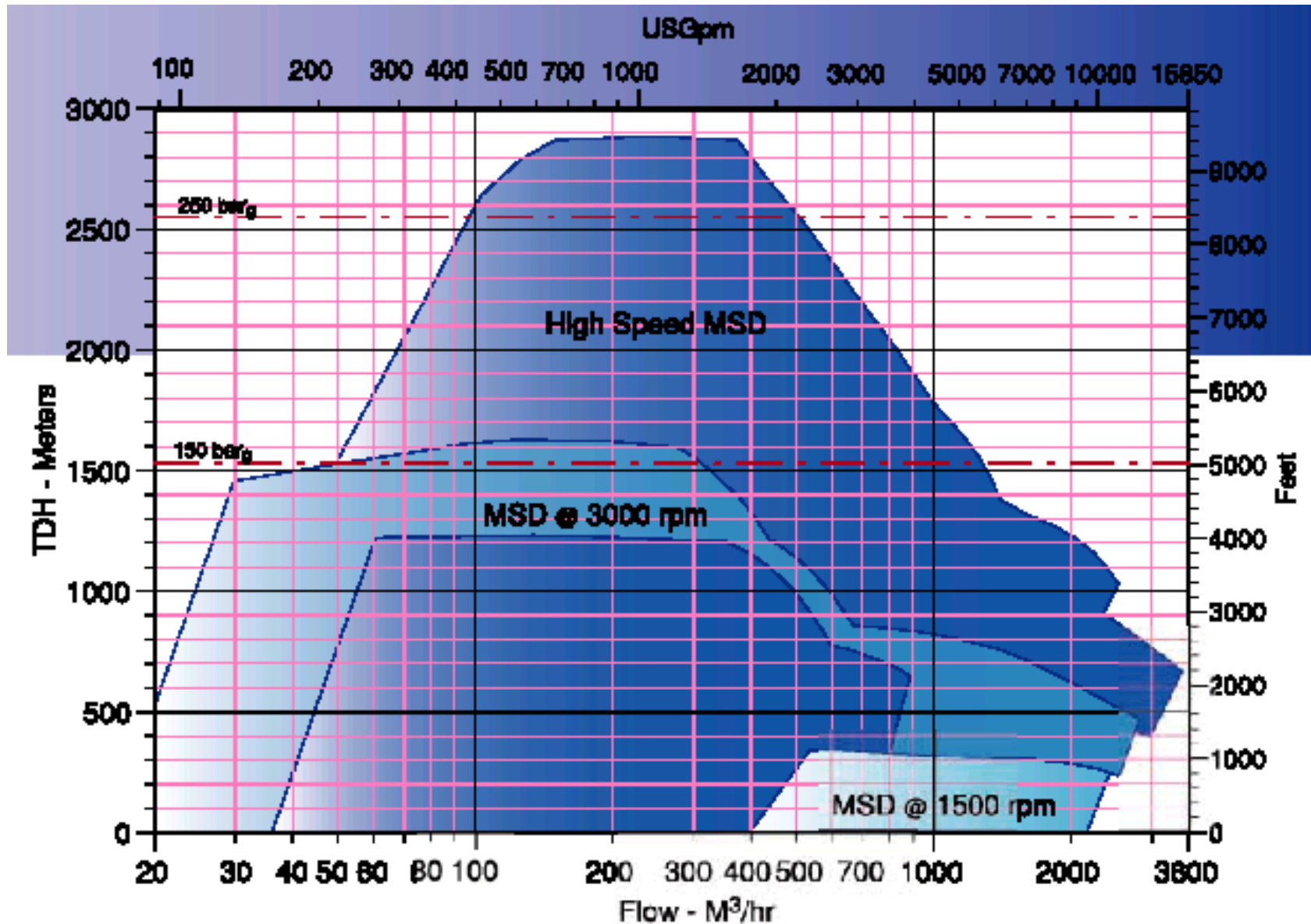
Materials and Enhanced Wear Life

- MSD pumps are available in all the ISO 13709 (API 610) material combinations.
- Wear Parts are often overlaid with a variety of welded or HVOF hardcoatings for added resistance to erosion most commonly associated with sand in produced crude oils or produced water.
- Sulzer Metco SUME coatings have proven to add remarkable life to those high velocity areas, as well as impeller exit vanes and volute lips.



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Hydraulics – 50Hz

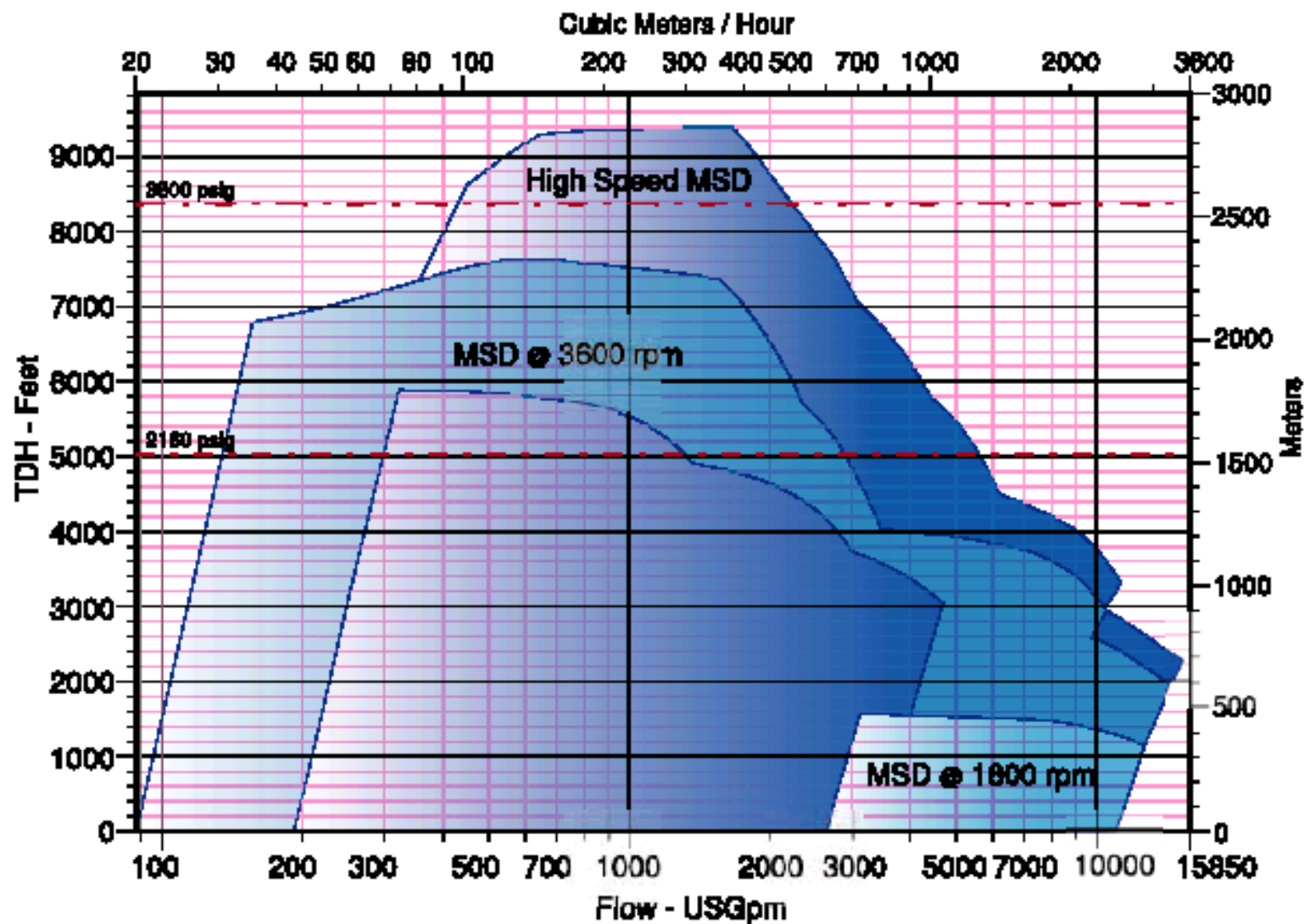


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Performance – 60Hz

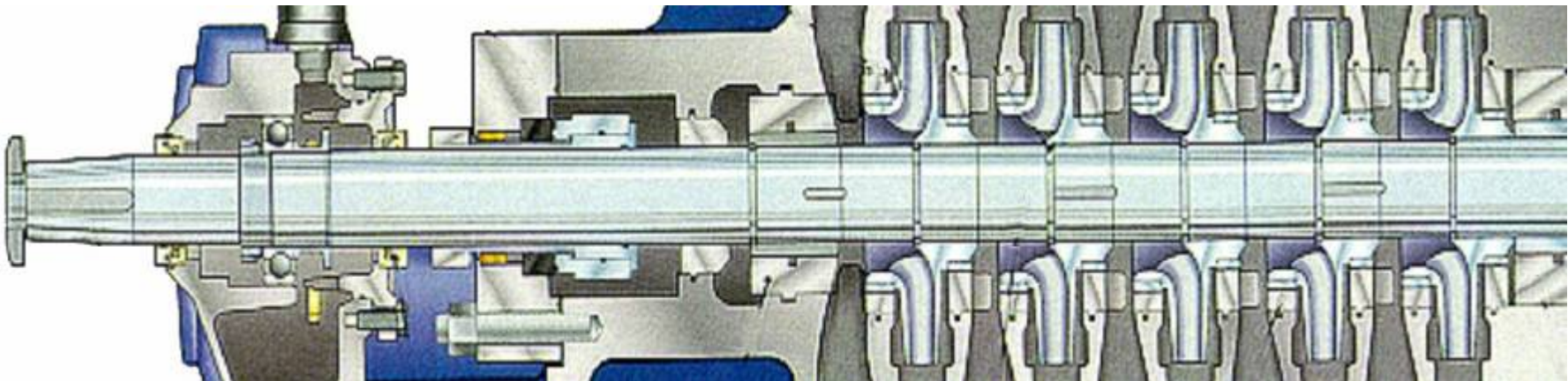
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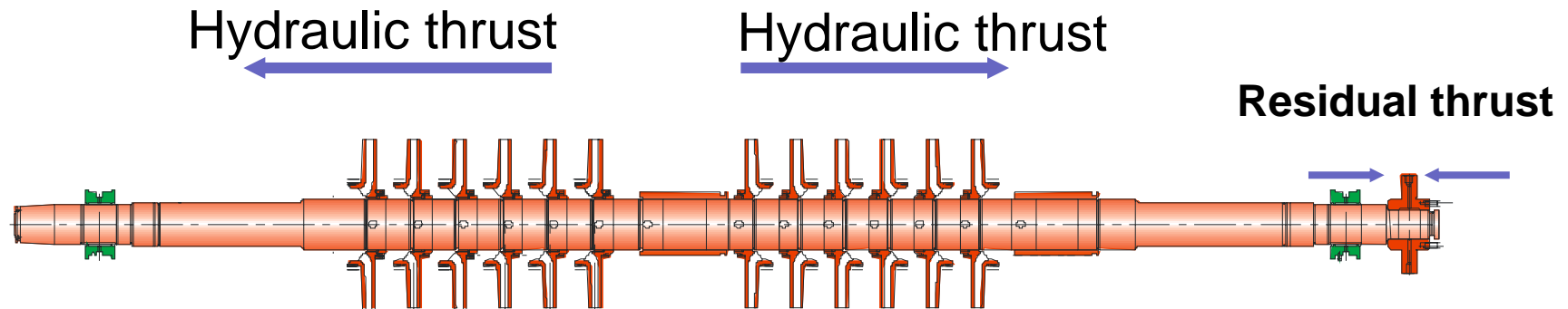


MSD Design Features: Shaft & Casing

- Large shaft diameter, stepped for easy assembly and tapered at coupling for ease of mechanical seal repair
- Sized to satisfy rotor dynamics and power transmission
- Each stage is dual volute for radial balance
- Opposed impeller design balances axial thrust
- Allows ball thrust bearings to be used at higher energy levels without expensive lube systems



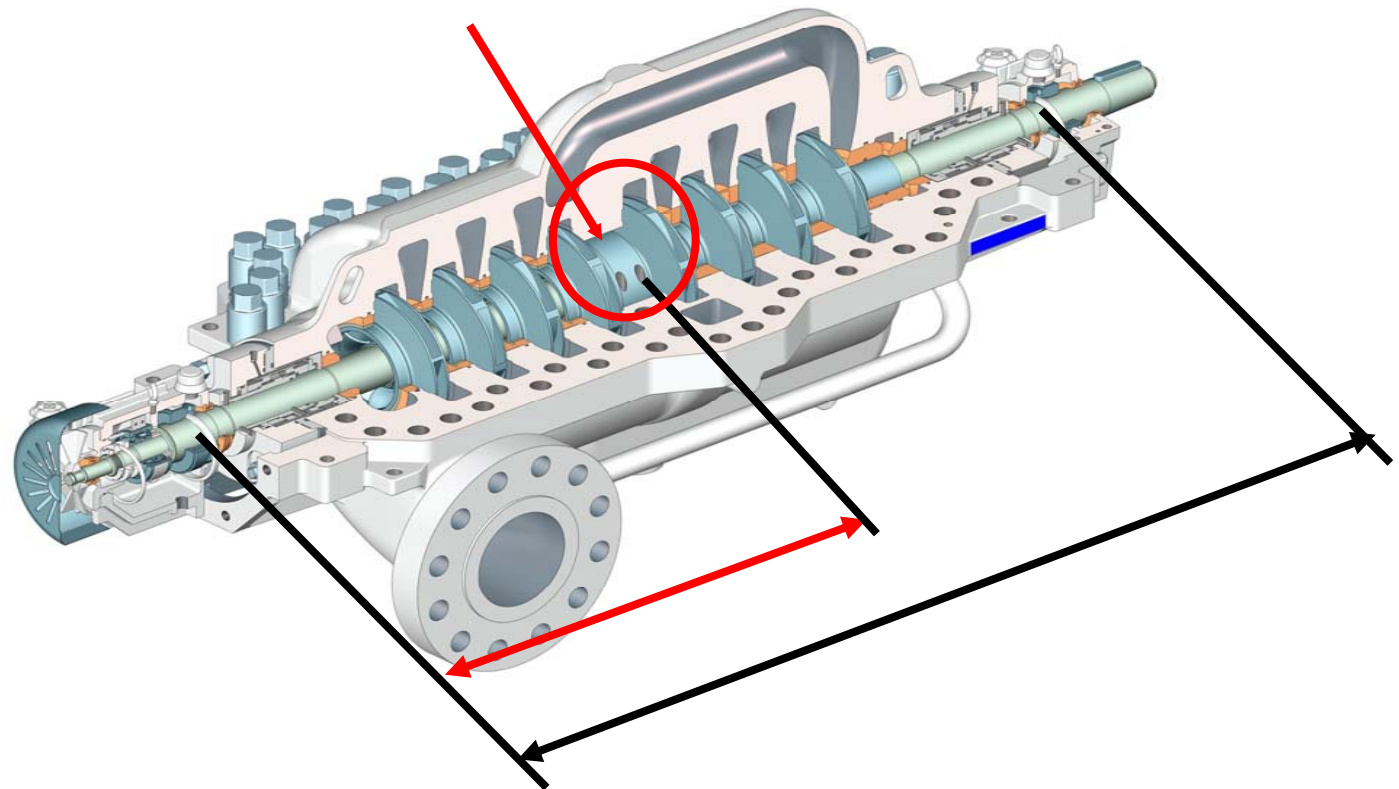
Axial Thrust with opposed impellers



- Changes in axial thrust due to wear in clearances results in almost no change in small residual thrust over lifetime.
- Hence a smaller thrust bearing can be selected.
- Most MSD product pipeline pumps run with sleeve radial bearing and ball thrust bearing for that reason – no lube system required.

Rotordynamics with Opposed Impellers

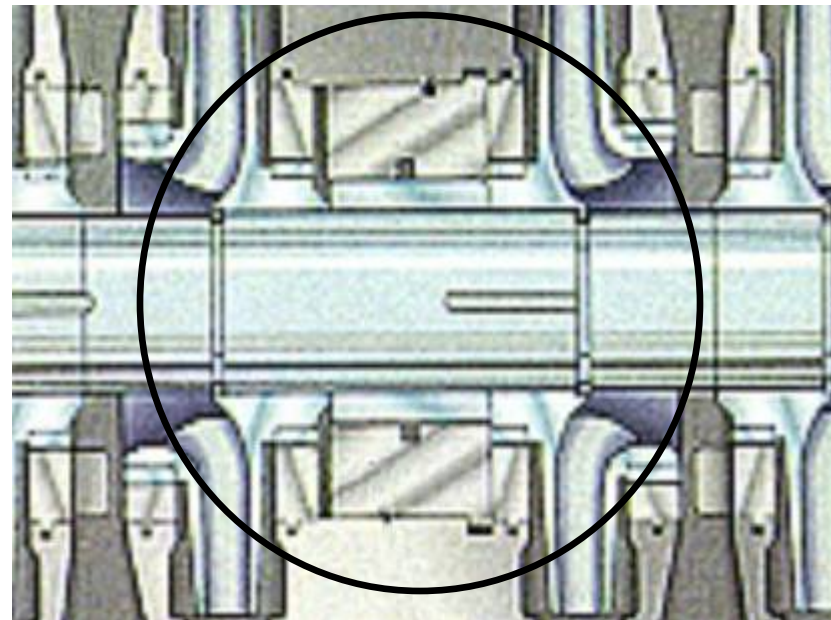
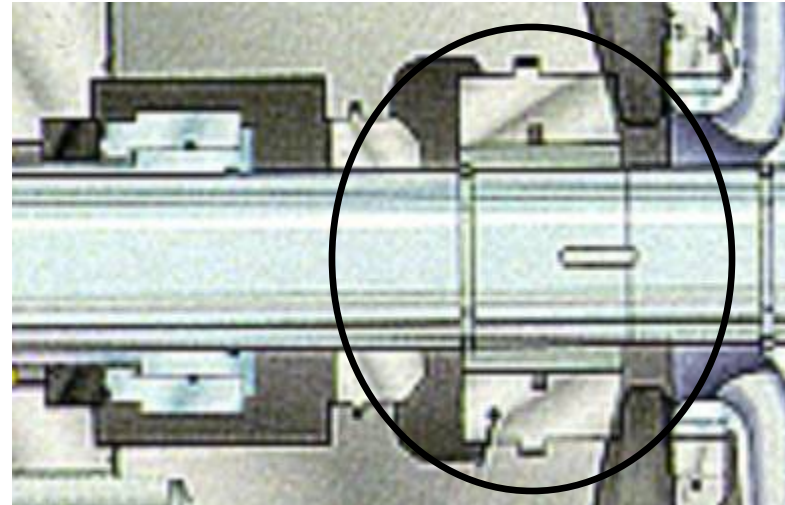
ISO 13709 requires that the rotor be stable with 2 times normal wear ring clearances. The center bushing is a very effective bearing. As long as there is discharge pressure in the discharge nozzle, there is fluid in the center bushing. Over 10,000 MSD pumps are running with this design. We use it on high stage count, high energy barrel pumps also. The Sulzer Thunderhorse 650 Bar (9400 psi), 13MW (17,500 hp) injection pumps are designed in this manner for this reason.



MSD Design Features: Throttle Bushing & Center Bushing

- Throttle bushing at HP end;
 - Single piece design
 - Reduces pressure in DE seal chamber
 - Provides axial thrust balance

- Center bushing
 - Split construction for ease of assembly and inspection
 - Balances axial thrust
 - Provides maximum rotating element support and damping



MSD Design Features: Impellers, Wear Rings and Bushing

■ Impellers

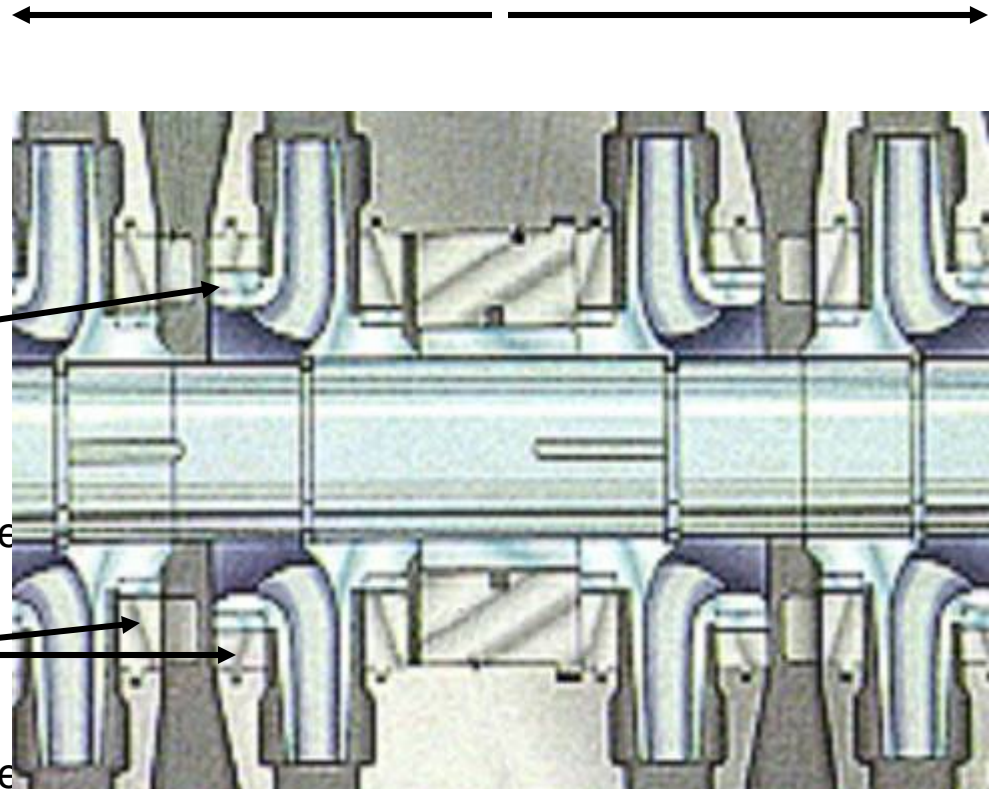
- Dynamically balanced
- Individually secured
- Opposed layout
- Double suction option

■ Wear Rings

- Tongued construction
- Pinned for anti-rotation at the split line

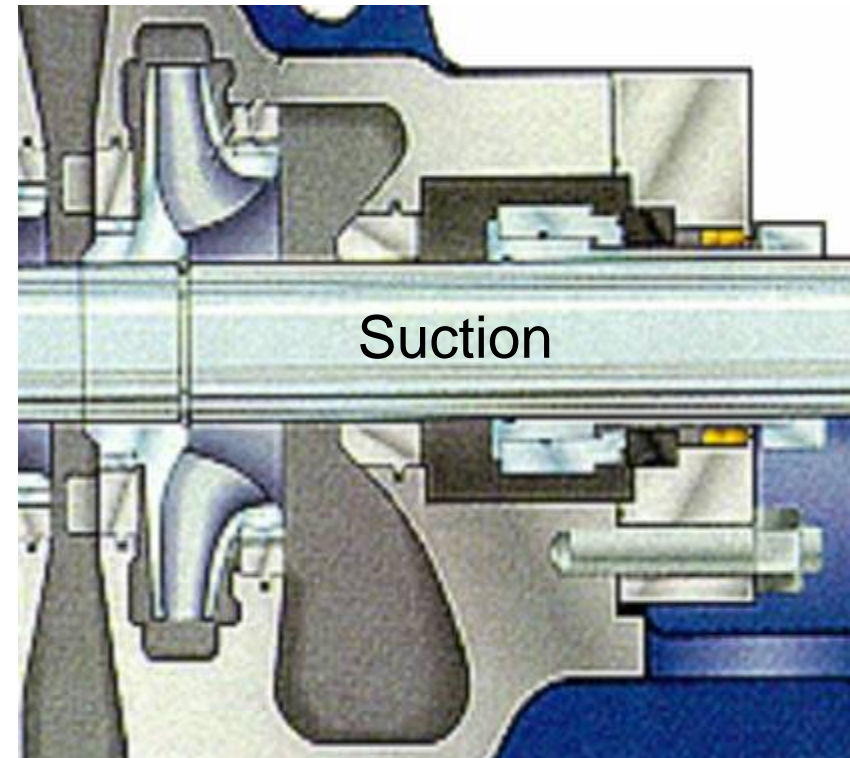
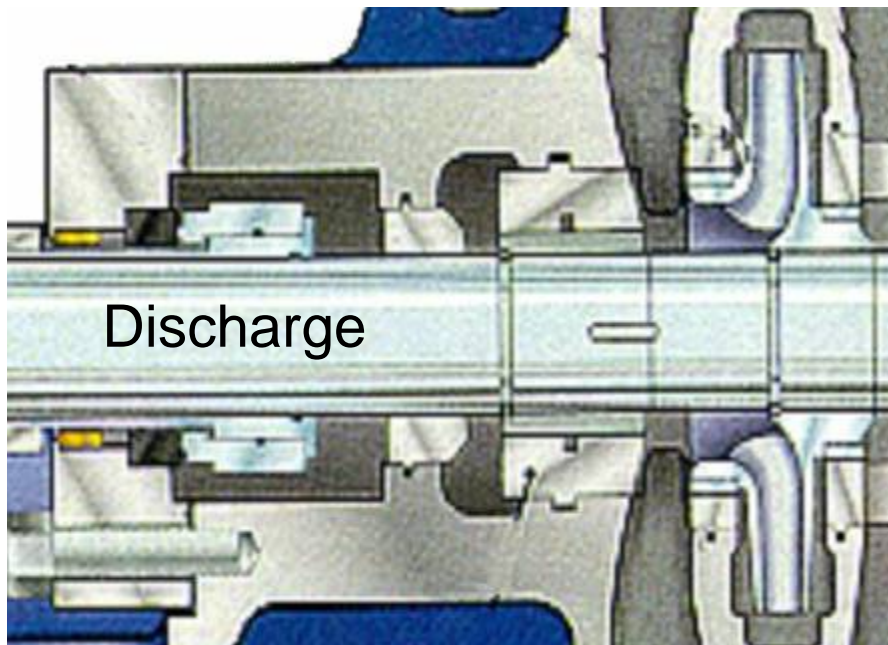
■ Inter-stage bushing

- Tongued construction
- Pinned for anti-rotation at the split line



MSD Design Features: Seal Chambers

- Full compliance with ISO 13709 dimensions
- Space for all seal configurations
- De & NDE chamber at the same pressure due to throttling bushing and balance line



MSD Design Features

Axially Split Casing

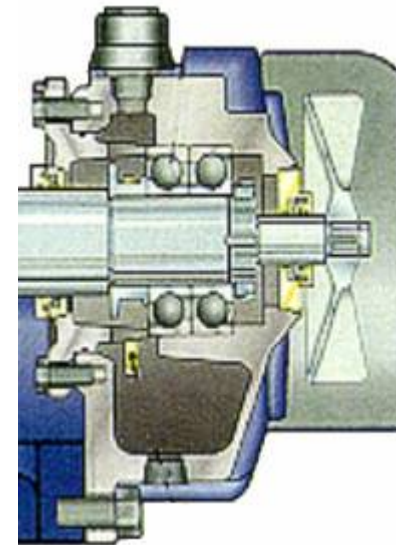
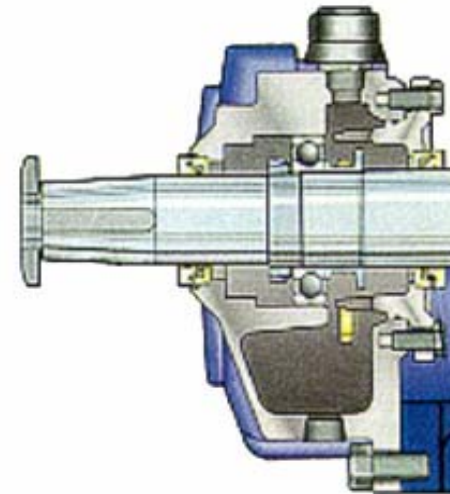
- Simple rotor inspection and replacement
- Easy hydraulic passageway inspection
- Quick rotor installation in casing as complete assembly after dynamic balancing
- Fast return to service: Suction and discharge pipework remain connected when inspecting or replacing the rotor



MSD Design Features

Bearing Options – Ball/Ball

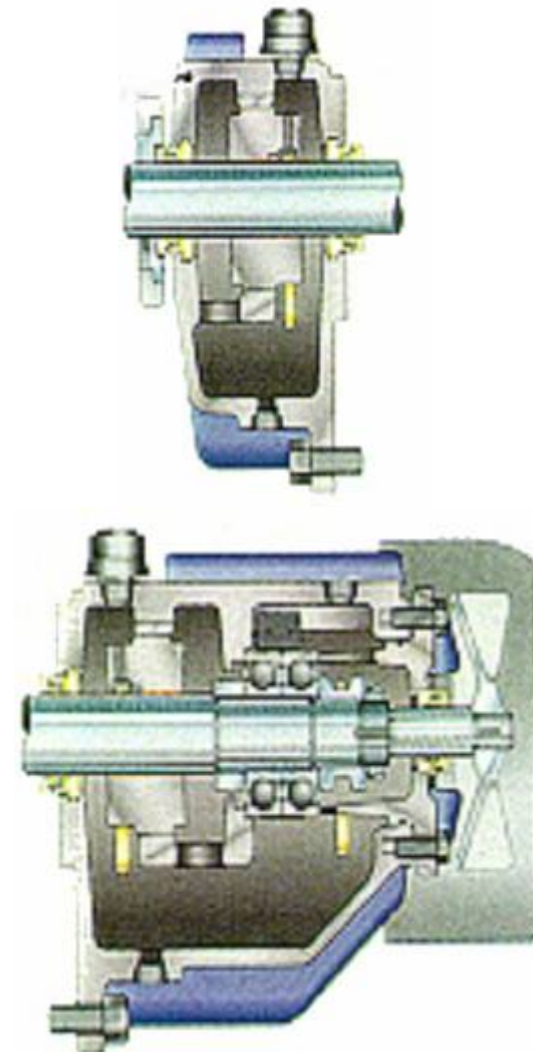
- Ball/ball bearings standard
- Ring oil lubrication
- Carbon steel finned bearing housing
- Cooling fan for the thrust bearing (NDE)
- Pure or purge oil mist lubrication possible



MSD Design Features

Bearing Options – Sleeve/Ball

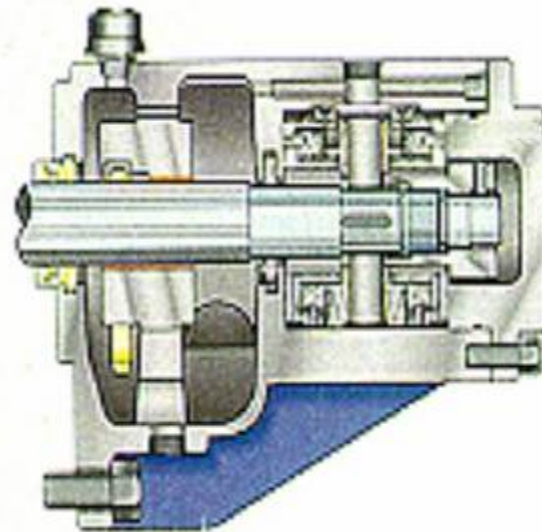
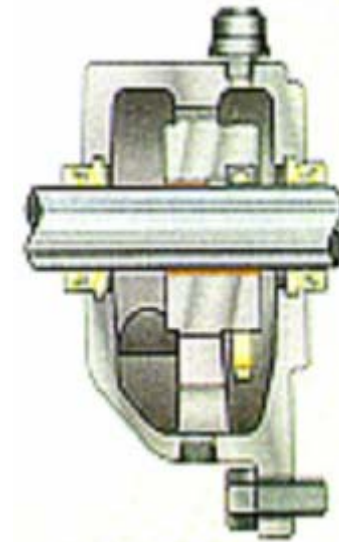
- Used on larger sizes
- Used where the absorbed power exceeds the limits of ball/ball bearing arrangements
- Carbon steel finned bearing housings
- Fan cooled or pumpage cooled options



MSD Design Features

Bearing Options – Sleeve/Pivot Shoe

- High speed pumps
- When compliance with ISO 13709 is required due to high power levels
- When required by customer specifications
- Requires pressure lubrication system
- Carbon steel finned bearing housings
- Variety of instrumentation available



Engine Driven MSD-D



Motor + Fluid Coupling Driven MSD-D



Motor-Geared Fluid Coupling Driven MSD



Motor Driven MSD + Lube System



MSD-DD (Double, Double Suction)

For high flowrates with very low NPSH_r, the MSD-DD with 2 double suction first stage impellers is available.



MSD / HSB-T Carbonate Trains

For Nitrogenous Fertilizer plants, large MSD pumps with HSB power recovery turbines are supplied.

Sulzer takes a very conservative approach to such applications with entrained gases. We have learned from experience.



Gas Turbine Driven MSD's

These Solar driven MSD's are for an offshore crude oil shipping application in Africa.

Sulzer Pumps USA has supplied 100's of MSD pumps to Solar since the 1960's for a variety of pipeline and waterflood applications

Sulzer Pumps and Solar continue to work together to meet customer requirements.

