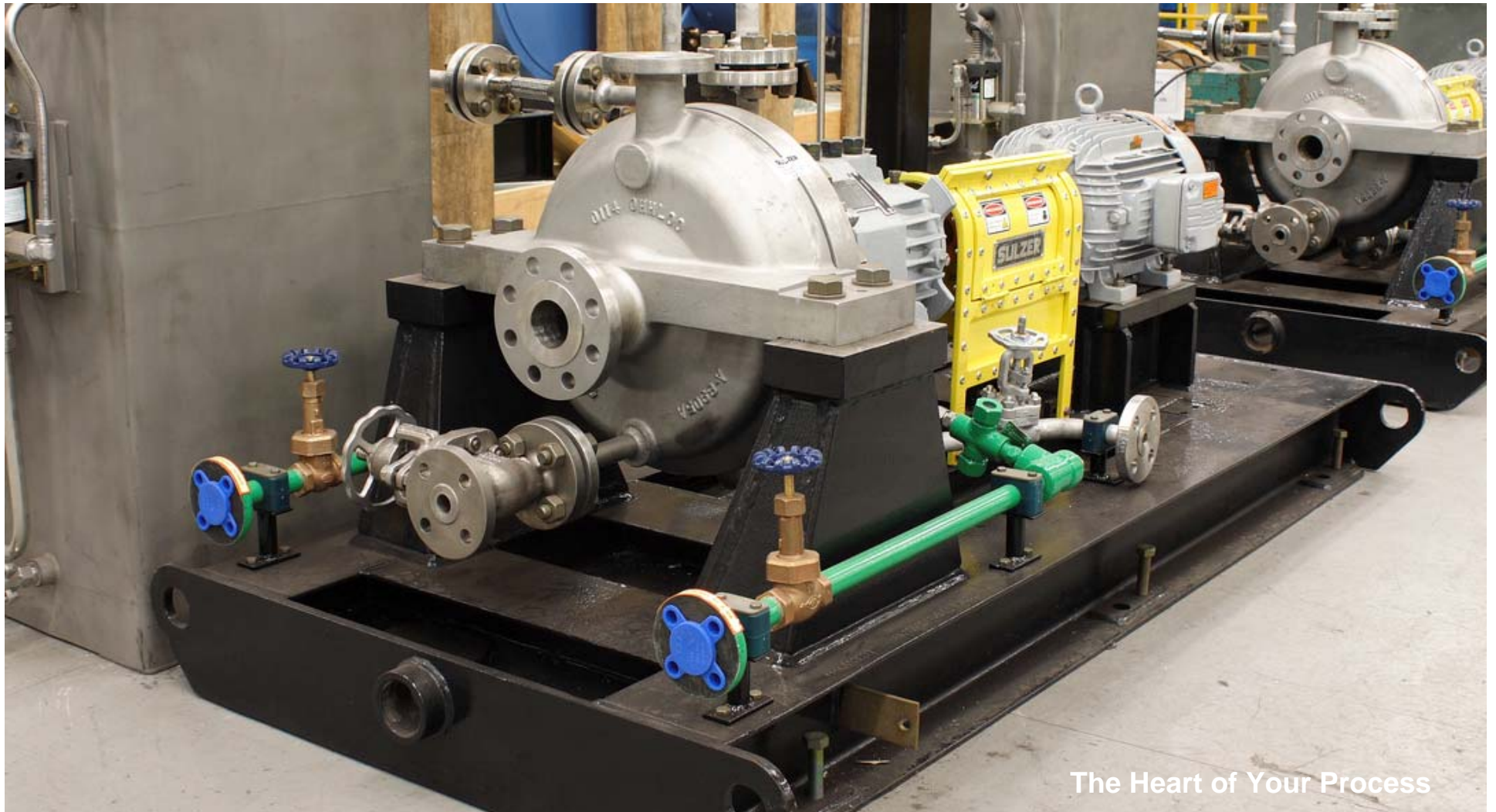


SULZER

OHHL Low flow high head process pump

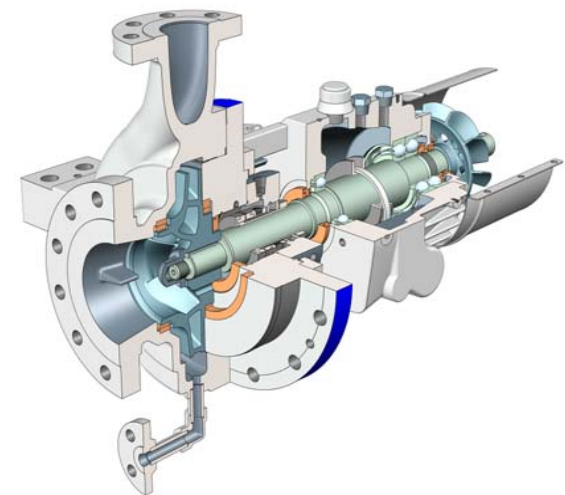
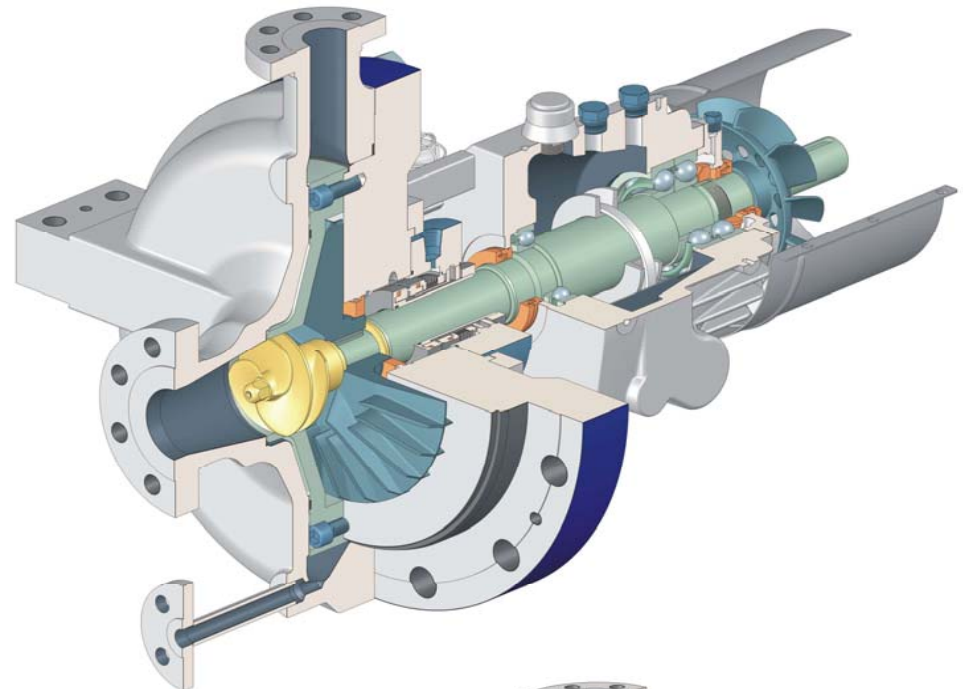
Sulzer Pumps



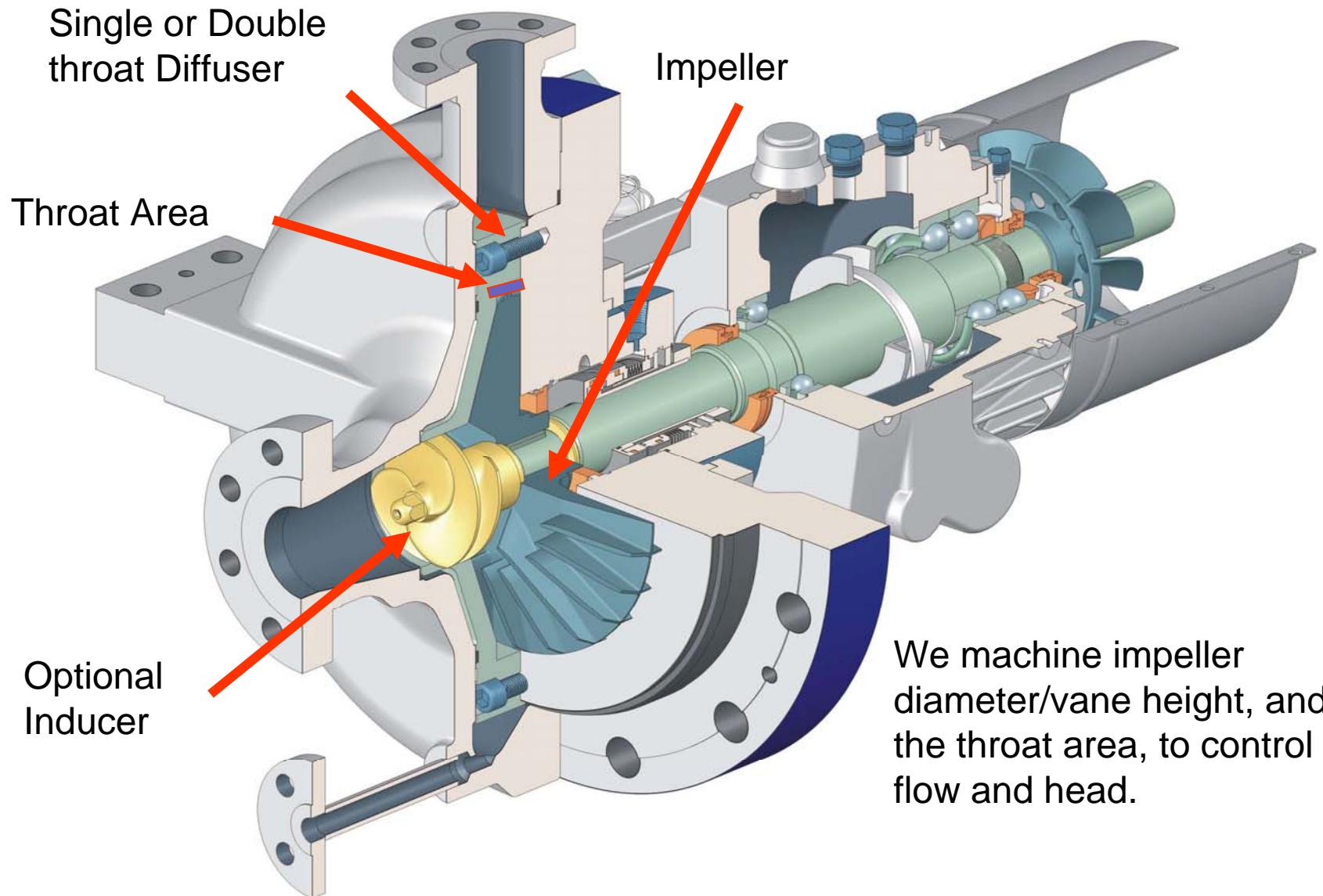
The Heart of Your Process

OHHL – What is it?

- The OHHL is the low flow version of Sulzer's OHH ISO 13709 (API 610) product line.
- It fills the gap on the low flow side of the OHH range map while utilizing the mechanical seals and bearing frame from the OHH.



OHHL - How it works

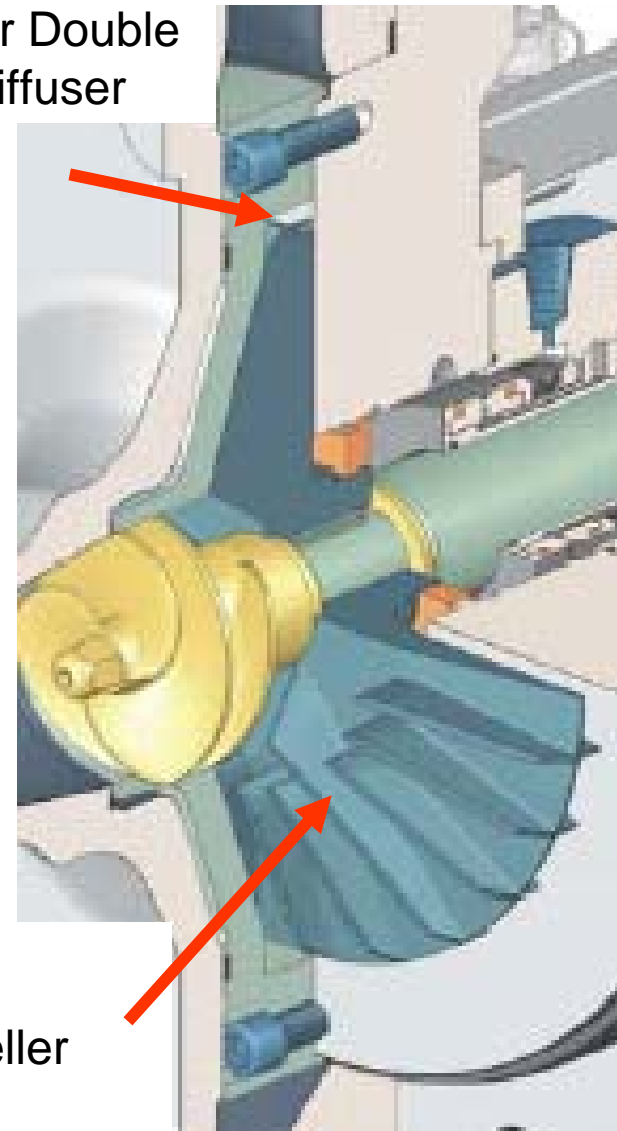


We machine impeller diameter/vane height, and the throat area, to control flow and head.

OHHL - interchangeability

- We use 3 casings, 3 casing covers and 2 bearing frames to achieve 54 OHHL performances.
- In many cases, the customer can easily change the performance – flow, head and best efficiency point – simply by replacing the diffuser and impeller.
- The casing, casing cover, mechanical seal and bearing frame can remain unchanged.

Single or Double
throat Diffuser



Impeller

OHHL – Mechanical Seals

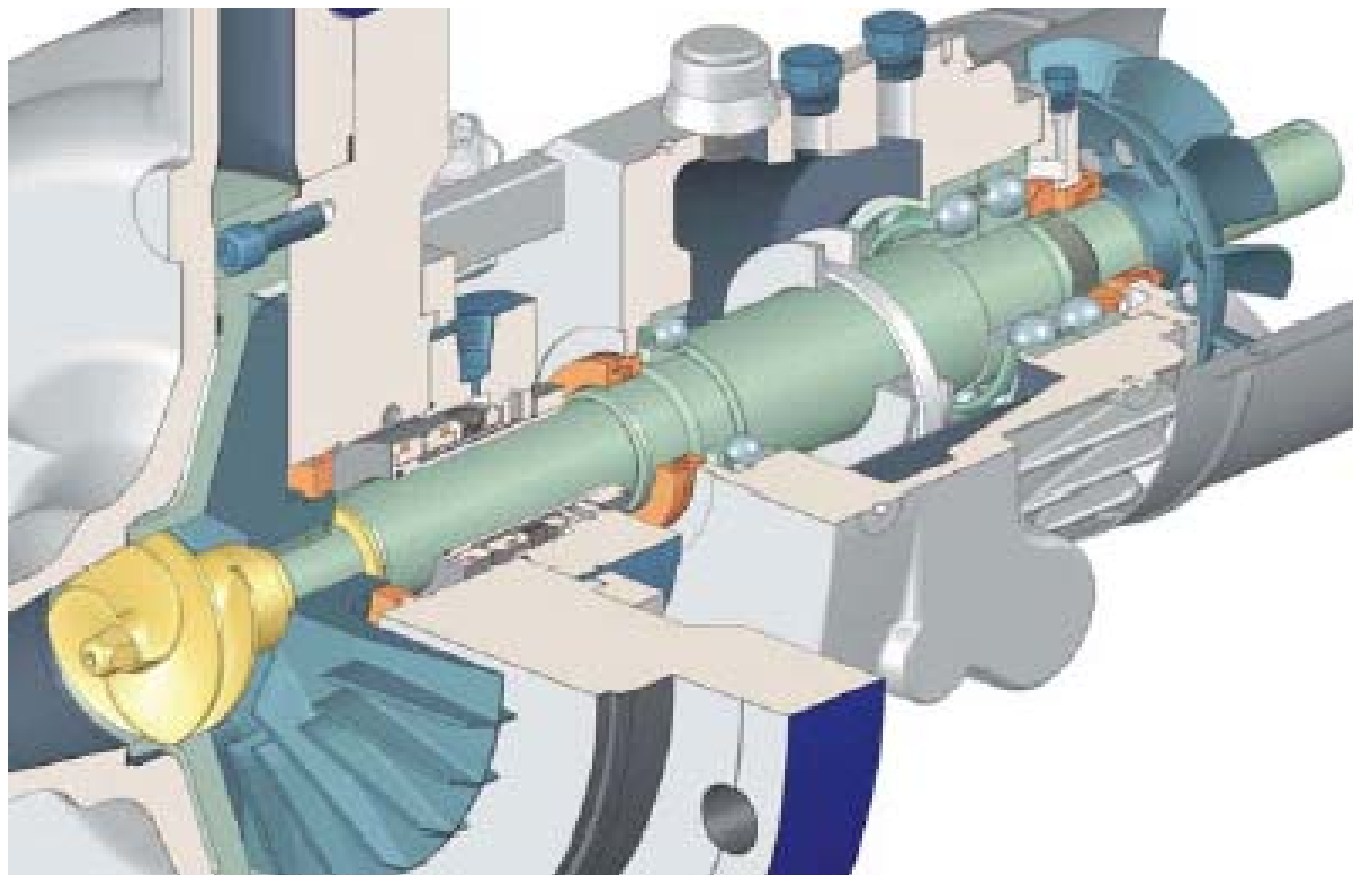
Unlike other low flow pumps, the OHHL utilizes the same standard ISO 21049 (API 682) cartridge type mechanical seals from the OHH.

Other low flow pump suppliers utilize non-cartridge type component seal pieces that have to be assembled individually in the pump.

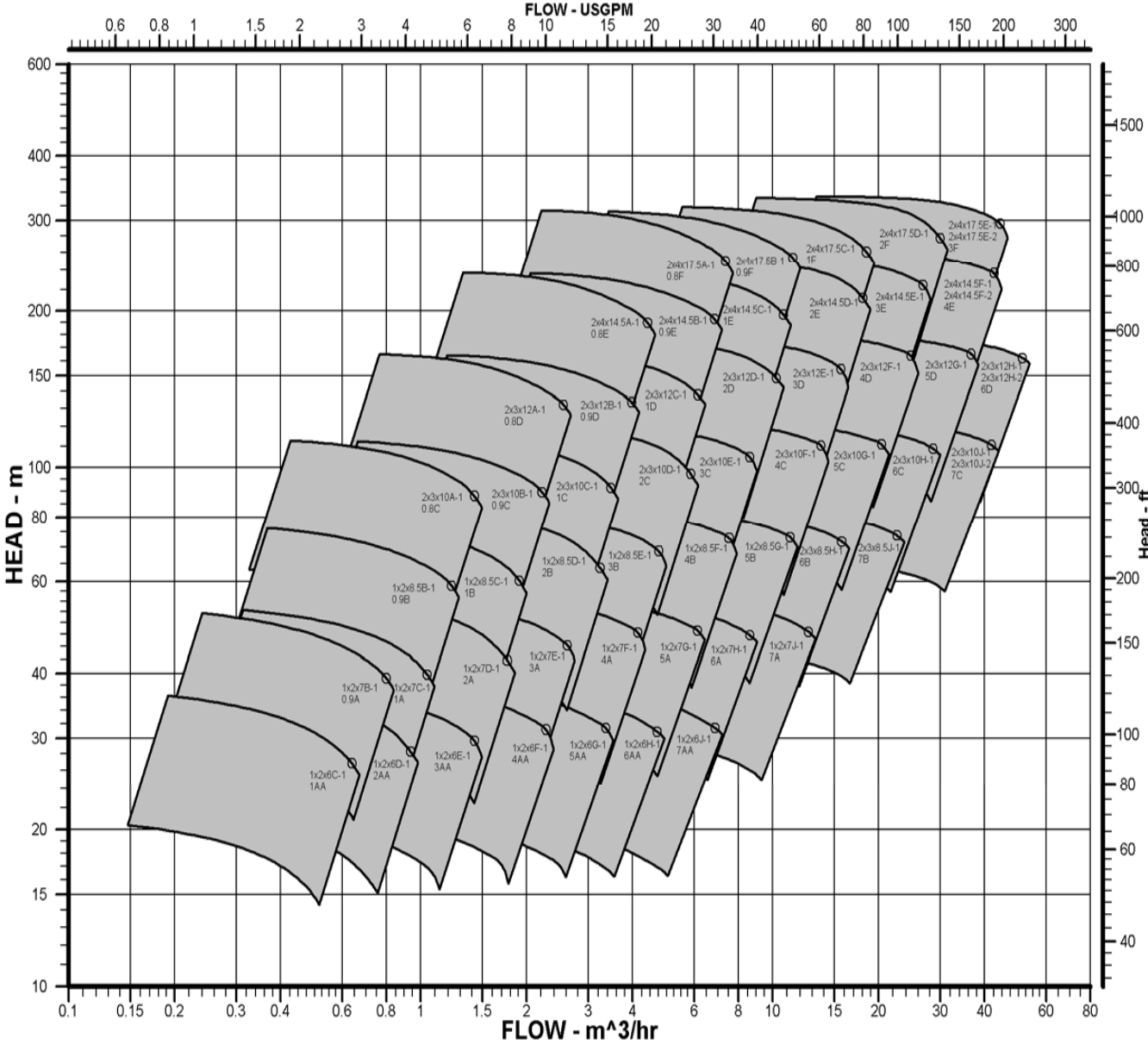


OHHL – Bearing Frames

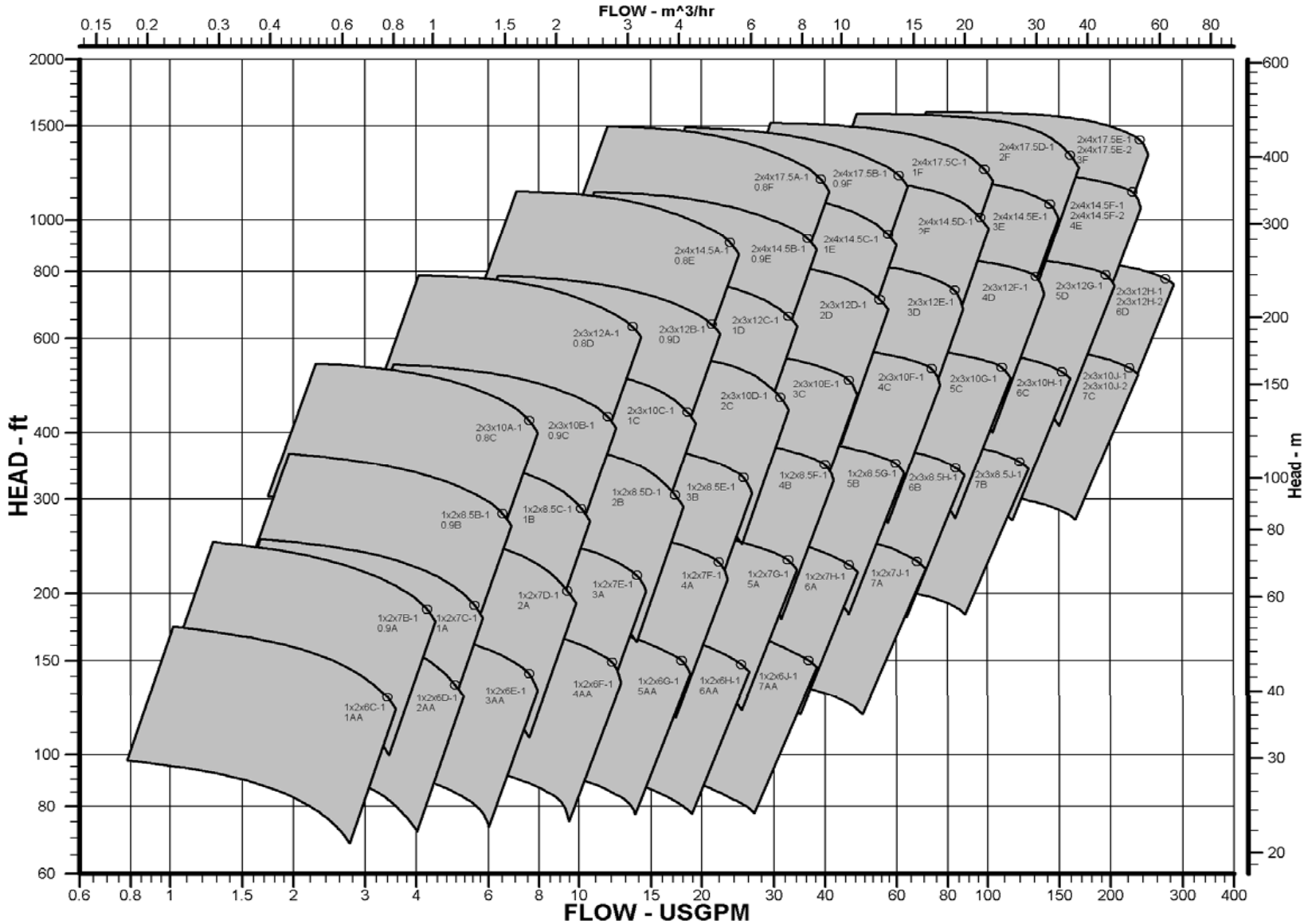
The OHHL utilizes the extra heavy duty bearing frame components from the OHH. Shaft end under impeller is only difference. First dry critical speed is over 6000 RPM.



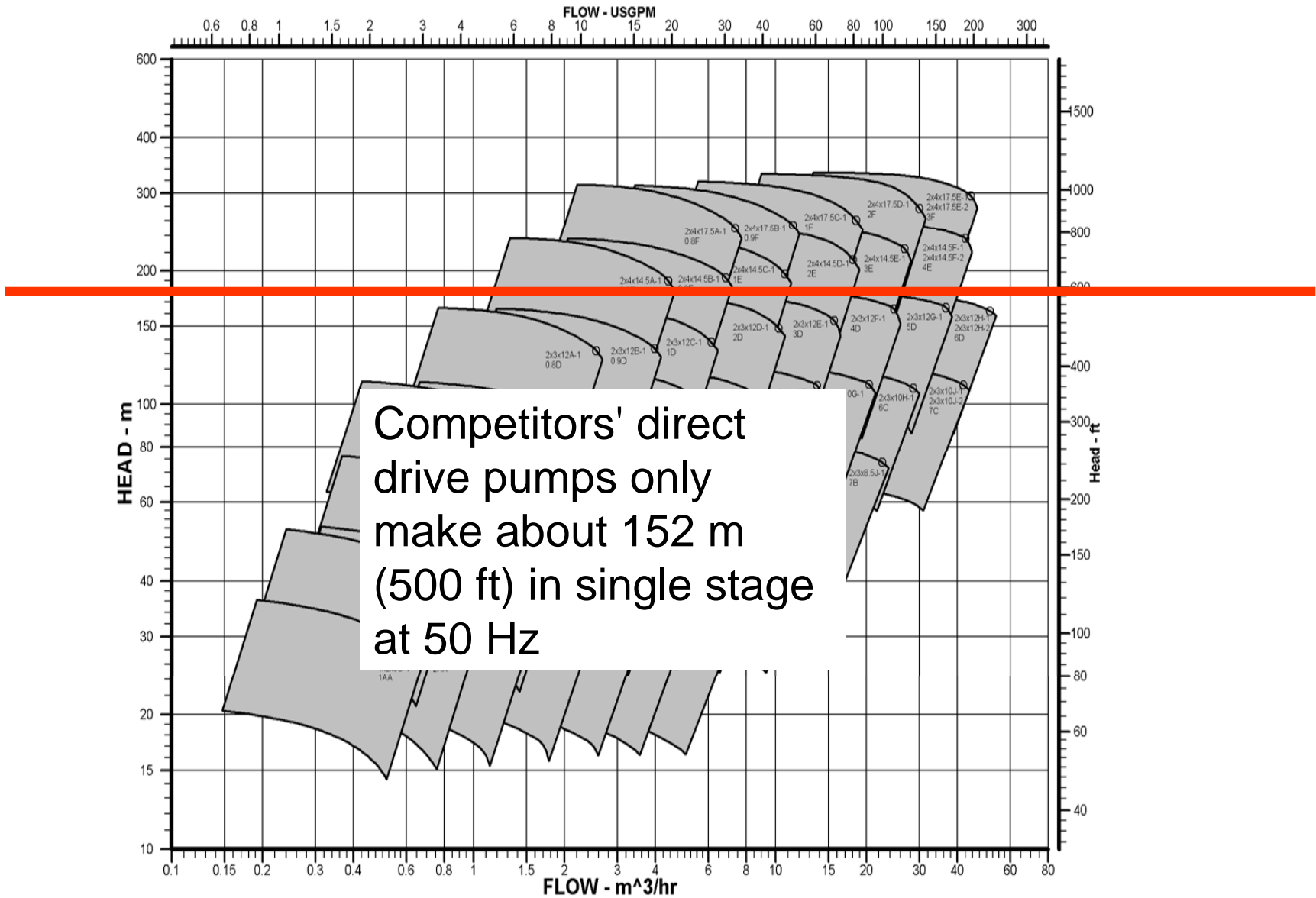
OHHL – 50 HZ Range Maps



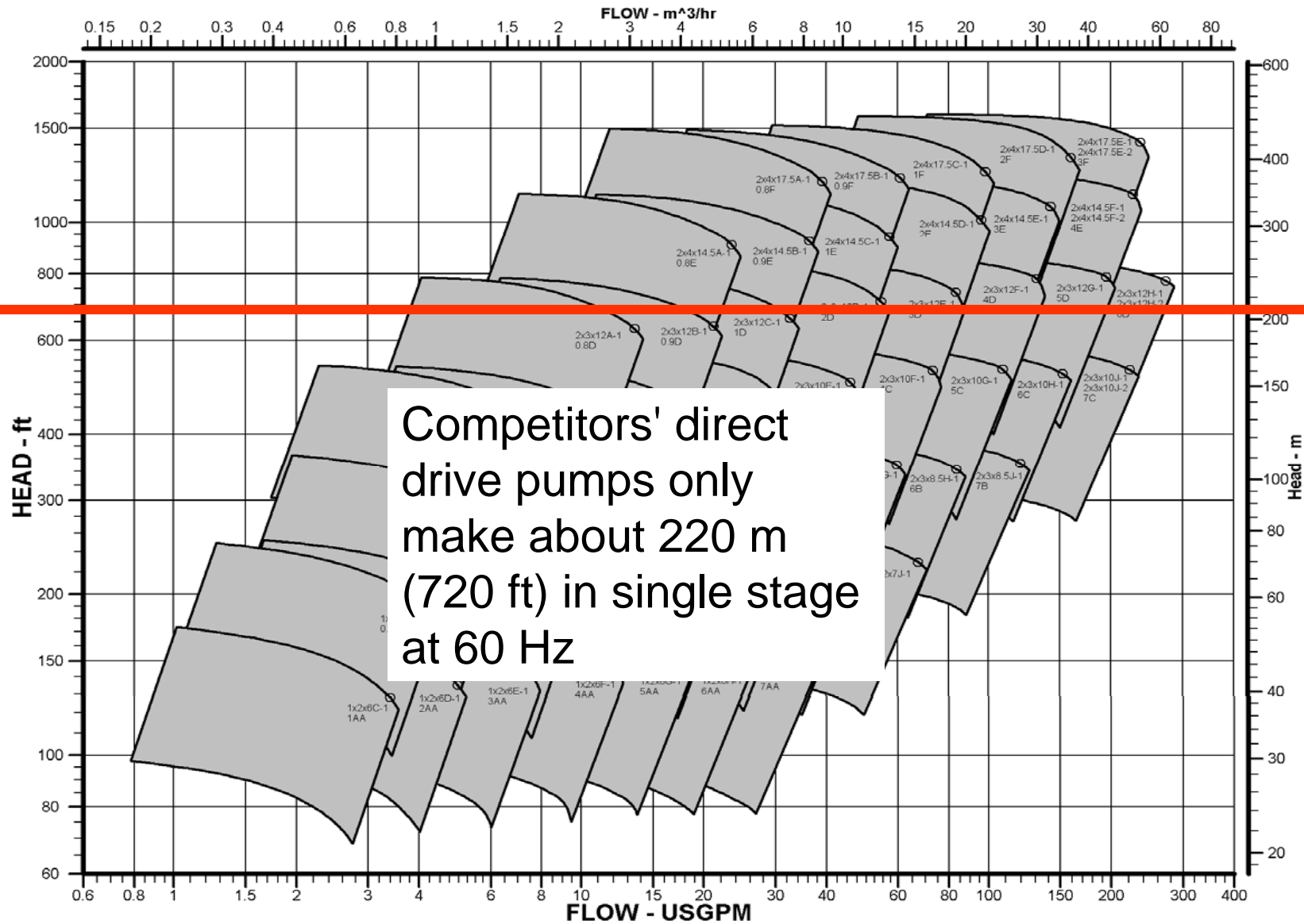
OHHL – 60 HZ Range Maps



OHHL vs. Competition – 50 HZ



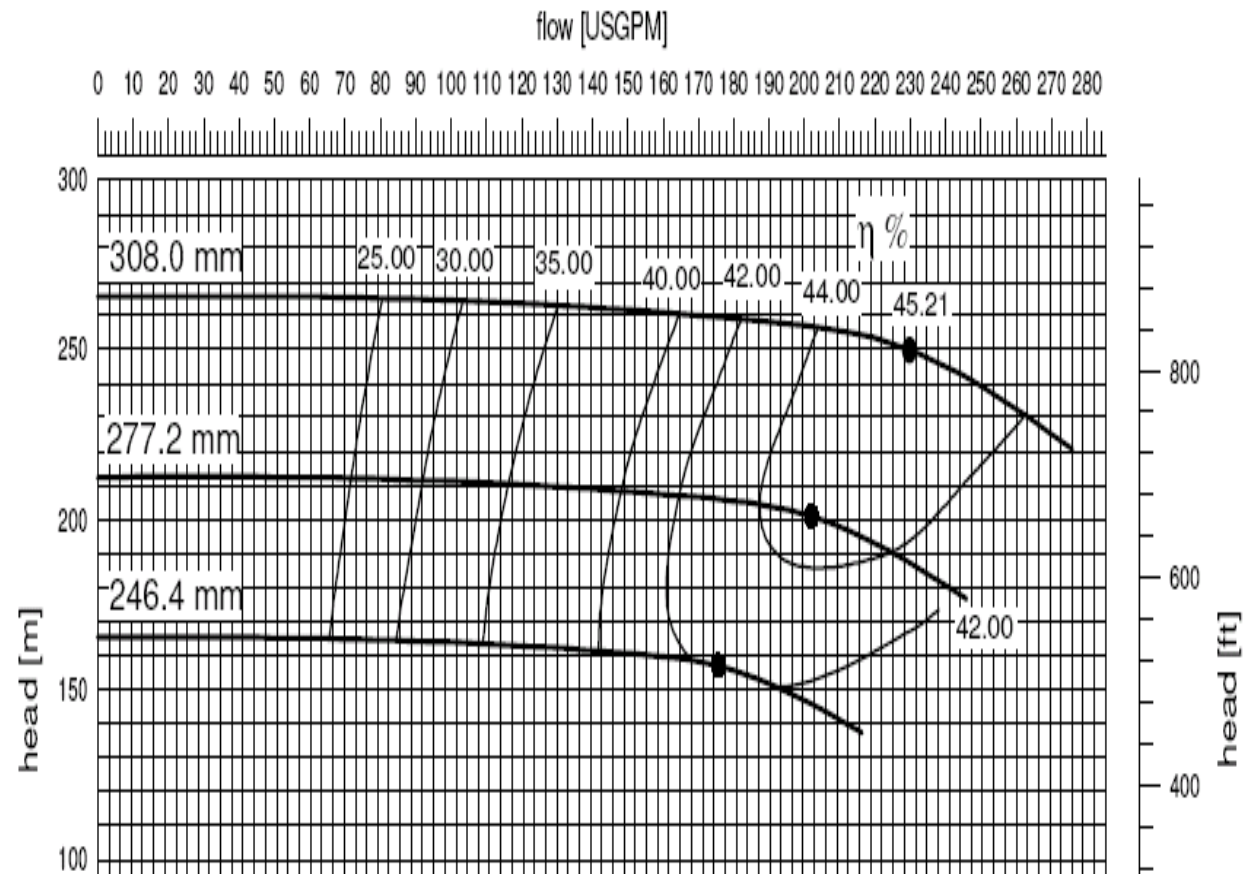
OHHL vs. Competition – 60 HZ



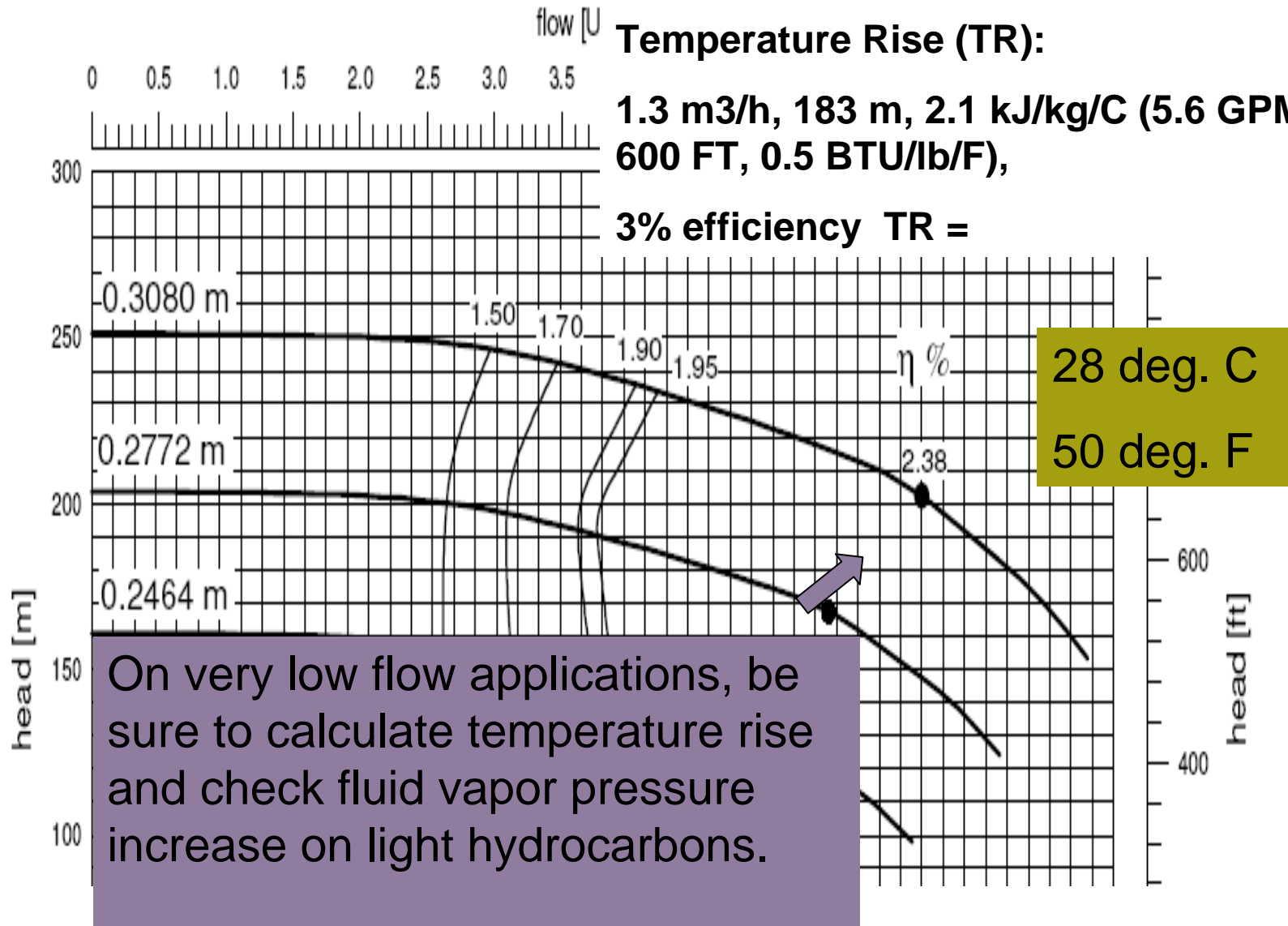
OHHL - Efficiencies

OHHL efficiencies are comparable to normal OHH pumps for similar flow and head.

OHHL curves are stable and continuously rise to shutoff as required by ISO 13709 (API 610) para. 5.1.13



OHHL – Temperature Rise Example



OHHL Temperature Rise

- Due to small liquid volume in OHHL (or any other low flow pump), on light hydrocarbon services, discharge valve needs to start opening when pump is started. Depending upon liquid specific heat, vapor pressure, suction pressure, and pump shutoff power, if valve left closed for as few as 15 seconds, TR could vapor lock the pump and damage the seal faces.
- Temperature rise must then be calculated at various process flow conditions.
- Purchaser must provide vapor pressure vs. temperature data or curve.
- Check vapor pressure at $T_s + dT$. Suction pressure needs to exceed VP at discharge temperature to avoid bubbles.
- Often not a problem on heavy hydrocarbons or water, but can be a problem on middle to light hydrocarbons, so calculations are prudent.

OHHL - Inducer

Depending upon flow rate, the normal OHHL impeller will often provide suction performance which is even better than our 1.5 m (5 feet) production testing NPSH limitation.

For higher flow OHHL pumps where suction performance $> 11,000$ Nss is required, the optional inducer can be supplied (-2 perf. curves).

The inducer runs inside of the diffuser neck which allows simple replacement without replacing the more expensive casing



OHVL – inline low flow

- OHVL adds OHHL hydraulics to OHV product line
- OHVL utilizes the same mechanical seals, shaft and bearings as the OHHL, with OHV bearing housing and isolators

