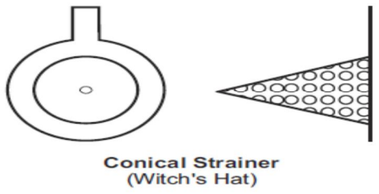
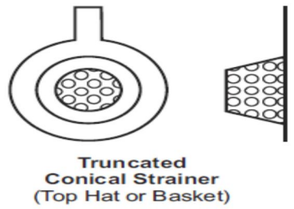
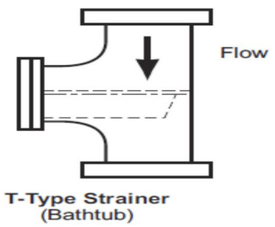
Key recommendations of API RP 686 for Centrifugal pumps

Subject	Discerption and interpretation
Rigging and Lifting	*A rigging plan showing the lifting points and including the load capacities of spreader bars, slings, cables, shackles, hooks, rings, and so forth. Load capacities shall be based upon a minimum* ***safety factor*** *of* ***1.5.*** *Plans shall also be made for lifting crated equipment.*
Receiving and protecting pumps	Fill bearing housings to the bottom of shaft with the recommended oil for pumps with oil lubricated bearings. Put oil mist on the bearing housings of pumps that are oil mist lubricated (if possible, at this time or as soon as possible). An external note should be clearly visible that the oil housings are full of oil. Fill all barrier fluid piping and components with the manufacturer's recommended fluid.
Rotor turning	The shaft must be **turned 2 1/4 revolutions (810°) once per week** and accomplished with a strap wrench or other non-marring device. It is intended to help prevent permanent rotor sag / bow. Rotors having many stages and large bearing-span / shaft-diameter ratios are more prone to rotor sag. If a rotor is stored vertically then rotor turning is not required.
Long term-preservation	Equipment if expected to be in the field in excess of six months, suitable long-term preservation procedure to be followed. shall be purged with nitrogen or oil flooding with Vapor phase inhibitor and desiccant shall be used to protect internals from rusting.
Foundation size	For block foundation the thickness is normally greater than **one-fifth the least plan dimension and less than one-tenth** the largest plan dimension.
Clearance b/w foundation and grout	The elevation of the top of the foundation shall be set to allow a minimum thickness of grout of 25 mm
Foundation Mass	A machinery block foundation supported on soil shall have a minimum mass ratio of three times the mass of the machinery.
Levelling	Each soleplate is set longitudinally and transversely to within 42 micrometers per meter with no more than 130 micrometers (0.005 in.) elevation difference between any two points taken on an individual soleplate. General-purpose equipment and ASME pumps baseplate mounting surfaces are to be levelled to within 420 micrometers per meter
	API pump baseplate mounting surfaces are to be levelled longitudinally and transversely to within 250 micrometers per meter
Anchor bolt torque	Anchor bolts torqued to maximum of 10 % of final torque.
Piping alignment and auxiliary connection	All auxiliary equipment, piping, conduit, instruments, coolers, seal pots, consoles, and so forth mounted separately from the machine and driver.
	These items do not interfere with removal of the machine or driver nor with access to the machinery for normal operation and maintenance.
	Suction and discharge piping for vertical in-line pumps have adjustable supports located within 1 m of the pump's suction and discharge flanges.
	Pump is in solid contact with the foundation mounting plate and adjustable supports should be locked in position.
	Temporary blinds to be installed at the machinery flanges to prevent dirt and debris from entering the machinery.
	All threaded openings plugged with a threaded pipe plug to prevent contamination.
	Pipe flange bolt holes lined up with machinery nozzle **bolt holes within 1.5 mm** maximum offset from bolt hole centre
	The machine and piping flange **face parallel to less than 10 micrometers per cm of pipe flange** outer diameter up to a maximum of 750 micrometers
	The maximum shaft movement in either the vertical or horizontal directions after all the flanges are tightened is 50 micrometers or less. Final shaft alignment verified after final piping bolt-up.
Acceptable strainer design	  
Shaft and coupling Alignment	Installed coupling hubs shall **have 0.05 mm or TIR or the equipment vendor's** requirements, whichever are more restrictive. This limitation applies both to the coupling rim as well as to the coupling face.
Preliminary shaft alignment	Prior to grouting, a preliminary shaft alignment shall be made. Final alignment tolerance need not be achieved, but the equipment installer shall confirm that the required axial, horizontal, and vertical alignment tolerances are achievable during final alignment without modifications to the machinery or hold-down bolts.
Alignment bracket sag	Alignment brackets may have different amounts of sag in the 3 and 9 o'clock positions and must be compensated for. The maximum allowable sag for dial indicator brackets/fixture system used for alignment shall **not exceed 0.8 mm per meter of span**.
Mechanical Seal	Pumps with mechanical seals shall have the **seal locking tabs disengaged** before turning the equipment to obtain alignment readings.
	For flexible-element couplings, the coupling spacer gap length or distance between shaft ends **(DBSE) shall be set within ±0.50** mm unless a closer tolerance is specified by the vendor.
	Axial alignment shall be done after the motor magnetic centre is marked during field or factory run-in. The motor shaft shall be located on **magnetic centre.**
	Maximum allowable number of shims under any equipment **support foot is 5.** The maximum shim stack height shall **not exceed 12 mm**. Only one 3 mm or thicker shim per mounting foot is allowed. The use of tapered shim packs laminated or peelable shims, brass shims, aluminium shims, plastic shims and **shims thinner than 0.05 mm is not permitted**. Ground shims shall have a surface finish of 64 Ra or better.
	The use of shims under special-purpose machinery gearboxes to correct for soft-foot or gear tooth contact is **NOT** permitted.
	The soft-foot check shall be done with piping disconnected from the equipment body to be checked. A soft-foot check shall be made during final alignment on each equipment foot. Maximum permissible **movement is 0.05 mm** at each foot.
	The maximum amount of movement at the coupling during the tightening **process shall be 0.05 mm.**

Kirit Domadiya