# Requirements for Impeller and Rotor Balance

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| Approved by: | R. Connor |

## 1.0 Scope

1.1 This document serves to address the minimum balancing requirements for impellers and rotors to be applied by Sulzer Pumps (UK) Ltd on new supply contracts.

1.2 This document describes the procedure and controls for balancing pump rotating components and assemblies as part of Sulzer's standard practice.

1.3 All balancing operations shall be carried out in accordance with the referenced Sulzer procedures.

## 2.0 Reference Documents

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|---|---|
| API 610 | Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries |
| ISO 21940-11 | Mechanical vibration – Rotor Balancing Part 11: Procedures and tolerances for rotors with rigid behaviour |
| LPE-712 | Dynamic Balance Report |

## 3.0 Equipment

3.1 Balancing shall be carried out on a calibrated slow speed dynamic balancing machine.

3.2 Prior to balancing, verify the balance machine calibration using the machine manufacturer's procedure.

## 4.0 Pre-Balance Checks

**Components.**

4.1 All rotating components are to be fully machined with impeller neck rings installed and secured.

4.2 Run-out checks shall be made on impellers mounted on a mandrel.

**Rotating Elements.**

4.4 Rotating element shall be balanced with all rotating components including impellers, sleeves, balance drum and captive stationary wear rings etc. mounted on the shaft.

4.5 Run-out checks shall be carried out on both the shaft and rotating element supported at the bearing locations.

## 5.0 Balancing

5.0 Unless when specifications (e.g., ITP, engineering data sheet (EDS) etc.) define otherwise, impellers and rotors are to be balanced in accordance with ISO 21940-11 G2.5.

5.1 Rotors are to be balanced as assemblies.

5.2 Balance speed shall be 300 rpm minimum/800 rpm maximum.

5.3 Balance correction shall be carried out by the removal of metal from the impeller shroud as indicated on the component drawing. This operation is to be done ensuring that the minimum shroud thickness is always maintained. No deviation from the design/manufacturing drawing is acceptable.

5.4 Component balance shall take account of the mandrel unbalance so that the component alone is balanced and not the component/mandrel assembly. Follow the balance machine manufacturers recommended procedure to correct for component balance. Any trim balance required to obtain the balance tolerance is to be achieved by removing material from first and last stage impellers.

5.5 Concentricity checks shall be performed on the individual components and at each stage during assembly of the rotor. Results are to be documented within the assembly build records.

5.6 Residual unbalance quantity and its phase angle with relation to the shaft shall be recorded during the build.

5.7 Final weight of all components and the rotor shall be recorded.

5.8 If identified by the ITP that a residual unbalance test is required, it shall be carried out after final balancing of the rotor following the procedure given in Annex J, API 610 Latest Edition.

5.9 Unless defined otherwise in the ITP or EDS, rotors shall be two-plane dynamically balanced at low speed to the Grade of 2.5.

## 6.0 Reporting

6.1 All balances carried out shall be recorded in the daily log. A balance certificate shall be issued for the final balance. Both initial unbalance and residual unbalance after correction are to be recorded on the Balance Record.

6.2 Check run-outs of the shaft and all fitted parts of the assembled rotor and record run-outs in the "Assembly Build Charts" and complete a Dynamic Balance Report (LPE-712).