1 Scope

1.1 This procedure details the method and acceptance standards for the dimensional inspection of pump parts unless otherwise specified in the Sulzer Purchase Order. It is intended for use, where specified, on all parts and items as part of or for use on pump and compressor packages.

1.2 Note: Sulzer procedures referred to in this specification can be downloaded from

www.sulzer.com/q-documents

2 Reference documents

2.1 All standards, codes and norms refer to the last published edition and addenda, which must be adopted if customer is not requiring a former revision.

a) ASME B1.20.1 Pipe Threads, General Purpose (Inch)

b) ISO 1502 ISO General purpose metric screw threads – Gauges and gauging

c) TP-0015 NDT – Visual examination of machined surfaces

3 Qualification of Inspection Personnel

3.1 The personnel performing dimensional inspections described in this test procedure shall be suitably trained and qualified as per the organization's internal documented process and the records for qualification shall be made available on request.

4 Inspection conditions

4.1 Timing of inspection

a) Inspection shall be carried out in the manner defined in the project Quality Plan (Inspection & Test Plan), Purchase Specification, Purchase Order both in chronological order and material condition.

4.2 Extent of inspection

a) All dimensions, except reference dimensions, on the part drawing(s) relevant to the part shall be checked. Geometric tolerances such as true position, parallelism, and circularity shall be verified during dimensional inspections. If 100% inspection is not feasible, alternative methods shall be employed to ensure compliance.

4.3 Calibrated gauges with accuracy appropriate to the tolerance of the dimension to be measured shall be used.

4.4 In conjunction with the dimensional inspection, all machined surfaces shall be visually examined per TP-0015.

4.5 Adequate lighting of at least 500 lux shall be provided in the areas where dimensional inspection shall be performed unless additional illumination is specified by customer requirements.

5 Acceptance Criteria – Dimensions

5.1 Dimensions shall be within the drawing tolerance given. NB: tolerance may be adjacent to the dimension, in a separate table (e.g. "h6" hole & shaft system tolerances), in a tolerance block or expressed as a geometric tolerance (e.g. ⊥ 0.01 A).

6 Surface finish

6.1 Machined surfaces will be checked to ensure that they are of the correct surface finish as indicated on the part drawing.

7 Threads

7.1 Taper threads are verified using a special taper thread gauge. Straight threads are verified using GO and NOGO gauges. Additionally, this section defines limit of damage allowed to threads.

7.2 Acceptance limits for taper gauges for internal and external threads in accordance with ASME B1.20.1. Note that there are 2 types of NPT thread gauges. These have either 2 flats which indicate the maximum and minimum amount of thread engagement allowed or they have 1 flat which is the nominal thread size.

a) Screw gauge on hand tight. If the thread gauge has 2 flats, the part surface must be between the 2 notch surfaces. If the thread gauge has 1 flat, the part surface must be within +/- 1 turn of the notch surface. See Figure 1.

b) If the surrounding surface is not perpendicular to the axis of the hole or is irregular, the gauge shall be read at the first full thread; partial threads shall be ignored.

7.3 Acceptance limits for GO and NOGO gauges applied to internal and external threads in accordance with ISO 1502

a) GO gauge must thread onto the product freely for the entire length of the thread.

b) NOGO gauge either will not thread onto the product, or if it does, will not go more than 3 turns before significant resistance to hand turning is encountered. Do not force gauge once resistance is encountered.

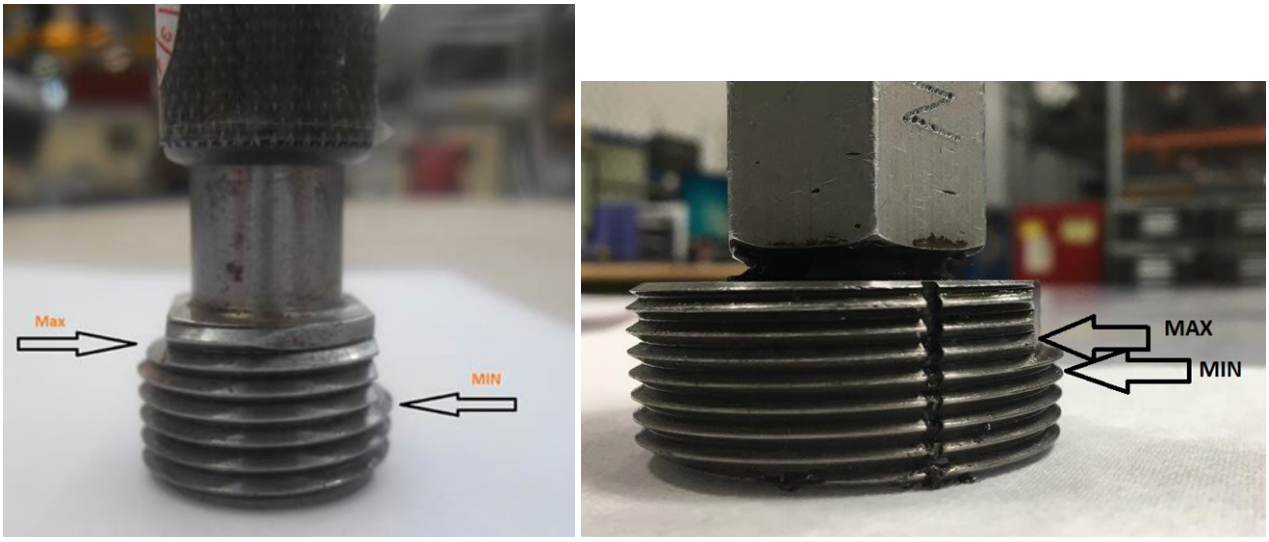

Figure 1: NPT thread gauging acceptance limits

7.4 Thread surface finish, unless otherwise specified on the part drawing, shall be free from flaws and other defects, such as burrs, nicks and fins that would make them unsuitable.

7.5 Damage to threads is acceptable provided that:

a) 90% of the total threads are undamaged.

b) Cavities in damaged threads are faired in. The reworked thread shall not stick or bind when checked with the GO gauge or assembled with mating product.

8 Reporting

8.1 When required by the PO or other referenced documents, a dimensional inspection report shall be provided which includes the following:

a) Order and part identification

b) Details for each dimension listed on the part drawing as per 8.2

c) Test procedure reference and method used

d) The name and the signature of the person(s) carrying out the inspection

8.2 For each dimension listed on the drawing, the inspection report will provide the following details:

a) Dimension

b) Tolerance

c) Actual measurement

d) Tool type and serial number of the tool used to take the measurement

e) Accept / Reject