

QUALITY SPECIFICATION 40-995

Impeller / Pump Bowl Internal Inspection

Revision Number	0
Date	07.04.2014
Amendment Details	Original Issue.
Revision Number	1
Date	02/12/2014
Amendment Details	Certification required from the foundry.
Revision Number	2
Date	17/12/2021
Amendment Details	General review and update; addition of LPE-890 and Reference Documents section.
Revision Number	3
Date	18/07/2024
Amendment Details	Updated to include Pump Bowls. Section 7.5 and 8.0 added.
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1.0 Scope

- 1.1 The purpose of this document is to define the extent of the impeller / pump bowl inspection using a borescope camera and document the process.

2.0 Reference Documents

LPE-890 - Outsource Machined Casting Inspection Process

MSS SP-55 - Quality Standard for Steel Castings for Valves, Flanges, Fittings, and Other Piping Components - Visual Method for Evaluation of Surface Irregularities

Note: Sulzer procedures referred to in this specification can be downloaded from www.sulzer.com/q-documents

3.0 Items to be Inspected

- 3.1 All impellers and pump bowls where the full hydraulic passageways cannot be satisfactorily inspected by line of sight
- 3.2 Unless otherwise directed, this inspection is to be undertaken twice during the manufacturing process: -
- (1) By foundry personnel at the foundry prior to delivery.
 - (2) By Sulzer at Goods Inwards.

4.0 Safety

- 4.1 It is essential that compliance with safe working practices is always maintained during the inspection process.
- 4.2 The operator shall ensure they are familiar with the relevant risk assessment for the activity they are undertaking.

5.0 Process

- 5.1 The principal purpose of the internal inspection is to ensure that all foundry defects are found and addressed prior to the casting progressing into the machining process, refer to Swimlane diagram in LPE-890.
- 5.2 The internal surfaces of the casting shall be examined and shall be free from adhering sand, scale, cracks, hot tears and shot. Other surface defects shall meet the requirements of MSS SP-55
- 5.3 Hydraulic surfaces are to be clean and free from obtrusions with a surface finish in the order of 25µm (N11)
- 5.4 Thorough internal inspection is required to ensure: -
- a) All passageways are free from sand, scale, flashing, fins, core supports, shot, swarf etc.
 - b) Castings are free from visible defects that allow leak paths between adjacent passageways.

6.0 Process Steps

- 6.1 The camera is to be slowly fed through the individual passages checking each surface. The head is to be manipulated to ensure that all surfaces are viewed since the camera will tend to follow the outer surface and make defects there look very large whilst those of the inner surface may appear smaller than they are.

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- 6.2 Sulzer Goods Inwards Inspection: Areas which are difficult to access should be inspected using a borescope held by Goods Inwards Inspection. Any areas of concern should be investigated.
- 6.3 All defects logged at Sulzer are to be recorded in a notification and high-quality images of the defects are to be attached.
- 6.4 On satisfactory completion of the internal inspection at the foundry stage, a note is to be added to the material certification stating compliance with this specification.

7.0 Common Defects

7.1 Flashing



Commonly seen on double suction impellers, flashing shall be a cause for rejection.

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7.2 Sand and Scale



A patch of sand or shot has become adhered and shall be a cause for rejection.

7.3 Cavities



Cavities can occur when the central splitter on a double suction impeller has been cast too thinly and are a cause for rejection.

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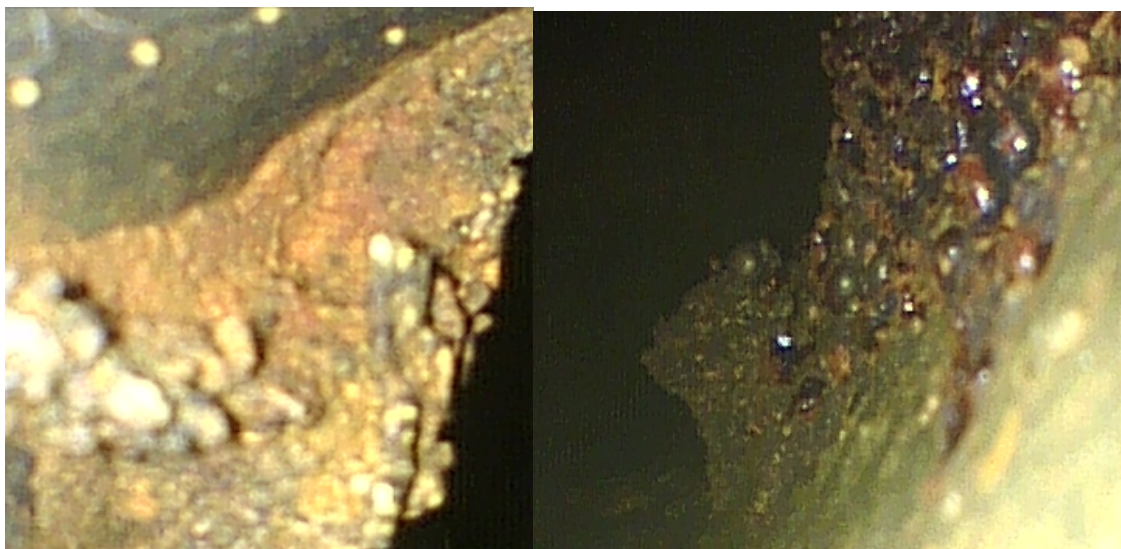
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7.4 Tears & Cracks



Tears and cracks are a cause for rejection.

7.5 Shot

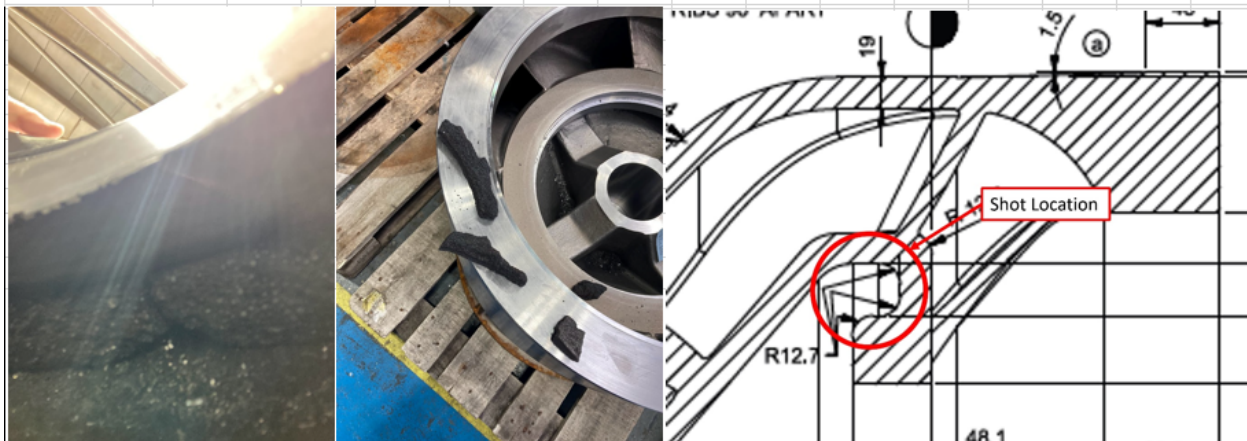


Congeaed shot in hard-to-reach areas is a cause for rejection.

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8.0 Difficult to access areas



Extra focus must be applied to areas that are difficult to access as this is a common place to find congealed shot. Any area on an impeller / pump bowl which is inaccessible by eye, must be examined using a borescope.