Powder Metallurgy Hot Isostatically Pressed Manufacturing Processes for Use in the Petroleum and Natural Gas Industries

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Suggested revisions are invited and should be submitted to the Standards Department, API, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001, standards@api.org.

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Powder Metallurgy Hot Isostatically Pressed Manufacturing Processes for Use in the Petroleum and Natural Gas Industries

1 Scope

This standard specifies requirements for the manufacturing process, production control, material testing, marking, and documentation of powder metallurgy hot isostatically pressed (PM-HIP) components used in the petroleum and natural gas industries when referenced by an applicable API equipment standard or otherwise specified as a requirement for conformance.

This standard applies to PM-HIP components using metallic powder feedstock with an encapsulation method (e.g., capsule) and consolidated using high temperatures and pressures to achieve a near-net shape.

Blending feedstock powder of different alloy compositions (e.g., UNS numbers) is outside the scope of this standard.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any addenda) applies.

API 6A, *Specification for Wellhead and Tree Equipment*

API 20H, *Heat Treatment Services—Batch Type for Equipment Used in the Petroleum and Natural Gas Industry*

API 20N, *Heat Treatment Services—Continuous Line for Equipment Used in the Petroleum and Natural Gas Industry*

API Q1, *Specification for Quality Management System Requirements for Manufacturing Organizations for the Petroleum and Natural Gas Industry*

ASNT SNT-TC-1A,[1] *Personnel Qualification and Certification in Nondestructive Testing*

ASTM A370,[2] *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASTM A988/A988M, *Standard Specification for Hot Isostatically-Pressed Stainless Steel Flanges, Fittings, Valves, and Parts for High Temperature Service*

ASTM A1080/1080M, *Standard Practice for Hot Isostatic Pressing of Steel, Stainless Steel, and Related Alloy Castings*

ASTM E3, *Standard Practice for Preparation of Metallographic Specimens*

ASTM E10, *Standard Test Method for Brinell Hardness of Metallic Materials*

ASTM E18, *Standard Test Methods for Rockwell Hardness of Metallic Materials*

ASTM E112, *Standard Test Methods for Determining Average Grain Size*

ASTM E384, *Standard Test Method for Microindentation Hardness of Materials*

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[1] ASNT American Society for Nondestructive Testing, 1711 Arlingate Lane, P.O. Box 28518, Columbus, Ohio 43228, www.asnt.org.

[2] ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, Pennsylvania 19428, www.astm.org.