Closed Die Forgings for Use in the Petroleum and Natural Gas Industry

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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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Introduction

This specification is the result of updating requirements from API 20C, Second Edition. API 20C, Third Edition was developed based on input from the API 20C Task Group of technical experts. The technical revisions have been made to accommodate the needs of industry to move this specification to a higher level of service to the petroleum and natural gas industry.

Highlights of some of the significant changes between the second and third editions include:

— Photographs of the qualification forging in the required as-forged condition.

— Requirement that qualification test be performed at independent test laboratories conforming to ISO/IEC 17025 for the applicable processes.

— Group 3 microstructure requirements separated from Group 2.

— Group 3 microstructure requirements added.

— FSL-4 requalification required when a change in UNS number.

— FSL-4 requalification required in the event a material does not have a UNS number, each chemistry modification requires a separate qualification.

— ISO 148-1 added for Charpy (CVN) impact specimens.

— Maximum temperature added to quench requirements.

— A qualifying statement added to minimum overall hot work ratio “unless specifically agreed to by the purchaser and the forging manufacturer”.

— API 20H added to the list of standards acceptable for heat treatment furnace survey and furnace instrumentation calibration.

— API 6A, API Q1, and API 6ACRA have been added as normative references.

— Addition of forging manufacturer definition.

— Additional requirements added to the marking section.

— Added requirements for documentation provided with forgings.

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1 Scope

1.1 Purpose

This API specification identifies requirements for the forging manufacturer qualification, production, marking and documentation of closed die forgings for use in the petroleum and natural gas industries when referenced by an applicable equipment standard or otherwise specified as a requirement for conformance.

1.2 Applicability

This specification is applicable to equipment used in the oil and natural gas industries where service conditions warrant the use of closed die forgings. Examples include pressure-containing or load-bearing components.

1.3 Forging Specification Levels (FSLs)

This specification establishes requirements for four different FSLs. These FSL designations define different levels of forged product technical, quality, and qualification requirements.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Specification 6A, *Twenty First Edition, Specification for Wellhead and Tree Equipment*

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

API Standard 6ACRA, *Age-hardened Nickel-based Alloys for Oil and Gas Drilling and Production Equipment*

API Standard 20H, *Heat Treatment Services-Batch Type for Equipment used in the Petroleum and Natural Gas Industry*

ASTM A370 [1], *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASTM A388/A388M, *Standard Practice for Ultrasonic Examination of Steel Forgings*

ASTM A604, *Standard Practice for Macroetch Testing of Consumable Electrode Remelted Steel Bars and Billets*

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

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

ASTM E45, *Standard Test Method for Determining the Inclusion Content of Steel*

ASTM E110, *Standard Test Method for Indentation Hardness of Metallic Materials by Portable Hardness Testers*

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

ASTM E165, *Standard Practice for Liquid Penetrant Examination for General Industry*

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