Recommended Practice for Repair and Remanufacture of Wellhead and Christmas Tree Equipment

API RECOMMENDED PRACTICE 6AR (RP 6AR)
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Consult the most recent edition of the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Health Standard for Asbestos, 29 *Code of Federal Regulations* Section 1910:1001; the U.S. Environmental Protection Agency's National Emission Standard for Hazardous Air Pollutants concerning Asbestos, 40 *Code of Federal Regulations* Sections 61.140 through 61.156; and the proposed rule by the U.S. Environmental Protection Agency (EPA), proposing labeling requirements and phased banning of asbestos products, published at 54 *Federal Register* 29460-29513 (July 12, 1989) 40 CFR 763.160-179.

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FOREWORD

a. This Recommended Practice for Repair and Remanufacture of Wellhead and Christmas Tree Equipment is under the jurisdiction of the API Production Department committee on Standardization of Valves and Wellhead Equipment.

b. The purpose of this document is to provide communication of proven, sound, design, materials, quality and processes requirements for the repair and remanufacture of a family of equipment for use at the wellhead in the production of oil and gas.

c. Other publications under the jurisdiction of this committee are:

API Spec 6A: Specification for Wellhead and Christmas Tree Equipment.

API Bul 6AF: Bulletin on Capabilities of API Flanges Under Combinations of Load.

API Bul 6AF1: Bulletin on Temperature Derating of API Flanges Under Combination of Loading.

API Spec 6D: Specification for Pipeline Valves (Gate, Plug, Ball, and Check Valves).

API Spec 6FB: Specification for Fire Test for End Connections.

API Spec 6FC: Specification for Fire Test for Valves with Automatic Backseats

API Bul 6F1: Performance of API and ANSI End Connections in a Fire Test According to API Spec 6FA.

API Bul 6F2: Fire Resistance Improvements for API Flanges.

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SECTION 100
SCOPE

101. PURPOSE. This recommended practice was formulated to provide guidelines for the repair and remanufacture of safe, interchangeable wellhead and christmas tree equipment. Technical content provides recommendations for performance, design, materials, testing, inspection, welding, marking, handling, storing and shipping. When using this RP, the API Spec 6A PSL Level for API Spec 6A 15th and later edition equipment is not maintained. For information on maintaining the API PSL Level, refer to API Spec 6A.

102. APPLICATIONS.

102.1. EQUIPMENT. This recommended practice covers the equipment utilized for pressure control systems for the production of oil and gas. Specific equipment covered in this recommended practice is listed below:

API Flanged End and Outlet Connections
API Threaded End and Outlet Connections
Top Connectors
Other End Connectors
Actuators
Valves
Casing and Tubing Heads
Casing and Tubing Hangers
Tubing Head Adapters
Chokes
Tees and Crosses
Test and Gage Connections
Fluid Sampling Devices
Christmas Trees
Crossover Connectors
Independent Screwed Wellheads

The typical equipment nomenclature used in this recommended practice is shown in API Spec 6A.

102.2. SERVICE CONDITIONS.

102.2a. General. Service conditions for which the equipment will be repaired/remanufactured refer to classifications for pressure and temperature.

102.2b. Pressure Ratings. Pressure ratings indicate maximum rated working pressures expressed as gage pressure (psig).

102.2c. Temperature Ratings. Temperature ratings indicate temperature ranges from a minimum ambient to a maximum flowing fluid temperature expressed in degrees Fahrenheit (F).

103. REFERENCED STANDARDS.

103.1. General. This document includes by reference, either in total or in part, API, industry and government standards listed in API Spec 6A.

103.2. Equivalent Standards. Other nationally or internationally recognized standards may be submitted to and identified by API for use as equivalent standards.

SECTION 200
ABBREVIATIONS/DEFINITIONS

ABBREVIATIONS

API American Petroleum Institute

ASME American Society of Mechanical Engineers

ASTM American Society for Testing and Materials

AWS American Welding Society

NACE National Association of Corrosion Engineers

NDE Non-Destructive Examination

DEFINITIONS

The following definitions relate specifically to the repair/remanufacture of wellhead and christmas tree equipment and are presented to define the terminology used in this recommended practice.

Date of Repair — The date of repairer's/remanufacturer's final acceptance of finished equipment.

Remanufacture — An activity involving disassembly, reassembly, and testing of equipment with or without the replacement of parts where machining, welding, heat treating, or other manufacturing operations are employed. Remanufacture does not include the replacement of bodies.

Replacement Part — Parts used to repair/remanufacture a piece of equipment that meets or exceeds API RP 6AR recommendations.

Repair — An activity involving disassembly, reassembly and testing of equipment with or without the replacement of parts. Repair does not include machining, welding, heat treating, other manufacturing operations or the replacement of bodies.

Repairer/Remanufacturer — The principal agent in the repair, remanufacture of equipment who chooses to be in compliance with API RP 6AR.

Manufacturing Operation — An activity involving but not limited to machining, welding, heat treating or other processes utilized to produce a finished product.

SECTION 300
DESIGN

301. GENERAL.

301.1. This section identifies design recommendations which should be satisfied when repair or remanufacture activities require replacement parts or special processes.

301.1a. Replacement Parts. Replacement parts should be designed to perform in the designated pressure/temperature ranges without deformation to the extent that any other performance requirement is not met.

301.1b. Special Processes. Special processes should be qualified to ensure conformance to the established design requirements.

301.1c. Documentation. Design activities should be supported with established design requirements, calculations, verification and qualification test results.

SECTION 400
MATERIALS FOR REPLACEMENT PARTS

401. GENERAL.

401.1. This section identifies the recommendations for materials when repair or remanufacture activities require replacement parts.

401.1a. Metallic Materials — Replacement parts should be made of materials which comply with the design requirements in Section 300.

401.1a(1). The Repairer/Remanufacturer should establish control features for metallic materials which specify:

— Mechanical Properties
— Chemical Composition
— Heat Treat Procedure

401.1b. Nonmetallic Materials — Replacement seals should be made of materials which comply with the design requirements in Section 300.

401.1b(1). The Repairer/Remanufacturer should establish control features for nonmetallic materials which specify:

— Generic base polymer(s) ASTM D1418
— Storage and age control requirements
— Physical properties

SECTION 500
REPAIR

501. GENERAL.

501.1. This section describes guidelines for a program to perform repair activities on wellhead and christmas tree equipment. Field repair activities are beyond the scope of this recommended practice.

501.2. PROGRAM.

501.2a. Equipment Identification.

501.2a(1). Upon receipt, the equipment should be identified as to:

(a) Owner (name, P.O., W.O., etc.)

(b) Manufacturer

(c) Description (W.P., size, model, etc.)

(d) Serial number (other traceable I.D.)

(e) Owner instructions

(f) Work order number (repairer)

501.2a(2). The equipment should be maintained traceable to this information while in the possession of the repairer. Subsequent to shipment, the information should be maintained as a permanent record by the repairer.

501.2b. Equipment Disassembly. Equipment for repair should be disassembled and cleaned in accordance with the repairer control features. The control features should ensure identification of component to assembled unit.

501.2c. Equipment Evaluation.

501.2c(1). Following disassembly and cleaning, the equipment should be evaluated to establish the as received condition. Results of evaluation should be communicated to the owner and form the basis for repair activities.

501.2c(2). The repairer's evaluation process should be described in control features which include:

(a) Visual inspection/acceptance criteria

(b) Dimensional verification/acceptance criteria

(c) Method of documentation (a,b)

501.2d. Repair Process Control. Processing activities should be supported with a process control system. The control system should communicate instructions and acceptance criteria to personnel performing a test, inspection, special process or customer hold point.

501.2e. Equipment Reassembly. The repairer's reassembly process should be described in control features which include:

(a) Requirements for cleaning

(b) Assembly lubricants

(c) Torque requirements

501.2f. Equipment Testing.

501.2f(1). Hydrostatic Body Test. Assembled equipment should be subjected to a hydrostatic body test prior to shipment from repairer's facility. Test pressure should not be applied as a differential pressure across closure mechanisms of valves. Cold (tap) water or water with additives should be used as a testing fluid.

Loose connectors do not require a hydrostatic test.

501.2f(2). The hydrostatic body test for assembled equipment should consist of three parts:

The primary pressure-holding period.

The reduction of the pressure to zero.

The secondary pressure-holding period.

Tests should be conducted prior to the addition of body filler grease. Lubrication applied during assembly is acceptable.

Both pressure-holding periods should not be less than 3 minutes, the timing of which should not start until the test pressure has been reached, the equipment and the pressure monitoring gage have been isolated from the pressure source, and the external surfaces of the body members have been thoroughly dried.

The hydrostatic body test pressure should be determined by the rated working pressure of the equipment as defined in API Spec 6A.

501.2f(2)(a). Special Considerations. For equipment with end or outlet connections having different working pressures, the lowest working pressure rating should be used to determine the hydrostatic body test pressure (except for crossover connectors and chokes).

501.2f(2)(b). A crossover connector should be tested at a test pressure based on the pressure rating for the upper connection. Test pressure should be applied inside and above the restricted area packoff of the lower connection. The lower connection should be tested below the restricted area packoff to a level based on its pressure rating.

501.2f(2)(c). For chokes having an inlet connection of a higher pressure rating than the outlet connection, the body, from the inlet connection to the body-to-bean seal point of the replaceable seat or flow bean, should be hydrostatically tested to the appropriate pressure for the inlet connection. The remainder of the body, downstream from the seal point, should be tested to the appropriate pressure for the outlet connection. Temporary seat seals may be used to facilitate testing.

Valves and chokes should be in the partially open position during testing.

REPAIR (continued)

Each bore of multiple bore equipment should be individually tested.

501.2f(2)(d). Acceptance Criteria. The equipment should show no visible leakage under the test pressure. Leakage by the thread during the in plant hydrostatic testing of a threaded wellhead member when joined with a threaded test fixture is permissible above the working pressure of the thread.

501.2f(3). Hydrostatic Seat Test — Valves.

(a) Bidirectional valves should have hydrostatic seat test pressure equal to the rated working pressure applied to each side of the gate or plug with the other side open to atmosphere.

(b) Unidirectional valves should have pressure applied in the direction indicated on the body, except for check valves which will be tested on the downstream side.

(c) Holding periods for tests should be a minimum of 3 minutes.

(d) The pressure should be reduced to zero between all holding periods.

(e) Valves should be tested a minimum of two times on each side of the gate or plug.

(f) Acceptance Criteria: No visible leakage during each holding period.

501.2f(4). Drift Test — Full Bore Valves.

(a) Method. Pass a drift mandrel as described in API Spec 6A, Table 605.8 through the valve bore after the valve has been assembled, operated and pressure tested.

(b) Acceptance Criteria. The drift mandrel should pass completely through the valve bore.

501.2f(5). Drift Test — Christmas Trees.

(a) Method. Pass a drift mandrel as described in API Spec 6A, Table 605.8 through the vertical bore of christmas tree assemblies.

(b) Acceptance Criteria. The drift mandrel should completely pass through the vertical bore of the christmas tree.

SECTION 600
REMANUFACTURE

601. GENERAL.

601.1. This section describes guidelines for a program to perform remanufacture activities on wellhead and christmas tree equipment.

601.2. PROGRAM.

601.2a. Equipment Identification.

601.2a(1). Upon receipt, the equipment should be identified as to:

(a) Owner (name, P.O., W.O., etc.)

(b) Manufacturer

(c) Description (W.P., size, model, etc.)

(d) Serial number (other traceable I.D.)

(e) Owner instructions

(f) Work order number (remanufacturer)

601.2a(2). The equipment should be maintained traceable to this information while in the possession of the remanufacturer. Subsequent to shipment, the information should be maintained as a permanent record by the remanufacturer.

601.2b. Equipment Disassembly. Equipment for remanufacture should be disassembled and cleaned in accordance with the remanufacturer control features. The control features should ensure identification of component to assembled unit.

601.2c. Equipment Evaluation.

601.2c(1). Following disassembly and cleaning, the equipment should be evaluated to establish the as received condition. Results of evaluation should be communicated to the owner and form the basis for remanufacture activities.

601.2c(2). The remanufacturer's evaluation process should be described in control features which include:

(a) Visual inspection/acceptance criteria

(b) Dimensional verification/acceptance criteria

(c) Method of documentation (a,b)

601.2d. Remanufacturing Process Control. Processing activities should be supported with a process control system. The control system should communicate instructions and acceptance criteria to personnel performing a test, inspection, special process or customer hold point.

601.2e. Equipment Reassembly. The remanufacturer's reassembly process should be described in control features which include:

(a) Requirements for cleaning

(b) Assembly lubricants

(c) Torque requirements

601.2f. Equipment Testing.

601.2f(1). Hydrostatic Body Test. Assembled equipment should be subjected to a hydrostatic body test prior to shipment from remanufacturer's facility. Test pressure should not be applied as a differential pressure across closure mechanisms of valves. Cold (tap) water or water with additives should be used as the testing fluid.

Loose connectors do not require a hydrostatic test.

601.2f(2). The hydrostatic body test for assembled equipment should consist of three parts:

The primary pressure-holding period.

The reduction of the pressure to zero.

The secondary pressure-holding period.

Tests should be conducted prior to the addition of body filler grease. Lubrication applied during assembly is acceptable.

Both pressure-holding periods should not be less than 3 minutes, the timing of which should not start until the test pressure has been reached, the equipment and the pressure monitoring gage have been isolated from the pressure source, and the external surfaces of the body members have been thoroughly dried.

The hydrostatic body test pressure should be determined by the rated working pressure of the equipment as defined in API Spec 6A.

601.2f(2)(a). Special Considerations. For equipment with end or outlet connections having different working pressures, the lowest working pressure rating should be used to determine the hydrostatic body test pressure (except for crossover connectors and chokes).

601.2f(2)(b). A crossover connector should be tested at a test pressure based on the pressure rating for the upper connection. Test pressure should be applied inside and above the restricted area packoff of the lower connection. The lower connection should be tested below the restricted area packoff to a level based on its pressure rating.

601.2f(2)(c). For chokes having an inlet connection of a higher pressure rating than the outlet connection, the body, from the inlet connection to the body-to-bean seal point of the replacement seat or flow bean, should be hydrostatically tested to the appropriate pressure for the inlet connection. The remainder of the body, downstream from the seal point, should be tested to the appropriate pressure for the outlet connection. Temporary seat seals may be used to facilitate testing.

Valves and chokes should be in the partially open position during testing.

Each bore of multiple bore equipment should be individually tested.

601.2f(2)(d). Acceptance Criteria. The equipment should show no visible leakage under the test pressure. Leakage by the thread during the in plant hydrostatic testing of a threaded wellhead member when joined with a threaded test fixture is permissible above the working pressure of the thread.

601.2f(3). Hydrostatic Seat Test — Valves.

(a) Bidirectional valves should have hydrostatic seat test pressure equal to the rated working pressure applied to each side of the gate or plug with the other side open to atmosphere.

(b) Unidirectional valves should have pressure applied in the direction indicated on the body, except for check valves which will be tested on the downstream side.

(c) Holding periods for tests should be a minimum of 3 minutes.

(d) The pressure should be reduced to zero between all holding periods.

(e) Valves should be tested a minimum of two times on each side of the gate or plug.

(f) Acceptance Criteria: No visible leakage during each holding period.

601.2f(4). Drift Test — Full Bore Valves.

(a) Method. Pass a drift mandrel as described in API Spec 6A, through the valve bore after the valve has been assembled, operated and pressure tested.

(b) Acceptance Criteria. The drift mandrel should pass completely through the valve bore.

601.2f(5). Drift Test — Christmas Trees.

(a) Method. Pass a drift mandrel as described in API Spec 6A, through the vertical bore of christmas tree assemblies.

(b) Acceptance Criteria. The drift mandrel should completely pass through the vertical bore of the christmas tree.

SECTION 700
WELDING

701. GENERAL.

701.1. The remanufacturer should have written Welding Procedure Specifications (WPS) to cover all welding activities.

701.2. WELDING/WELDING OPERATOR QUALIFICATION. All welders and welding operators should be qualified in accordance with the applicable requirements of ASME Section IX.

SECTION 800
QUALITY CONTROL

801. SCOPE. This section describes the recommended Quality Control features for equipment repaired/remanufactured to meet this recommended practice.

802. MEASURING AND TESTING EQUIPMENT.

802.1. GENERAL. Measuring and testing equipment used to inspect, test or examine material or other equipment should be identified, controlled, calibrated, and adjusted at specified inervals in accordance with documented instructions. These instructions should be consistent with industry standards and be utilized to maintain the accuracy recommended by this document.

802.2. MEASUREMENT STANDARDS AND MEASURING EQUIPMENT. Measurement standards and measuring equipment should be controlled and calibrated to maintain accuracies within the limits specified by the measuring equipment manufacturer or in accordance with the repairer's/remanufacturer's written procedures.

802.3. PRESSURE MEASURING DEVICES.

802.3a. Type and Accuracy. Test pressure measuring devices should be either pressure gages or pressure transducers and should be accurate to at least ±0.5% of full scale range.

802.3b. Size and Range. Pressure gages should have a minimum face diameter of 4.0 inches. Pressure measurements should be made at not less than 25% and not more than 75% of the full pressure span of the gage.

802.3c. Calibration Procedure. Pressure measuring devices should be periodically recalibrated with a master pressure measuring device or a dead weight tester at 25%, 50% and 75% of full scale range.

802.3d. Calibration Intervals.

802.3d(1). Calibration intervals should be established for calibration based on recorded calibration history.

802.3d(2). Calibration intervals should be a maximum of three (3) months until recorded calibration history can be established.

803. QUALITY CONTROL PERSONNEL QUALIFICATIONS.

803.1. NON DESTRUCTIVE EXAMINATION (NDE) PERSONNEL. NDE personnel should be qualified in accordance with Recommended Practice SNT-TC-1A.

803.2. VISUAL EXAMINATION PERSONNEL. Personnel performing visual examinations should have an annual eye examination in accordance with SNT-TC-1A.

803.3. WELDING INSPECTORS. Personnel performing visual inspection of welding operations and completed welds should be qualified and certified as one or more of the following:

803.3a. AWS certified welding inspector.

803.3b. AWS certified associate welding inspector.

803.3c. Welding inspector certified by the repairer/remanufacturer in accordance with their documented training program.

803.4. OTHER PERSONNEL. Personnel performing other Quality Control activities directly affecting material and product quality should be qualified in accordance with the repairer's/remanufacturer's documented requirements.

804. QUALITY CONTROL REQUIREMENTS.

804.1. GENERAL.

804.1a. Quality Control Activities. Quality Control activities should be controlled by the repairer's/remanufacturer's documented instructions which should include appropriate methodology and acceptance criteria. NDE instructions should be approved by qualified NDE Level III personnel.

804.1b. Acceptance Status. The acceptance status of equipment should be indicated either on the equipment or in the quality records which should be traceable to the equipment, parts or material.

804.1c. Sour Service Equipment. Equipment, components or materials intended for use in sour service should meet the requirements of API Spec 6A.

804.2. BONNETS, BONNETS AND FLANGES (REPLACEMENT PARTS).

804.2a. Tensile Testing. Tensile testing should be performed in accordance with API Spec 6A.

804.2b. Impact Testing. Impact testing should be performed in accordance with API Spec 6A.

804.2c. Dimensional Verification.

804.2c(1). Sampling. End and outlet connection threads should be gaged.

804.2c(2). Methods. Threaded end and outlet connections should be gaged for standoff at handtight assembly by the use of gages and gaging practices illustrated in API Spec 6A.

804.2c(3). Acceptance Criteria. Acceptance criteria for threaded end and outlet connections should be in accordance with API Spec 5A, 5L or ANSI B1.1 and B1.2 as applicable.

804.2d. Hardness Testing For Sour Service.

804.2d(1). Methods. Replacement bonnets and flanges should be hardness tested in accordance with the procedures specified in ASTM E-10 or E-18 when intended for use in sour service.

804.2d(2). Acceptance Criteria. Acceptance criteria for hardness testing should be per API Spec 6A.

804.3. BODIES, BONNETS AND FLANGES (REUSE PARTS).

804.3a. Visual Examination. Bodies, bonnets and flanges to be reused should be visually examined prior to reuse. The repairer/remanufacturer should have written specifications governing this activity.

804.3b. Hardness Testing. Bodies, Bonnets and flanges to be reused which are intended for sour service should be hardness tested in accordance with ASTM E-10 or E-18. The repairer/remanufacturer should establish written acceptance criteria for hardness testing that comply with API Spec 6A.

804.3c. Dimensional Verification. Dimensions which are specified in API Spec 6A should be verified.

804.3d. Weld Repair. After completion of all welding and postweld heat treatment the part should be hardness tested in accordance with the requirements of ASTM E-10 or E-18 to verify material hardness per the remanufacturers WPS.

804.4. STEMS (REPLACEMENT PARTS). Stems intended for sour service should be hardness tested as in Section 804.2d of this document.

804.5. STEMS (REUSE PARTS).

804.5a. Visual Examination. Stems to be reused should be visually examined. The repairer/remanufacturer should have written specifications detailing procedures, methods and acceptance criteria.

804.5b. Hardness Testing. Stems to be reused which are intended for sour service should be hardness tested as in Section 804.2d. of this document.

804.6. VALVE BORE SEALING MECHANISMS (REPLACEMENT PARTS). Components intended for use in sour service should be hardness tested per ASTM E-10 or E-18 and should meet the repairer's/remanufacturer's written specifications which should be in accordance with API Spec 6A for the material(s) being utilized.

804.7. VALVE BORE SEALING MECHANISMS (REUSE PARTS).

804.7a. Visual Examination. Valve bore sealing mechanisms intended for reuse should be visually inspected. The repairer/remanufacturer should have written specifications detailing procedures, methods and acceptance criteria.

804.7b. Hardness Testing. Valve bore sealing mechanisms intended for use in sour service should be hardness tested per ASTM E-10 or E-18 and should meet the repairer's/remanufacturer's written specifications which should be in accordance with API Spec 6A for the material(s) being utilized.

804.8. RING GASKETS (REPLACEMENT). Ring gaskets should conform to the requirements API Spec 6A.

804.9. STUDS AND NUTS (REPLACEMENT). Studs and nuts should conform to the requirements of API Spec 6A.

804.10. NONMETALLIC SEALING MATERIALS. Nonmetallic sealing material should conform to the written specifications of the repairer/remanufacturer.

804.11. ASSEMBLED EQUIPMENT. The repairer/remanufacturer should have written Quality Control specifications for assembled equipment which should include at least a drift test, hydrostatic seat test. Suitable guidelines for such tests are presented in API Spec 6A.

805. QUALITY CONTROL RECORDS.

805.1. GENERAL.

805.1a. This Section summarizes the quality control records needed to fulfill the recommendation of this document.

805.1b. Sour Service Equipment. For equipment intended for use in sour service which has been previously certified for use in sour service the repairer/remanufacturer should have written instructions/procedures to assure that the replacement parts and operations performed (i.e. welding) meet the requirements of API Spec 6A.

805.1c. Record Control.

805.1c(1). Quality control records should be legible, identifiable, retrievable and protected from damage, deterioration or loss.

805.1c(2). Quality control records should be retained by the repairer/remanufacturer for a minimum of five (5) years following the date of repair/remanufacture.

805.1c(3). Quality records should be signed and dated.

805.2. RECORDS TO BE MAINTAINED BY THE REPAIRER/REMANUFACTURER. It is recommended that the following quality control records be maintained.

Measurement Test Equipment (MTE) Calibration Records

Personnel Qualification
- — NDE Personnel Qualification
- — Visual Personnel Qualification

Procedures (NDE) Approval

Materials Test Records

Dimensional Verification Records

Visual Inspection Records

Equipment Test Records
- — Hydrostatic
- — Drift

Equipment Identification Records

Welding Records

Design Documentation

Special Process Qualification

SECTION 900
EQUIPMENT MARKING

901. GENERAL.

901.1. MARKING INFORMATION. Equipment Repaired/Remanufactured in accordance with this recommended practice should be marked with the following information:

a. "6AR"

b. Repairer's/Remanufacturer's name or Logo

c. Date of Repair and Remanufacture

901.2. MARKING LOCATIONS. It is recommended that the repairer or remanufacturer utilize a metal nameplate to provide the information in 901.1 of this RP or follow the marking location requirements of API Spec 6A.

902. PREVIOUS MARKINGS.

902.1. Original Manufacturer's markings and Repair/Remanufacture markings, if previously repaired or remanufactured, should be protected so that they remain legible after Repair/Remanufacture.

902.2. Where alteration to OEM configurations has occurred, the original descriptive information should be replaced with current information.

SECTION 1000
STORING/SHIPPING REPAIRED/REMANUFACTURED EQUIPMENT

1001. STORING.

1001.1. DRAINING AFTER TESTING. All equipment should be drained of hydrostatic test fluids before being put into storage.

1001.2. RUST PREVENTION. Parts and equipment should be stored with suitable rust preventative on seals, load bearing surfaces and threads. Rust preventative should not become fluid and run at a temperature less than 125 degrees Fahrenheit. Seal ring grooves should be protected from corrosion and physical damage.

1001.3. IDENTITY. Material, parts and equipment should be stored in a manner to preclude contamination or deterioration and to prevent loss of identity and traceability.

1001.4. ELASTOMER AGE CONTROL. Age control procedures and protection of elastomer material should be documented by the repairer/remanufacturer.

1002. SHIPPING.

1002.1. Parts and equipment should be prepared for shipping so as to prevent damage, deterioration or entry of foreign material.

1002.2. Procedures should exist to ensure parts and equipment are not shipped unless recorded information for final documentation compilation is available.

1002.3. All shipments should be tagged and labeled in accordance with remanufacturer's written procedures.

1002.4. Loose ring gaskets should be boxed or wrapped during shipping.

APPENDIX A
SCOPE AND USE OF API 6A VS. API 6AR REPAIR AND REMANUFACTURE STANDARDS FOR WELLHEAD AND CHRISTMAS TREE EQUIPMENT

A1. BACKGROUND.

A1.1. The 15th edition of API Spec 6A included many changes in the Specifications governing the manufacturing and monogramming of API 6A wellhead and Christmas tree equipment. Among these changes were requirements: that all companies licensed to use the API monogram under API Spec 6A have a written quality assurance program; that these companies be audited periodically to verify conformance to their quality program; that all API monogrammed equipment be manufactured to meet a specific "Product Specification Level" (PSL); and that records be maintained to confirm traceability of materials and program compliance. The 15th edition of API Spec 6A became effective April 1, 1986.

A1.2. Up to that date, API had not addressed the repair or remanufacture of API wellhead and Christmas tree equipment. It had always been left to the repair or remanufacture companies and their customers to establish guidelines for the work performed. While these practices generally had been acceptable in the past, the changes in the 15th edition of API Spec 6A dictated that specifications governing the repair and remanufacture of 15th and later edition API 6A equipment must be part of an API monogram licensed and monitored program if the PSLs were to be maintained. The API Committee on Standardization of Valves and Wellhead Equipment formed an "API 6AR Task Group" charged with developing such specifications. This initial charge was later amended to include, if possible, all API monogrammed 6A equipment manufactured before the 15th edition of API Spec 6A, and all API 6A type equipment which did not have an API monogram.

A1.3. The 6AR Task Group was comprised of both manufacturers and end users. After considerable work and many changes, the task group produced specifications that would allow 15th and later edition API 6A equipment to be repaired or remanufactured in an API monogram licensed facility in a manner that would preserve the equipment's original PSL and allow its continued use in the originally intended PSL environment. These specifications were approved as Section 1000 of API Spec 6A, and became effective on October 1, 1991 as part of Supplement 1 to the 16th edition of Spec 6A. These specifications satisfied the task group's first charge, but did not resolve the problem of establishing repair and remanufacture standards for all the other 6A type wellheads not covered by API Spec 6A.

A1.4. The 6AR Task Group next developed a recommended practice, API RP 6AR, to address the repair and remanufacture of non-monogrammed and non-PSL rated 6A type equipment. This would include equipment produced and monogrammed prior to the 15th edition of API Spec 6A, non-monogrammed equipment regardless of manufacturer or date of manufacture, and 15th edition and later edition equipment which had lost its traceability or no longer evidenced an API monogram and PSL stamping.

A1.5. These two documents provide the industry's first set of specifications for repair and remanufacture of 15th and later edition API 6A monogrammed wellhead and Christmas tree equipment (Section 1000 of Spec 6A), and written minimal guidelines for the repair and remanufacture of all other 6A type equipment (RP 6AR). Both programs are voluntary on the part of companies desiring to perform repair and remanufacture services. Qualified companies may obtain an API monogram license for repair and remanufacture services that comply with Section 1000 of API Spec 6A. Those companies may or may not also be API monogram licensed manufacturers of 6A equipment, and they may choose to repair and remanufacture only their own equipment or both their and other manufacturer's equipment. In either case they must meet the requirements of API Spec 6A in order to apply the API monogram to equipment they have repaired or remanufactured.

Following is a summary of commonly asked questions and answers about repair and remanufacture of wellhead and Christmas tree equipment under API Spec 6A and RP 6AR.

A2. COMMONLY ASKED QUESTIONS ABOUT API SPEC 6A AND RP 6AR.

A2.1. *What is repair?*

A repair is work performed on a piece of equipment which does not require any welding or machining in order to return it to a reusable condition.

A2.2. *What is remanufacturing?*

Remanufacturing occurs when a piece of equipment requires welding or machining to return it to a reusable condition.

A2.3. *Can previously manufactured API 6A equipment be upgraded to current PSL standards through the repair or remanufacture process?*

No. Neither API monogrammed nor non-monogrammed 6A equipment can be upgraded to a level which it was not originally manufactured and designated to meet. Equipment manufactured to API 6A specifications prior to the 15th edition cannot be upgraded to meet the requirements of the 15th or later edition requirements or PSLs. Likewise, non-API monogrammed equipment cannot be upgraded to API monogram status through repair or remanufacture.

APPENDIX A (continued)

A2.4. *Can a piece of equipment which was originally purchased with an API monogram and PSL be repaired or remanufactured and maintain its PSL rating if all traceability for the piece has been lost?*

No. Traceability for API monogrammed PSL rated equipment must be maintained for a piece of equipment to maintain its PSL rating. It is the responsibility of the purchaser of the equipment to obtain and/or maintain records indicating API monogram and PSL status.

A2.5. *Can a piece of equipment which does not have an indication of an API monogram and PSL rating be repaired or remanufactured under the API 6A monogram program?*

No. If an API monogram and PSL rating cannot be found on a piece of equipment, it cannot be repaired or remanufactured under the 6A monogram program. In such case, the RP 6AR recommended practice would be appropriate.

A2.6. *Is the RP 6AR program audited by API?*

No. API does not audit or monitor companies voluntarily utilizing the RP 6AR recommended practice in their repair and/or remanufacture program.

A2.7. *What do the repair and remanufacture requirements in API Spec 6A, Section 1000, do for my company?*

API Spec 6A, Section 1000, provides a means to repair and remanufacture current generation wellhead and Christmas tree equipment which was manufactured under the API Spec 6A 15th and later edition monogram program. Without this program, your company would not be able to have monogrammed and PSL rated equipment repaired or remanufactured and returned to its originally rated service with the API monogram maintained.

A2.8. *What does the recommended practice RP 6AR do for my company?*

RP 6AR provides, for the first time, industry guidelines for the repair and remanufacture of all other API 6A type wellhead and Christmas tree equipment. These recommended guidelines call for written procedures to be utilized for repair and remanufacturing of equipment, a quality program, traceability of parts and equipment test procedures to name a few examples. As a result, companies that adhere to these recommended practices should be better able to demonstrate the quality of the work they perform and deliver a more reliable product to your company.

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