ARTICLE NCA-2000
CLASSIFICATION OF COMPONENTS AND SUPPORTS

NCA-2100  GENERAL REQUIREMENTS

NCA-2110  SCOPE

(a) Division 1 specifies rules for
(1) nuclear power system metal components, parts, and appurtenances
(2) metal containment vessels
(3) supports

(b) Division 2 specifies rules for concrete containments.

(c) While providing for several classes of construction (NCA-2120, NCA-2130), this Section does not provide guidance in the selection of a specific classification to fit a component in a given system. Such guidance is derived from systems safety criteria for specific types of nuclear power systems, such as pressurized water reactors, boiling water reactors, or high temperature gas-cooled reactors, and may be found in engineering standards or in the requirements of regulatory and enforcement authorities having jurisdiction at the nuclear power plant site.

(d) The Owner of a nuclear power plant shall be responsible for applying system safety criteria to classify the equipment in the nuclear power plant to be constructed in accordance with the rules of this Section (NCA-2120 and NCA-2130). Classification shall be included in the Design Specification.

NCA-2120  PURPOSE OF CLASSIFYING ITEMS OF A NUCLEAR POWER PLANT

Construction rules are specified for items that are designated Code Classes 1, 2, 3, CS, MC, and CC. These Code classes are intended to be applied to the classification of items of a nuclear power system and containment system. Within these systems the Code recognizes the different levels of importance associated with the function of each item as related to the safe operation of the nuclear power plant. The Code classes allow a choice of rules that provide assurance of structural integrity and quality commensurate with the relative importance assigned to the individual items of the nuclear power plant.

NCA-2130  CLASSIFICATIONS AND RULES OF THIS SECTION

NCA-2131  Code Classes and Rules of Division 1

(a) Division 1 provides rules for the construction of items in the following Code classes:

(1) Class 1 — items constructed in accordance with the rules of Subsection NB
(2) Class 2 — items constructed in accordance with the rules of Subsection NC
(3) Class 3 — items constructed in accordance with the rules of Subsection ND
(4) Class MC — metal containment vessels constructed in accordance with the rules of Subsection NE
(5) Class CS — core support structures constructed in accordance with the rules of Subsection NG

(b) Division 1 also provides rules for
(1) supports constructed in accordance with the rules of Subsection NF
(2) internal structures constructed in accordance with the rules of Subsection NG

NCA-2132  Rules of Division 2

Division 2 of this Section provides rules for concrete containments designed and constructed in accordance with the rules of Subsection CC.

NCA-2133  Multiple Code Class Components

(a) Compartments in components consisting of multiple compartments such as heat exchangers may be assigned different Code classes, provided any interactions between compartments produced by service conditions are taken into account and these conditions are specified in the Design Specifications.

(b) Supports for multiple Code class components shall be constructed in accordance with the rules of Subsection NF for the more restrictive class.

NCA-2134  Optional Use of Code Classes

(a) Items classified as Class 2 in their Design Specifications may be constructed and stamped in accordance with the rules of Subsection NB.

(b) Items classified as Class 3 in their Design Specifications may be constructed and stamped in accordance with the rules of Subsection NB or NC.

(c) Containment vessels classified as Class MC in their Design Specification may be constructed and stamped in accordance with the rules of Subsection NB or NC.

(d) When an item is optionally classified to a higher class, the Design Specifications shall identify the minimum required class as well as the optionally selected higher class.
fracture for materials that have specified minimum yield strengths at room temperature greater than 50.0 ksi (345 MPa) but not exceeding 90.0 ksi (620 MPa); where these materials of higher yield strengths are to be used in conditions where radiation may affect the material properties, the effect of radiation on the $K_{IC}$ curve shall be determined for the material prior to its use in construction

(7) when operability of a component is a requirement, the Design Specification shall make reference to other appropriate documents that specify the operating requirements

(8) the effective Code Edition, Addenda, and Code Edition and Addenda of Section XI to be used in construction.

Rewrite (b) to read:

(b) The boundaries for Class 2 or Class 3 components are given in NCD-1130.

Delete (c)

Renumber (d), (e) and (f) as (c), (d) and (e)

NCA-3254 Boundaries of Jurisdiction

In order to define the boundaries of components with respect to adjacent components, intervening elements, and other structures, the Design Specifications shall include:

(a) the locations of each such boundary
(b) the forces, moments, strains, or displacements that are imposed at each such boundary
(c) the structural characteristics of the attached components or structures, whether or not they are within this Section’s jurisdiction when such components or structures provide constraints to the movement of components or appurtenances
(d) when the foundation support is constructed as an integral part of the concrete containment, it shall be included within this Section’s Division 2 jurisdiction to the extent required by NCA-2132

NCA-3254.1 Definition of Division 1 Boundaries.

(a) The boundaries for Class 1 components are given in NB-1130.

(b) The boundaries for Class 2 components are given in NC-1130.

(c) The boundaries for Class 3 components are given in ND-1130.

(d) The boundaries for metal containment vessels are given in NE-1132.

(e) The boundaries for supports are given in NF-1130.

(f) The boundaries for core support structures are given in NG-1130.

NCA-3254.2 Definition of Division 2 Boundaries.

The Design Specification shall define the boundaries of Division 2 in accordance with the limits defined in CC-1140; it shall also show the external boundaries of the component with respect to its supporting structures. Where the support is constructed as an integral part of the concrete containment, it shall be included within the jurisdiction of Division 2 to the extent required by CC-1140. The Design Specification shall include the specific dimensional location of each boundary, including the boundaries for parts and appurtenances designated to meet the requirements of Division 1.

NCA-3255 Certification of the Design Specifications

The Design Specifications shall be certified to be correct and complete and to be in compliance with the requirements of NCA-3250 by one or more Certifying Engineers, on behalf of the Owner or his designee. The Certifying Engineers shall be competent in the applicable field of design and related nuclear power plant requirements and qualified by the Owner or his designee in accordance with the requirements of Section III Appendices, Mandatory Appendix XXIII. These Certifying Engineers are not required to be independent of the organization preparing the Design Specifications. Document distribution for Division 2 construction is shown in Table NCA-3200-1.

NCA-3256 Filing of Design Specifications

(a) The Design Specifications in their entirety shall become a principal document governing design and construction of items. A copy of the Design Specification shall be made available to the Inspector at the manufacturing site before fabrication begins, and a copy shall be
filed at the location of the installation and made available to the enforcement authorities having jurisdiction over the plant installation before components or appurtenances are placed in service. In the case of parts, piping subassemblies, appurtenances, and supports, the Design Specifications need not be made available to the Inspector at the fabrication site (NCA-3251). However, the applicable data from the Design Specifications that form the basis for fabrication shall be made available to the Inspector at the fabrication site. Document distribution for Division 2 construction is shown in Table NCA-3200-1.

(b) For pumps and valves 4 in. nominal pipe size (DN 100) and less, for linear supports used as mechanical snubbers, and for standard supports, the Certificate Holder may provide his own Design Specification in accordance with NCA-3252 as a basis for construction. Prior to installation, the Owner or his designee shall be responsible for reconciling the Certificate Holder’s Design Specification with his own Design Specification.

NCA-3260 REVIEW OF DESIGN REPORT

(a) The Design Report that the Certificate Holder or the Designer provides shall be reviewed by the Owner or his designee to determine that all the Design and Service Loadings as stated in the Design Specification have been evaluated, and that the acceptance criteria explicitly provided for in this Section, or additional acceptance criteria permitted by this Section when established in the Design Specification, associated with the specified Design and Service Conditions, have been considered. The responsibility for the method of analysis and the accuracy of the Design Report remains with the Certificate Holder or the Designer.

(b) Except as provided for in (c) below, documentation shall be provided by the Owner or his designee to indicate that the review required by (a) above has been conducted. Prior to the stamping of the component, a copy of this documentation shall be attached to the copy of the Design Report that is made available to the Inspector. A copy of this documentation shall be included with the Design Report that is filed at the location of the records. Document distribution for Division 2 construction is shown in Table NCA-3200-1.

(c) When a Certified Design Report Summary (NCA-3551.3) is furnished in lieu of a Design Report (NCA-3551.1), for standard supports, documentation shall be provided by the Owner or the Owner’s designee to indicate that the Certified Design Report Summary has been reviewed in accordance with (a) above. Prior to stamping of the component, including piping systems, a copy of this documentation shall be attached to the Certified Design Report Summary that is made available to the Inspector. A copy of this documentation and the Certified Design Report Summary shall be filed at the location of the installation in accordance with NCA-4134.17 and made available to the regulatory and enforcement authorities having jurisdiction at the site of the nuclear power plant.

NCA-3270 OVERPRESSURE PROTECTION REPORT

NCA-3271 Responsibility and Content

It is the responsibility of the Owner to prepare, or cause to be provided, an Overpressure Protection Report for each component or system (NB-7200, NC-7200, ND-7200, or NE-7200).

NCA-3272 Certification of Report

The report shall be certified as specified in NB-7230, NC-7230, ND-7230, or NE-7230.

NCA-3273 Filing of Report

The report shall be filed as specified in NB-7250, NC-7250, ND-7250, or NE-7250.

NCA-3280 OWNER’S DATA REPORT AND FILING

The Owner or his designee shall prepare Form N-3 (Section III Appendices, Mandatory Appendix V).

NCA-3290 OWNER’S RESPONSIBILITY FOR RECORDS

The Owner shall be responsible for designating the records to be maintained (NCA-4134.17). The Owner shall also be responsible for continued maintenance of the records required by this Section and Section XI, Rules for In-service Inspection of Nuclear Power Plant Components, at the power plant site, the Certificate Holder’s plant, or other locations determined by the Owner. The Owner shall advise the enforcement authority in writing regarding the location of the records.

NCA-3300 RESPONSIBILITIES OF A DESIGNER — DIVISION 2

NCA-3320 CATEGORIES OF THE DESIGNER’S RESPONSIBILITY

The Designer has the following categories of responsibility:

(a) prepare structural design of the component in conformance with this Section and the Design Specification (NCA-3250)

(b) prepare the Design Drawings and Construction Specification (NCA-3340)

(c) prepare and submit the Design Report (NCA-3350)

(d) surveillance of construction to the extent designated by the Owner in the Design Specification (NCA-3220)

(e) review of construction documents (NCA-3450) as specified in the Construction Specification
NCA-3460 RESPONSIBILITY FOR QUALITY ASSURANCE

NCA-3461 Scope of Responsibilities for Quality Assurance

(a) The N Certificate Holder shall be responsible for surveying, qualifying, and auditing suppliers of subcontracted services (NCA-3125), including nondestructive examination contractors and Material Organizations. Material Organizations holding a Quality System Certificate (Materials) and Certificate Holders whose scope includes supply or manufacture and supply of material need not be surveyed nor audited for work or material covered by the scope of their certificate. Subcontractors holding an appropriate certificate need not be surveyed nor audited for work within the scope of the subcontractor’s certificate.

(b) An N Certificate Holder may qualify vendors of subcontracted services other than those requiring a certificate, such as Material Organization, for another Certificate Holder doing work for that N Certificate Holder. The qualification documentation shall be supplied to the other Certificate Holder prior to their use of the subcontracted service or Material Organization.

NCA-3462 Documentation of Quality Assurance Program

The N Certificate Holder shall be responsible for documenting its Quality Assurance Program (NCA-4134).

NCA-3463 Filing of Quality Assurance Manual


NCA-3500 RESPONSIBILITIES OF AN N CERTIFICATE HOLDER — DIVISION 1

NCA-3520 CATEGORIES OF THE N CERTIFICATE HOLDER'S RESPONSIBILITIES

The N Certificate Holder’s responsibilities include the following:

(a) obtaining an N Certificate (NCA-3530)
(b) compliance with this Section (NCA-3540)
(c) achievement of structural integrity (NCA-3540)
(d) provision of a Design Report (NCA-3550) when one is required including
(1) stress analysis of parts (NCA-3552)
(2) stress analysis of appurtenances (NCA-3553)
(3) reconciliation of Design Drawing changes with Design Report (NCA-3554)
(4) certification of Design Report (NCA-3555)
(5) availability of Design Report and its documentation of review to Inspector (NCA-3557)
(6) provision of Design Report to Owner or his designees for review, and documentation of review (NCA-3556)
(7) filing at the site of installation the Design Report or Certified Design Report Summary
(e) qualification of Material Organizations and suppliers of subcontracted services (NCA-3561)
(f) establishing and maintaining a Quality Assurance Program (NCA-3560 and NCA-3562)
(g) documenting a Quality Assurance Program (NCA-3562)
(h) filing the Quality Assurance Manual (NCA-3563)
(i) Data Reports (NCA-3570)
(j) obtaining an agreement with an Authorized Inspection Agency (NCA-8130)
(k) making available to the Inspector the documents specified by this Section and those requested by him to assure compliance with Code requirements
(l) review of Certified Material Test Reports and Certificates of Compliance for materials (NCA-1220) used by him
(m) preparation, accumulation, control, and protection of required records while in his custody (NCA-4134.17)
(n) documentation of review and approval of material used by him as permitted by NCA-1140(e)
(o) subcontracting (NCA-3125) for materials, design, fabrication, installation, examination, testing, and inspection. The N Certificate Holder shall retain overall responsibility, including certification and stamping

NCA-3530 OBTAINING A CERTIFICATE

An N Certificate (NCA-8100) shall be obtained for the construction of any item intended to be in compliance with the requirements of this Section and to be stamped with a Certification Mark with N Designator. An N Certificate Holder may do all of the work of an NPT, NS, or NA Certificate Holder at the location shown on his certificate, provided that the scope of work is included in this certificate.

NCA-3540 COMPLIANCE WITH THIS SECTION

The N Certificate Holder has the responsibility for the structural integrity using the Design Specification as a basis of design, complying with this Section, and furnishing a Design Report if required.

NCA-3550 REQUIREMENTS FOR DESIGN OUTPUT DOCUMENTS

NCA-3551 General

The drawings used for construction shall comply with the Design Specifications and the rules of this Section and shall be in agreement with the other design output documents.

NCA-3551.1 Design Report. The drawings used for construction shall be in agreement with the Design Report before it is certified and shall be identified and
described in the Design Report. It is the responsibility of the N Certificate Holder to furnish a Design Report for each component and support, except as provided in NCA-3551.2 and NCA-3551.3. The Design Report shall be certified on behalf of the N Certificate Holder by a Certifying Engineer when it is for Class 1 components and supports, Class CS core support structures, Class MC vessels and supports, Class 2 vessels designed to Service Loadings greater than Design Loadings. A Class 2 Design Report shall be prepared for Class 1 piping NPS 1 (DN 25) or smaller that is designed in accordance with the rules of subsection NC-3200.

NCA-3551.2 Load Capacity Data Sheet. The Load Capacity Data Sheet shall state the load capacity of the support and identify the tests and calculations used to establish the load capacity. The Load Capacity Data Sheet shall adequately identify the support. The Load Capacity Data Sheet for supports for Class 1 components, Class MC vessels, and Class 2 vessels designed to Service Loadings greater than Design Loadings shall be certified by a Certifying Engineer on behalf of the N or NS Certificate Holder. The Certifying Engineer shall be qualified by the N or NS Certificate Holder. The Certifying Engineer shall be qualified by the N or NS Certificate Holder in accordance with the requirements of Section III Appendices, Mandatory Appendix XXIII. The Load Capacity Data Sheet shall specify the organization responsible for retaining the data substantiating the stated load capacity. Such data shall be on file and available for review.

(19) NCA-3551.3 Certified Design Report Summary.

(a) For standard supports designed by analysis, a Certified Design Report Summary may be furnished in lieu of a Design Report when the manufacturer of the standard support provides his own Design Specifications [NCA-3256(b)].

(b) The Design Report used to justify the Certified Design Report Summary shall be certified by a Certifying Engineer, on behalf of the N or NS Certificate Holder, prior to completion of the Certified Design Report Summary. The Certifying Engineer shall be qualified by the N or NS Certificate Holder in accordance with the requirements of Section III Appendices, Mandatory Appendix XXIII.

(c) The Certified Design Report Summary shall include (1) through (7) below.

(1) a description or sketch of the standard support including the manufacturer’s catalog item number or identification number.

(2) identification and location of the standard support manufacturer’s applicable Design Specification

(3) identification and location of the standard support manufacturer’s applicable Design Report.

(4) the classification (Class 1, 2, 3, or combination) of the standard support.

(5) a summary of allowable loads, temperatures, and associated Service Level Limits that the designer of the piping system or other component may use in his design.

(6) applicable Code Editions and Addenda (if applicable).

(7) date the Certified Design Report is certified. As an alternative, a signed and certified Design Report Summary is certified by a Certifying Engineer, on behalf of the N or NS Certificate Holder, the Date of Certification may be the date the Certified Design Report Summary is certified.

NCA-3552 Design Output Documents for Parts

When the N Certificate Holder purchases parts from an NPT Certificate Holder, it is the responsibility of the N Certificate Holder to provide or cause to be provided the calculations for the parts and to incorporate them into the design output documents.

NCA-3553 Design Output Documents for Appurtenances

The design output documents for each appurtenance that is to be attached to a completed component shall be provided unless they are already included in the component design output documents.

NCA-3554 Modification of Documents and Reconciliation With Design Report

Any modification of any document used for construction, from the corresponding document used for design analysis, shall be reconciled with the Design Report by the person or organization responsible for the design. A revision or addenda to the Design Report shall be prepared and (if required by NCA-3551.1) certified to indicate the basis on which this has been accomplished. All such revised documentation shall be filed with the completed Design Report.

NCA-3555 Certification of Design Report

(a) The Design Report for Class 1 components and supports, Class CS core support structures, Class MC vessels and supports, Class 2 vessels designed to Service Loadings greater than Design Loadings shall be certified by one or more Certifying Engineers, on behalf of the N Certificate Holder. The Certifying Engineers shall be competent in the applicable field of design and qualified by the N Certificate Holder in accordance with the requirements of Section III Appendices, Mandatory Appendix XXIII. The Design Report shall be certified only after all design requirements of this Section have been met. Such Certifying Engineers shall be other than the individuals certifying the Design Specifications (NCA-3255) but are not required by these rules to be independent of the organization holding the certificate.

(b) It is the intent of this Section that the certification of the Design Report shall in no way relieve the N Certificate Holder of the responsibility for the structural integrity of the completed item for the conditions stated in the Design Specifications.
(d) provision of a Design Report (NCA-3784.2) when one is required, including:
   (1) stress analysis of parts and appurtenances (NCA-3784.3)
   (2) reconciliation of Design Drawing changes with Design Report (NCA-3784.4)
   (3) certification of Design Report (NCA-3784.5)
   (4) availability of Design Report and its documentation of review to Inspector (NCA-3784.7)
   (5) provision of Design Report to Owner or their designee for review, and documentation of review (NCA-3784.6)
   (6) filing of the Design Report at the site of installation

NCA-3782 Obtaining a Certificate

An NV Certificate (NCA-8100) shall be obtained for the construction of any item intended to be in compliance with the requirements of this Section and to be stamped with a Certification Mark with NV Designator. An NV Certificate Holder may do all of the work of an NPT or NA Certificate Holder at the location shown on their certificate, provided that the scope of work is included in this certificate.

NCA-3783 Compliance With This Section

The NV Certificate Holder has the responsibility for the structural integrity using the Design Specification as a basis of design, complying with this Section, and furnishing a Design Report if required.
(b) approved suppliers may adopt a limited scope quality system program as approved by the Certificate Holder or Material Organization [NCA-4255.3(b)]

NCA-3812 Exclusions

Material falling within the small products exclusion of NB/NC/ND/NE/NF/NG-2610 or material that is allowed by this Section to be furnished with a Certificate of Compliance, is exempted from the requirements of NCA-3800, except

(a) Certified Material Test Reports or Certificates of Compliance shall meet the requirements of NCA-3862.1

(b) for Class 1 construction only, material identification and marking shall meet the requirements of NCA-4256.3

NCA-3820 CERTIFICATION OR QUALIFICATION OF MATERIAL ORGANIZATIONS

(a) A Material Organization shall be certified by obtaining a Quality System Certificate (QSC) issued by the Society verifying the adequacy of the Material Organization’s Quality System Program. The certified Material Organization that maintains an ASME Quality System Certificate is also known as a QSC (Quality System Certificate) Holder.

(b) Alternatively, the Certificate Holder (NCA-3461, NCA-3561, NCA-3661, NCA-3681, or NCA-3761) or, when included in its scope of activities, the certified Material Organization [(a)] may qualify Material Organizations not certified by the Society by evaluation of the organization’s Quality System Program in accordance with the requirements of NCA-3842.

(c) A Certificate Holder may furnish material when stated in the scope of its certificate. If not stated in the scope of its certificate, a Certificate Holder may provide material to another Certificate Holder to be used in the fabrication, assembly, or installation of an item that will be stamped by the original Certificate Holder who provided the material. In either case, a Quality System Certificate is not required, nor is the user of the material required to survey, qualify, or audit such a Certificate Holder.

NCA-3830 RESPONSIBILITIES OF MATERIAL ORGANIZATIONS

The Material Organization shall be responsible for establishing, documenting, implementing, and maintaining a Quality System Program in accordance with the requirements of NCA-4250, and as applicable to its scope of activities

(a) establishing and maintaining measures for the traceability of material or source material while under its control (NCA-4256)

(b) controlling quality during manufacture, including control of testing, examination, repair, and treatment of the material or source material (NCA-4257, NCA-4258)

(c) evaluating, qualifying, and auditing Material Organizations (NCA-3842), as provided by NCA-3820(b), except when the party holds a Quality System Certificate that operations performed

(d) approving and controlling operations performed by suppliers of source material and subcontracted services (NCA-4255)

(e) preparing Certified Material Test Reports and Certificates of Compliance (NCA-3860)

(f) shipment of material (NCA-4257.4)

NCA-3840 EVALUATION OF THE PROGRAM

NCA-3841 Evaluation by the Society

(a) The Society, when requested by the applicant on forms issued by the Society, will arrange for a survey of the Material Organization’s Quality System Program for the scope of activities at the locations listed on the application. The Program will be evaluated on the basis of its compliance with the applicable material requirements of this Section and the requirements of NCA-4200. The Quality System Certificate, which is issued for a 3-year period, will describe and specify the scope and limits of work and locations for which the certified Material Organization is qualified and will be subject to a planned audit program by the Society. Not later than 6 months prior to the expiration of the certificate, the certified Material Organization shall apply for a renewal evaluation and for issuance of a new certificate.

(b) The applicant shall supply all information required by forms provided by the Society.

(c) The applicant’s Quality System Program shall be accepted by the Society prior to the issuance of a certificate.

(d) A controlled copy of the certified Material Organization’s Quality System Manual shall be filed with the Society. The Manual shall be the Society’s guide for surveying and auditing the certified Material Organization’s continued compliance with the accepted Quality System Program.

(e) The certified Material Organization shall make available for on-site review by the Society any procedures, process sheets, or drawings as are necessary to understand the Program. Detailed technical procedures will not be approved by the Society. The certified Material Organization shall keep a controlled copy of the Manual on file and in a place and manner readily available to the Society’s audit team.

(f) The certified Material Organization shall obtain the Society’s review and acceptance of proposed revisions to the Quality System Manual prior to implementation.

(g) When the applicant requests that the scope of the Quality System Certificate allows any combination of the activities specified in NCA-4251.2(a)(1) through NCA-4251.2(a)(6), the control of these activities shall be included in the Manual and will be reviewed by the Society.
NCA-3860 CERTIFICATION REQUIREMENTS

NCA-3861 Certification Requirements for Material Organizations

(a) The Material Organization whose scope of activities includes NCA-3830 shall provide a Certified Material Test Report or Certificate of Compliance, as applicable (NCA-3862), for the material.

(1) The certification affirms that contents of the report are correct and accurate and that all test results and operations performed by the Material Organization or its subcontractors are in compliance with the material specification and the specific applicable material requirements of this Section.

(2) Chemical analyses, tests, examinations, and heat treatments required by the material specification that were not performed shall be listed on the Certified Material Test Report or Certificate of Compliance, as applicable, or may be listed on an identified attachment.

(3) When the Material Organization’s scope of activities includes product form conversion, the Material Organization shall also certify that the material conforms to the applicable dimensional requirements.

(b) Except where Certificates of Compliance are acceptable [NCA-3862.1(g)], the Material Organization shall transmit all certifications required by NCA-3862.1(b), received from other Material Organizations or approved suppliers in accordance with (a) above, to the purchaser at the time of shipment.

(c) The Certificate Holder shall complete all operations not completed by the Material Organization and shall provide a Certified Material Test Report for all operations performed by him or his approved suppliers. The Certificate Holder shall certify that the contents of the report are correct and accurate and that all test results and operations performed by the Certificate Holder or his approved suppliers are in compliance with the requirements of the material specification and this Section. Alternatively, the Certificate Holder shall provide a Certified Material Test Report for the operations it performed and at least one Certified Material Test Report from each of its approved suppliers for the operations they performed.

NCA-3862 Certification of Material

NCA-3862.1 Material Certification.

(a) The Certified Material Test Report shall include the actual results of all required chemical analyses, tests, and examinations.

(b) When required chemical analyses (including melting mill heat analysis report except as provided in NCA-4255.5), heat treatment, tests, examinations, or repairs are subcontracted, the approved supplier’s certification for the operations performed shall be furnished as an identified attachment to the Certified Material Test Report. For welding materials (NCA-1221.2, WA-1223) only, when permitted by the material specification and the rules of this Section (NCA-3850) and the melting mill heat analysis. When operations other than chemical analysis, heat treatment, tests, examination, or repairs, that require maintenance of traceability are subcontracted, these operations and the approved suppliers performing them shall be listed on the Certified Material Test Report, or the approved suppliers certification for the operation may be furnished as an attachment to the Certified Material Test Report.

(c) The Certified Material Test Report shall also include a report of all weld repairs performed on the material as required by this Section. Radiographic film required for the examination of material repair welds shall be included as a part of the Certified Material Test Report, except for those radiographs required for the testing of welding or brazing materials.

(d) When specific times or temperatures (or temperature ranges) of heat treatments are required by material specifications, they shall be reported. For austenitic stainless steels and high nickel alloys, a statement of the minimum solution annealing temperature is a sufficient statement of heat treatment. When specific times and temperatures (or temperature ranges) are not required by the material specification, a statement of the type of heat treated condition shall be reported. Additionally, the times and temperatures of postweld heat treatments of weld repaired materials as required by the fabrication requirements of this Section shall be reported.

(e) Reporting of actual dimensions and visual examination results is neither required nor prohibited by this paragraph.

(f) Notarization of the Certified Material Test Report is not required.

(g) A Certificate of Compliance with the material specification, grade, class, and heat treated condition, as applicable, may be provided in lieu of a Certified Material Test Report for material NPS 3/4 (DN 20) and less (pipe, fittings, flanges, materials for valves and tubes except heat exchanger tubes), bolting 1 in. (25 mm) and less, as applicable.

(h) Material identification shall be described in the Certified Material Test Report or Certificate of Compliance, as applicable. Heat or lot traceability to the Certificate of Compliance is not required.

NCA-3862.2 Quality System Program Statement.

(a) When the Material Organization holds a Quality System Certificate, the Material Organization’s Quality System Certificate number and expiration date shall be shown on the Certified Material Test Report or Certificate of Compliance included with the documentation that accompanies the material.

(b) When the Material Organization has been qualified by a party other than the Society, the revision and date of the applicable written Quality System Program shall...
ARTICLE NCA-4000
QUALITY ASSURANCE REQUIREMENTS

NCA-4100 REQUIREMENTS

NCA-4110 SCOPE AND APPLICABILITY

(a) This Article sets forth the requirements for planning, managing, and conducting Quality Assurance Programs for controlling the quality of activities performed under this Section and the rules governing the evaluation of such Programs prior to the issuance of certificates for the construction, fabrication, manufacture, and installation of Class 1, 2, 3, CS, MC, and CC items. The Quality Assurance requirements for Material Organizations (Metallic) for all Classes of construction are provided in NCA-3800. The Quality Assurance requirements for Nonmetallic Material Organizations, Polyethylene Material Organizations, and Constituent Suppliers for all Classes of construction are provided in NCA-3900. Certificate Holders are advised to consult other regulations for Quality Assurance requirements governing activities beyond the scope of this Section.

(b) As identified, modified, and supplemented in NCA-4120 and NCA-4134, N-Type Certificate Holders shall comply with the requirements of ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications, Part I and when specifically stated, Part II. The Quality Assurance Program requirements for an NS Certificate Holder shall comply with NCA-3680 and (b) above. Inspection by an ANI and Certification Mark is not required for supports.

NCA-4120 DEFINITIONS

(a) The definitions in Article NCA-9000 shall apply.

(b) The terms and definitions of NQA-1 shall apply unless defined in Article NCA-9000.

(c) For the following terms, which are defined in both NQA-1 and Article NCA-9000, the definitions in Article NCA-9000 shall apply:

1. item
2. Owner
3. quality assurance
4. repair
5. rework
6. service
7. use-as-is
8. nonconformance

NCA-4130 ESTABLISHMENT AND IMPLEMENTATION

NCA-4131 Material Organizations, Division 1

The requirements of NCA-3800 and NCA-4200 apply.

NCA-4131.1 Polyethylene Material Organizations.

The requirements of NCA-4470 apply.

NCA-4132 Material Organizations for Division 2

NCA-4132.1 Material Organizations. The requirements of NCA-3800 and NCA-4200 apply.

NCA-4132.2 Nonmetallic Material Organizations for Division 2. The requirements of NCA-3900 and NCA-4300 apply.

NCA-4133 Owner’s Quality Assurance Program

NCA-4133.1 The Owner shall maintain a Quality Assurance Program. For this purpose, the Owner may use a Quality Assurance program accepted by the regulatory authority.

NCA-4133.2 The Owner shall maintain either a Quality Manual or procedure accepted by the AIA that describes how the Owner will meet his Code responsibilities, NCA-3200, including control of his designee(s).

NCA-4133.3 Owners performing activities that require an N-type Certificate or Quality System Certificate shall include the requirements of NCA-3800 or NCA-4100, as applicable, in its Quality Assurance Program, and obtain the appropriate Certificate(s).

NCA-4133.4 The Owner shall assure that organizations performing activities requiring an N-type Certificate or Quality System Certificate have a Quality Assurance Program meeting the requirements of NCA-3800 or NCA-4100, as applicable.

NCA-4134 N, NV, NPT, NS, and NA Certificate Holders for Class 1, 2, 3, MC, CS, and CC Construction

NCA-4134.1 Organization. The provisions of NQA-1, Requirement 1, shall apply.

NCA-4134.2 Quality Assurance Program.

(a) The provisions of NQA-1, Requirement 2, shall apply and the system used to meet these requirements shall be described in the Quality Assurance Manual. The Quality Assurance Manual shall also include a statement of policy and authority indicating management support.
The specific responsibilities of the quality assurance organization of the Certificate Holder shall also include the review of written procedures and monitoring of the activities concerned with the Quality Assurance Program as covered in this Article.

(b) In lieu of para. 301, Requirement 2, the qualifications of nondestructive examination personnel shall be as required by NB/NC/ND/NE/NF/NG-5520.

(c) The controls used in the Quality Assurance Program shall be documented in the Quality Assurance Manual. The Quality Assurance Manual may be hard copy or electronic, provided the controls are described to assure approved revisions are made available for use by the Certificate Holder personnel. The Program need not be in the same format or sequential arrangement as the requirements in this Article, as long as all applicable requirements of this Article have been covered. A copy, including all changes that are made, shall be made available to the Inspector. The Certificate Holder shall make available to the Inspector such drawings and process sheets as are necessary to make the Quality Assurance Program intelligible.

(d) The Certificate Holder shall be responsible for advising its Authorized Inspection Agency of any changes that are proposed to be made to the Quality Assurance Manual, and shall have acceptance of the Authorized Inspection Agency’s Authorized Nuclear Inspector Supervisor before putting such changes into effect. The Certificate Holder shall be responsible for promptly notifying the Inspector of such accepted changes, including evidence of acceptance by the Authorized Inspection Agency, and for simultaneously reconciling copies of the Quality Assurance Manual.

NCA-4134.5 Instructions, Procedures, and Drawings. The provisions of NQA-1, Requirement 5, shall apply.

NCA-4134.6 Document Control. The requirements of NCA-4134.2 shall be used for subcontracted services. The provisions of NQA-1, Requirement 6, shall apply. If electronic controls are used, the Certificate Holder shall describe the review, approval, and control process to assure correct documents are being used at the location where the activity is performed.

NCA-4134.7 Control of Purchased Items and Services. The requirements of NCA-3125 shall be used for subcontracted services. The provisions of NQA-1, Requirement 7, shall apply, except that

(a) this requirement does not apply to Authorized Inspection Agency services.

(b) in para. 300, Bid Evaluation, the decision to perform bid evaluation for materials to confirm conformance to procurement documents shall remain the responsibility of the Certificate Holder.

(c) in para. 503, Certificate of Conformance, changes, waivers, or deviations are not acceptable unless they meet the requirements of this Section.

(d) in para. 503(c), Certificate of Conformance, the resolution of nonconformances shall be in conformance with the requirements of this Section.

(e) Other than as provided in NCA-4134.3, the use of NQA-1, Requirement 7, para. 700, Commercial Grade Items and Services, is not permitted.

(f) documentary evidence that items conform to the requirements of this Section shall be available at the construction or installation site before use or installation. Requirements for documentary evidence are satisfied for material when the applicable rules of NCA-3800 and NCA-3900 for material certification are met. For stamped items, the requirements are satisfied by a Data Report.

(g) the requirements of NCA-3126 and NCA-3127 may be used.

NCA-4134.8 Identification and Control of Items. The provisions of NQA-1, Requirement 8, shall apply.

(b) Welding and brazing materials for all Classes of construction shall be controlled.

(c) All characteristics required to be reported by the material specifications and by this Section shall appear on checklists, and each such characteristic shall be examined by accepted procedures as required and the results recorded. Characteristics included on Certified Material Test Reports or Certificates of Compliance need not be duplicated in the checklists. Checklists shall provide for a record that the Certified Material Test Reports and Certificates of Compliance have been received, reviewed, and found acceptable. When the results of the examination or test procedure conducted by the Certificate Holder are necessary to show compliance with material specification or other requirements, the checklists shall show the
under his control. The Owner shall be responsible for re-
tention and maintenance of those records that are trans-
ferred to him.

(e) Nonpermanent Records. For Classes 1, 2, CS, MC, and
CC, the records listed in Table NCA-4134.17-2 shall be
classified as nonpermanent records. For Class 3, only re-
 cords 3, 7, and 8 in Table NCA-4134.17-2 shall apply. The
Certificate Holder shall be responsible for their retention
for the period specified in Table NCA-4134.17-2. In no case need nonpermanent records be retained for longer
than 10 yr after completion of applicable Code Data Report.

NCA-4134.18 Audits.

(a) The provisions of NQA-1, Requirement 18, shall
apply.

(b) Results of audits shall be made available to the
Authorized Nuclear Inspector.

(c) The audit frequency shall be specified in the Certifi-
Holder’s audit frequency shall be commensurate with
his schedule of activities and shall be such that each on-
going Code activity is audited at least once annually.

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### Table NCA-4134.17-1

<table>
<thead>
<tr>
<th>Record</th>
<th>Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Index to lifetime records (NCA-4134.17)</td>
<td>11. Heat treatment records [Note (1)]</td>
</tr>
<tr>
<td>2. Code Data Reports (NCA-8400)</td>
<td>12. Qualification test reports such as for concrete design mixes and safety valves (NB-7700)</td>
</tr>
<tr>
<td>4. Design output documents, Division 1 (NCA-3350 and NCA-3550) [Note (2)]</td>
<td>14. Steel hydrostatic and pneumatic test results (NCA-5280)</td>
</tr>
<tr>
<td>5. Design Report, Division 2</td>
<td>15. Repair records when required by Code (NB/NC/ND/NE/NG-4130)</td>
</tr>
<tr>
<td>8. As-built drawings (NCA-3454)</td>
<td>18. Certificate of Analysis (NCA-4474.1) and Certified Polyethylene Test Report (NCA-4474.2)</td>
</tr>
<tr>
<td>9. Certified Material Test Reports (CMTR) and documentation providing traceability to location used, when required (NB/NC/ND/NE/NG-4122)</td>
<td></td>
</tr>
<tr>
<td>10. Records of post-tensioning sequence, procedure, and loads</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL NOTE:** Nonconformance reports that affect those records listed shall be incorporated into the record or be retained with the records. Records generated in compliance with Division 5, Subsection HB shall also comply with the record requirements of the referenced Subsections that apply to Division 5, Subsection HB.

**NOTES:**

(1) Either heat treatment charts or certified summaries of time and temperature data may be provided. These data may be included as part of the CMTR.

(2) For supports designed by load rating, the Load Capacity Data Sheet is the design output document to be maintained as a lifetime quality assurance record. For standard supports designed by analysis and supplied with a Certified Design Report Summary, the Certified Design Report Summary is the design output document to be maintained as a lifetime quality assurance record.
operations performed during the melting and heat analysis, affecting the mechanical properties, conversion from one product form into another product form including applicable dimensional requirements, and certification to the applicable material specification testing, examination, repair, or treatments required by the material specification or the specific applicable material requirements of this Section and certification of the results of such tests, examinations, repairs, or treatments receipt, identification, verification, handling, storage, and shipment of material or source material qualification of Material Organizations permitted by NCA-3820(b), including control of shipments of material from Qualified Material Organizations to parties other than the party performing the qualification approval and control of suppliers of source material or subcontracted services (NCA-4255.3) utilization of unqualified source material (NCA-4255.5)

(b) The Program shall include measures to comply with all requirements of NCA-4200 to the extent necessary to assure compliance with the requirements of this Section.

NCA-4251.3 Organization.

(a) The organizational structure for executing the Program may take various forms, provided the persons and organizations assigned the quality system functions have the required authority and organizational freedom.

(b) Persons or organizations responsible for defining and measuring the overall effectiveness of the Program shall

(1) be designated
(2) be sufficiently independent from the pressures of production
(3) have direct access to responsible management at a level where appropriate action can be initiated
(4) report regularly on the effectiveness of the Program

(c) The organizational structure, functional responsibilities, levels of authority, and lines of communication for activities affecting quality shall be documented. Persons or organizations responsible for assuring that an appropriate Quality System Program has been established and verifying that activities affecting quality have been correctly performed shall have sufficient authority, access to work areas, and organizational freedom to

(1) identify quality problems
(2) initiate, recommend, or provide solutions to quality problems through designated channels
(3) verify implementation of solutions
(4) assure that further processing, delivery, or use is controlled until proper disposition of a nonconformance, deficiency, or unsatisfactory condition has occurred

(d) Individuals or groups assigned the responsibility of checking, auditing, or otherwise verifying that production and quality control activities have been correctly performed shall be independent of the individual or group directly responsible for performing the specific activity. Such persons shall not report directly to the supervisor with immediate responsibility for the work being verified.

(e) Management shall regularly review the status and adequacy of the Program.

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**Table NCA-4134.17-2**

<table>
<thead>
<tr>
<th>Record</th>
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<tbody>
<tr>
<td>1. QA Program Manual</td>
<td>3 yr after superseded or invalidated</td>
</tr>
<tr>
<td>2. Design procurement and QA procedures (NCA-4434.5)</td>
<td>3 yr after superseded or invalidated</td>
</tr>
<tr>
<td>3. Installation and NDE procedures (NB/NC/ND/NE/NF/NG-5112)</td>
<td>10 yr after superseded or invalidated</td>
</tr>
<tr>
<td>4. Personnel qualification records (NB/NC/ND/NE/NF/NG-5520 and NB/NC/ND/NE/NF/NG-4322)</td>
<td>3 yr after superseded or invalidated</td>
</tr>
<tr>
<td>5. Purchase orders</td>
<td>10 yr after superseded or invalidated</td>
</tr>
<tr>
<td>6. Audit and survey reports (NCA-4134.18)</td>
<td>3 yr after completion of report</td>
</tr>
<tr>
<td>7. Final radiographs not covered in Table NCA-Record 15</td>
<td>10 yr after completion of report</td>
</tr>
<tr>
<td>8. Calibration records (NCA-4134.12)</td>
<td>Until recalibrated</td>
</tr>
<tr>
<td>9. Process sheets, travelers, or checklists (NCA-4134.10)</td>
<td>10 yr after completion</td>
</tr>
<tr>
<td>10. Rebar splice test reports (CC-4330)</td>
<td>10 yr after completion of report</td>
</tr>
<tr>
<td>11. Joint-welder identification records when such records are used in lieu of physical marking of welds (NB/NC/ND/NE/NF/NG-4322)</td>
<td>10 yr after completion of report</td>
</tr>
<tr>
<td>12. Certifying Engineer qualification records (Mandatory Appendix XXIII)</td>
<td>3 yr after superseded or invalidated</td>
</tr>
</tbody>
</table>

**GENERAL NOTE:** Nonconformance reports, which affect those records listed and are not incorporated into the record, shall be retained for the retention period applicable to the record the nonconformance report affects.
NCA-4252 Personnel

NCA-4252.1 Indoctrination, Training, and Qualification of Personnel.

(a) Measures shall be established to assure that all personnel performing or managing activities affecting quality are indoctrinated and trained. The assignment of personnel shall be at the discretion of the organization’s management. Indoctrination and training measures shall reflect the following requirements:

1. Personnel to be indoctrinated or trained shall be identified.
2. The extent of indoctrination and training shall be commensurate with the scope, complexity, and nature of the activity as well as the education, experience, and proficiency of the person.
3. Personnel shall be indoctrinated in the general criteria, applicable codes, standards, company procedures, Quality System Program requirements, job responsibilities, and authority as they relate to a particular function.
4. Training shall be provided, as needed, to achieve initial proficiency, maintain proficiency, and adapt to changes in technology, methods, and job responsibilities.

(b) All nondestructive examination personnel shall be qualified in accordance with NCA-5521 of the applicable Subsection.

(c) Personnel who lead audits shall be qualified on the basis of education, experience, training, audit participation, and examination in accordance with the organization’s Quality System Program.

NCA-4252.2 Personnel Records.

(a) Records shall be maintained of the implementation of indoctrination and training of personnel. Records of indoctrination and training may take the form of attendance sheets, training logs, or personnel training records.

(b) Qualification records of all nondestructive examination personnel shall be documented and maintained.

(c) Qualification records of personnel who lead audits shall be documented and maintained and shall include education, experience, audit training and examination, and audit participation used as the basis of qualification.

NCA-4253 Program Documentation

NCA-4253.1 Quality System Manual.

(a) The Quality System Program shall be described and summarized in a Quality System Manual that shall be a major basis for demonstration of compliance with the rules of this Section.

(b) The Program documented in the Manual shall be implemented by written procedures that are maintained either separately or in the Quality System Manual.

(c) Detailed technical procedures and processes, such as those for nondestructive examination, are not considered part of the Manual; however, the controls of such procedures and processes shall be covered by the Manual.

(d) The Quality System Manual may be hard copy or electronic, provided the controls are described to assure approved revisions are made available for use by the Material Organization personnel.

NCA-4253.2 Procedures, Instructions, and Drawings.

(a) Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings of a type appropriate to the circumstances.

(b) These documents shall include or reference appropriate acceptance criteria for determining that the prescribed activities have been satisfactorily completed.

NCA-4253.3 Document Control. The preparation, issue, and change of documents, including electronic documents, that specify quality requirements or prescribe activities affecting quality, such as Quality System Program Manuals, purchase specifications, instructions, procedures, and drawings shall be controlled to assure that the correct documents are being used at the location where the activity is performed. Such documents, including changes thereto, shall be reviewed for adequacy and approved for release by authorized personnel.

NCA-4253.4 Quality Assurance Records. Records that furnish documentary evidence of quality shall be specified, and maintained. Records shall be legible, identifiable, and retrievable. Records shall be protected against damage, deterioration, or loss. Requirements and responsibilities for record transmittal, distribution, retention, maintenance, and disposition shall be established and documented.

NCA-4253.5 Records of Examinations and Tests. All characteristics required to be reported by the material specification and this Section shall be verified and the results recorded. Records shall be traceable to the document and revision to which an inspection, examination, or test was performed.

NCA-4255 Control of Purchased Materials, Source Materials, and Services

NCA-4255.1 General.

(a) Measures shall be established to assure that all purchased material, source material, and subcontracted services conform to the requirements of this Section.

(b) Welding material used in the repair of material or source material shall be controlled in accordance with this Section.

(c) These measures shall be designed to prevent the use of incorrect or defective material or source material, or materials that have not received the required examinations or tests.
<table>
<thead>
<tr>
<th>Standard ID</th>
<th>Published Title</th>
<th>Section III Referenced Edition</th>
<th>Other Acceptable Editions</th>
<th>Subsection Applicability</th>
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<td><strong>Pipes and Tubes</strong></td>
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<tr>
<td>ASME B36.19M</td>
<td>Stainless Steel Pipe</td>
<td>2004</td>
<td>1985</td>
<td>NB, NE, ND, NE, CC, HBB</td>
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<td><strong>Fittings, Flanges, and Gaskets</strong></td>
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<td>ANSI B16.18</td>
<td>Cast Copper Alloy Solder joint Pressure Fittings</td>
<td>2012</td>
<td>2001, 1984</td>
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<td>ASME B16.21</td>
<td>Nonmetallic Flat Gaskets for Pipe Flanges</td>
<td>2016</td>
<td>2011, 2005, 1992</td>
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<td>ASME B16.24</td>
<td>Cast Copper Alloy Pipe Flanges, Flanged Fittings, and Valves: Classes 150, 300, 600, 900, 1500, and 2500</td>
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<td>Butt welding Ends</td>
<td>2012</td>
<td>1997, 1986</td>
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<td>ASME B16.28</td>
<td>Wrought Steel Butt welding Short Radius Elbows and Returns</td>
<td>2012</td>
<td>1994, 1986</td>
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<td>ASME B16.47</td>
<td>Large Diameter Steel Flanges</td>
<td>2017</td>
<td>2014, 2006, 1998</td>
<td>NB, NE, ND, NE, CC, HBB</td>
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<td>SAE J513</td>
<td>Refrigeration Tube Fittings — General Specifications</td>
<td>1981</td>
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<td>MSS SP-44</td>
<td>Steel Pipeline Flanges</td>
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<td>1996, 1985, 1982</td>
<td>NB, NC, ND, NE, CC, HBB</td>
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<td>MSS SP-87</td>
<td>Factory-Made Butt-Welding Fittings for Class 1 Nuclear Piping Applications</td>
<td>1991</td>
<td>1992</td>
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<td>MSS SP-97</td>
<td>Integirly Reinforced Forged Branch Outlet Fittings — Socket Welding, Threaded and Butt Welding Ends</td>
<td>2012</td>
<td>2006, 2001</td>
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<td>ANSI/AWWA C207</td>
<td>Steel Pipe Flanges for Waterworks Service — Sizes 4 in. through 144 in.</td>
<td>2013</td>
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<td><strong>Bolting</strong></td>
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<td>ASME B18.2.1</td>
<td>Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head and Lag Screws</td>
<td>2012</td>
<td>2010, 1999, 1991</td>
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<td>ASME/ANSI B18.2.2</td>
<td>Square and Hex Nuts (Inch Series)</td>
<td>2015</td>
<td>2010, 1987, 1972</td>
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<td>ASME B18.31.2</td>
<td>Continuous Thread Stud, Double-End Stud, and Flange Bolting Stud (Stud Bolt) (Inch Series)</td>
<td>2014</td>
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<td>ASME B1.1</td>
<td>Unified Inch Screw Threads (UN and UNR Thread Form)</td>
<td>2003</td>
<td>1989, 1982</td>
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<td>ANSI/ASME B1.20.1</td>
<td>Pipe Threads, General Purpose (Inch)</td>
<td>2013</td>
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<td>ANSI B1.20.3 [Note (4)]</td>
<td>Dryseal Pipe Threads (Inch)</td>
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<td>ANSI/MSS SP-58</td>
<td>Pipe Hangers and Supports — Materials, Design, Manufacture, Selection, Application, and Installation</td>
<td>2009</td>
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<td>NF</td>
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<td><strong>Valves</strong></td>
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<td>ASME B16.34</td>
<td>Valves — Flanged, Threaded, and Welding End</td>
<td>2017</td>
<td>2013, 2009</td>
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<td>MSS SP-100</td>
<td>Qualification Requirements for Elastomer Diaphragms for Nuclear Service Diaphragm Type Valves</td>
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<td>(S2010), 1998, 1988, 1981</td>
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<tr>
<td>MSS SP-105</td>
<td>Instrument Valves for Code Applications</td>
<td>2016a</td>
<td>2010, 2005</td>
<td>NC, ND</td>
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GENERAL NOTE: Reaffirmed versions of the listed standards are also acceptable.

NOTES:
(1) Analysis per ASME B16.9, para. 2.2, is acceptable only for caps and reducers.
(2) Analysis per ASME B16.28, para. 2.1, is not acceptable. In 1994, ASME B16.28 was incorporated into ASME B16.9.
(3) Analysis per MSS-SP-87 is acceptable only for caps and reducers.
(4) These standards are referenced for dimensional purposes only. Any manufacturing or inspection requirements contained in item are not mandatory. The SA or SB Material Specification specifies the applicable manufacturing and inspection requirements.
(5) HBB refers to Division 5, Subsection HB, Subpart B.
Table NCA-8100-1
Certificates and Certification Mark Issued by the Society for Construction of Nuclear Power Plants (Cont’d)

NOTES:
(1) Items within the containment system, excluding the Class CC and MC vessel and its supports, shall be stamped Class 1 or 2 in accordance with the classification stated in the Design Specification or Construction Specification.

(2) A Data Report shall be filled out on Form NCS-1 (Section III Appendices, Mandatory Appendix V) by the Certificate Holder assuming overall responsibility. If this Certificate Holder also performs the fabrication, the Form NCS-1 shall be completed by this Certificate Holder and shall be certified by the Inspector for the core support structure to be stamped with the Certification Mark with N Designator and no N-2 Form is required. When a Certificate Holder is responsible for fabrication only, the Form N-2 (for a part) or N-2A (for an appurtenance) (Section III Appendices, Mandatory Appendix V) shall be completed by that Certificate Holder and certified by the Inspector for core support structures, appurtenances, or parts which are to be stamped with the Certification Mark with NPT Designator.

(3) Data Report Form NPP-1 (Section III Appendices, Mandatory Appendix V) shall be forwarded in duplicate to the N Certificate Holder taking overall responsibility for the piping system and the NA Certificate Holder installing the piping system.

(4) Data Report Form N-2 for parts or N-2A for appurtenances shall be forwarded in duplicate to the Certificate Holder of the finished component or support. The certification documentation shall be forwarded in duplicate to the Certificate Holder who performs the installation. A single Certificate of Conformance may be used for ten supports when each is of the same design and each is identified on the NS-1 Certificate of Conformance by serial number.

(5) Welded supports shall be documented on an NS-1 Certificate of Conformance or for non-welded supports on a manufacturer’s Certificate of Compliance. The certification documentation shall be forwarded in duplicate to the Certificate Holder who performs the installation. A single Certificate of Conformance may be used for ten supports when each is of the same design and each is identified on the NS-1 Certificate of Conformance by serial number.

(6) A single Data Report may be used for each group of 25 line valves and pumps of the same size and design with inlet piping connection of 4 in. nominal pipe size and smaller when each is identified on the Data Report by an individual serial number.


(8) A multiple number of parts or appurtenances for a single nuclear power plant may be included on the applicable Data Report (i.e., N-2 or N-2A), provided the parts or appurtenances are of the same class, size, and design and that the parts or appurtenances are manufactured for the same N Certificate Holder and authorized by the Inspector for stamping on the same day. Each part or appurtenance must be identified on the Data Report by an individual serial number.

(9) Miscellaneous items as described in NCA-1270 shall be stamped with the Certification Mark and listed on the appropriate Data Report Form when constructed as an “N” or “NPT” item or installed under an “NA” Certificate. When furnished as material, a Certified Material Test Report or Certificate of Compliance is required in lieu of Data Reports and stamping.

(10) A single Data Report may be used for each group of 25 braided flexible hose of the same nominal pipe size and design, provided each is identified on the Data Report by an individual serial number.

(11) The Data Report and nameplate, or marking information, shall be in conformance with NCA-8220 and NB/NC/ND-7000.

(12) An N Certificate Holder who designs an appurtenance that is fabricated by an NPT Certificate Holder is responsible for completing the design certification and design responsibility certification on the N-2A Data Report and the NPT Certificate Holder fabricating the appurtenance completes the fabrication certification on the N-2A Data Report. When an NPT Certificate Holder designs and fabricates an appurtenance, the NPT Certificate Holder is responsible to complete the fabrication certification, the design certification, and the design responsibility certification on the N-2A Data Report.
and may be used in lieu of the N, NA, NPT, or NV Stamp shown in the Section III Edition and Addenda used for construction.

(c) The completed Code Data Report Form indicates that the Inspector has inspected the item and authorized the application of the Certification Mark. The sequence for stamping and the completion of the Code Data Report shall be determined by agreement between the Authorized Nuclear Inspector and the Certificate Holder.

NCA-8320 APPLICATION OF THE CERTIFICATION MARK WITH N DESIGNATOR

NCA-8321 Authorization and Time of Stamping

The Certification Mark with N Designator shall be applied only with the authorization of the Inspector after the pressure test requirements have been satisfied and all other examinations, tests, and inspections have been satisfactorily completed.

NCA-8322 Application of the Certification Mark With N Designator at Field Sites or Other Locations

(a) The completed shop fabrication portion of the Data Report Form, together with the Inspector’s own inspections of the component, shall be authority for that field Inspector to witness the test and authorize stamping of the completed component.

NCA-8322.2 Application of the Certification Mark With N Designator at Field Sites or Other Locations for Items Not Requiring Pressure Test. The N Certificate Holder may apply the Certification Mark with N Designator to the component in the field or other locations, without having the N Certificate of Authorization extended to a field site or other locations, under the following provisions:

(a) When the N Certificate Holder subcontracts fabrication and installation activities, the N Certificate Holder shall verify the activities are completed in accordance with the supplier’s approved program.

(b) The completed shop fabrication and field fabrication Data Report Forms, together with the Inspector’s own inspection of the component, shall be the authority to authorize stamping of the completed component.

NCA-8330 PARTS AND PIPING SUBASSEMBLIES FURNISHED WITHOUT STAMPING WITH CERTIFICATION MARK

(a) An organization with separate or extended certificates may manufacture and ship items such as parts and piping subassemblies without the Certification Mark with NPT Designator for use at another of its facilities, provided its Quality Assurance Manual includes the provisions of (1) through (3) below.

(1) Requirements for legible and specific identification of each item. Identification shall be permanent and not detrimental to the item. Identification shall be on the item.

(2) Requirements for completing a transmittal form with each shipment of items. The form shall list all items and their corresponding identification number, and shall indicate that the items do not contain the Certification Mark with NPT Designator. The form shall be signed by the Certificate Holder and the Authorized Nuclear Inspector prior to shipment.

(3) Requirements for receipt of items shipped without the Certification Mark with NPT Designator. Requirements shall include inspection upon receipt and maintenance and retention of transmittal forms.

(b) Neither a Certification Mark with NPT Designator, nameplate, Code Data Report, nor transmittal form is required on items manufactured and installed at the same facility by the same Certificate Holder, provided that the Certificate Holder’s Quality Assurance Program provides for control of these items through completion of installation.
For the editors: paragraph citations highlighted in yellow will need to be verified during editorial review as they may change due to other records tied to the NC ND consolidation.

1 Refer to Article NCA-9000 for definitions of the terms construction, nuclear power plant, and items.

2 Specifically excluded from consideration in this Section are tubes or other forms of sheathing used only for cladding nuclear fuel or neutron control material.

3 For consideration of environmental effects see Section III Appendices, Nonmandatory Appendix W, Environmental Effects on Components, for guidance.

4 SA or SB Specifications listed under the heading Bars, Rods, Shapes, Forgings may be used as material for any of these product forms even though not all product forms are listed in the SA or SB Specification.

5 Plant and system operating conditions are commonly referred to as normal, upset, emergency, and faulted.

6 The terms welding, welders, and welding operators include brazing, brazers, and brazing operators.

7 As explained in Articles NB/NC/ND/NE-7000, an overpressure protection device or devices may be provided to protect one or more components, portions of the nuclear power system, or portions of components, provided they are designed and located so that the overpressure protection requirements of all protected components and systems are fully complied with and that the safety relieving devices cannot be isolated from any component or system protected by them while the component or system is operating.

8 See Section III Appendices, Nonmandatory Appendix B.

9 For consideration of environmental effects resulting from these conditions, see Nonmandatory Appendix W, Environmental Effects on Components, for guidance.

10 See Section III Appendices, Nonmandatory Appendix C.

11 Results of chemical analyses, tests, or examinations, rounded to the number of significant digits required by the material specification, are considered actual results.

12 ASME NQA-1, Part IV provides guidance for various applications.

13 Includes Inspectors and Authorized Nuclear Inspector Supervisors.

14 A list of acceptable Authorized Inspection Agencies may be obtained from the Society.

15 Pressure tests include hydrostatic, pneumatic, and structural integrity tests. Hydrostatic or pneumatic tests are not required for core support structures.

16 In this usage, organization may be the same company at a single site, a multiplant company with separate certificates, regardless of type, or a multiplant corporation with extended corporate certificates.

17 Samples of the forms referred to in this subarticle may be found in Section III Appendices, Mandatory Appendix V. Copies of these forms may be obtained from the Society.
## Table S2-1
### Design Specification — Divisions 1 Through 3 and 5 (Cont'd)

<table>
<thead>
<tr>
<th>Division 1</th>
<th>Division 2</th>
<th>Division 3</th>
<th>Division 5 Nonmetallic CSS</th>
<th>Remaining Division 5</th>
</tr>
</thead>
<tbody>
<tr>
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<td>...</td>
<td>...</td>
<td>...</td>
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<tr>
<td>NX-5100 G</td>
<td>...</td>
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</tr>
<tr>
<td>NX-5200 G</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>NX-6000 W [Note (2)]</td>
<td>...</td>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
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<td>...</td>
<td>...</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>...</td>
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</table>

Legend:
- CSS = Core Support Structures
- G = General Knowledge
- HX = HB/HC, as applicable (including Subparts A and B), as well as references to Subsections NB and NC rules, respectively
- NX = NB/NC/ND/NE, as applicable
- W = Working Knowledge
- WX = WB/WC/WD, as applicable

NOTES:
1. Subsection HA, Subpart A references Subsection NCA for general requirements.
2. As applicable.
3. Subsections HF and HG (Subparts A and B) rules as well as references to Subsections NF and NG rules, respectively.

## Table S2-2
### Design Report — Divisions 1, 3, and 5 (Excluding Nonmetallic CSS)

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<td>WA-3400 G</td>
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Legend:
- NB/NC/ND/NE
- NCD
### Table S2-2

**Design Report — Divisions 1, 3, and 5 (Excluding Nonmetallic CSS) (Cont’d)**

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<tr>
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**Legend:**
- **CSS** = Core Support Structures
- **NX** = NB/NC/ND/NE, as applicable
- **G** = General Knowledge
- **HX** = HB/HC, as applicable (including Subparts A and B), as well as references to Subsections NB and NE rules, respectively
- **W** = Working Knowledge
- **WX** = WB/WC/WD, as applicable

**NOTES:**
1. Subsection HA, Subpart A references Subsection NCA for general requirements.
2. As applicable.
3. Subsections HF and HG (Subparts A and B) rules as well as references to Subsections NF and NG rules, respectively.

### Table S2-3

**Load Capacity Data Sheet — Divisions 1 and 5**

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<thead>
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<th>Division 1</th>
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### Table S2-3
Load Capacity Data Sheet — Divisions 1 and 5 (Cont’d)

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<td>NF All G</td>
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<table>
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Legend:
- G = General Knowledge
- W = Working Knowledge

NOTES:
1. Subsection HA, Subpart A references Subsection NCA for general requirements.
2. Subsection HF, Subpart A references Subsection NF for rules.
3. As applicable.

### Table S2-4
Fabrication Specification — Division 3

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<td>WA-4000 W</td>
</tr>
<tr>
<td>WA-5000 G</td>
</tr>
<tr>
<td>WA-7000 G</td>
</tr>
<tr>
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Legend:
- G = General Knowledge
- W = Working Knowledge
- WX = WB/WC/WD, as applicable
### Table S2-5
Overpressure Protection Report — Divisions 1, 2, and 5

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**Legend:**
- G = General Knowledge
- HX = HB/HC, as applicable (including Subparts A and B), as well as references to Subsections NB and NC, respectively
- NX = NB/NC/ND/NE, as applicable
- W = Working Knowledge

**NOTE:**
(1) Subsection HA, Subpart A references Subsection NCA for general requirements.

### Table S2-6
Construction Specification, Design Drawings, and Design Report — Divisions 2 and 5 (Nonmetallic CSS)

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ARTICLE B-2000
GENERIC REQUIREMENTS

B-2100 CERTIFIED DESIGN SPECIFICATION REQUIREMENTS

The information in this Article addresses those portions of the certified Design Specification which are generic in nature and therefore applicable to the construction of all Section III items.

B-2110 GENERAL

B-2110.1 Contents of the Certified Design Specification.

(a) NCA-3252 provides the minimum requirements for the contents of the certified Design Specification.

(b) With respect to NCA-3252(a), it is important to recognize that the boundary defines an interface between two items that are dependent on each other for the transmittal of loads. In order to properly design the item on either side of the boundary, the effect of the attached item is required. The effect may be furnished directly by supplying the forces and moments that are transmitted across the boundary or, alternatively, by providing sufficient information to enable the designer to determine the interaction across the boundary. This Section provides rules to accomplish this in NCA-3254.

(c) Any Code Cases applicable to the construction of an item should be included in the Design Specification.

B-2110.2 Certification. NCA-3255 provides the requirements for certification of the Design Specification. The required certification is not applicable to supplementary, regulatory, or operability requirements which are outside of the scope of this Section.

B-2110.3 Permanent Records. NCA-4134.17 provides the requirements for the continued maintenance and retention location for permanent records.

B-2110.4 Handling, Storage, and Shipping. The Design Specification should include any special measures to control handling, storage, and shipping of the component (NCA-4134.13).

B-2110.5 Identification of Regulatory and Enforcement Authorities. The Design Specification should include identification of regulatory and enforcement authorities at locations of component installation with whom Data Reports must be filed.

B-2110.6 Filing. NCA-3256 provides the requirements for filing of the Design Specification.


B-2111 Classification

B-2111.1 Responsibility. NCA-2110(d) provides the requirements for classification of equipment.

B-2111.2 Multiple Code Class Components. NCA-2133 provides the requirements for multiple Code Class components.

B-2111.3 Optional Use of Code Classes. NCA-2134 provides the requirements for optional use of Code Classes.

B-2111.4 Special Requirements. NCA-2160 provides the requirements for contractual arrangements that are beyond the scope of this Section.

B-2112 Design Basis and Service Limits

B-2112.1 Plant and System Service Conditions. The definition of plant and system service conditions, and the determination of their significance to the design and operability of components and supports of a nuclear facility, may be derived from systems safety criteria documents for specific types of nuclear facilities and may be found in the requirements of regulatory and enforcement authorities having jurisdiction at the site [NCA-2141(b)].

B-2112.2 Design Loadings. The Design Specification shall include the Design Pressure [NCA-2142.1(a)], the Design Temperature [NCA-2142.1(b)], and the Design Mechanical Loads [NCA-2142.1(c)].

B-2112.3 Establishment of Component and Support Design and Service Limits.

(a) For Class 1, MC, and CS components, and for Class 2 and 3 piping and its supports, Design and Service Loads should be specified and appropriate Service Limits designated [NCA-2142(a)].

(b) For Class 2 and 3 components and supports, other than piping and its supports, two options are available as follows:

(1) Design and Service Loads may be specified and appropriate Service Limits designated.

(2) Service Loadings are not required to be identified when the Design Pressure, Design Temperature, and Design Mechanical Loads result in stresses that are at least as high, relative to allowable values, as any which may occur for any Service Loading [NCA-2142(a)].
B-2112.4 Test Loadings. NCA-2142.3 provides the rules for consideration of Test Loadings.

B-2113 N Certificate Holder's Responsibilities

B-2113.1 Manufacturers of Small Pumps and Valves and of Standard Supports. Manufacturers of small pumps and valves [NPS 4 (DN 100) and smaller] and standard supports (including snubbers) who elect to provide their own Design Specification are responsible for compliance with the requirements of NCA-3252.

B-2113.2 Compliance With N Certificate Holder's Responsibilities. When the completed Code item involves work by more than one organization, the Design Specification shall be provided to the organization having overall responsibility.

B-2120 DESIGN

B-2121 Loadings

The Owner or Owner’s designee shall identify the loadings and designate the appropriate Design and Service Limits for each component or support. The loadings that should be taken into account in designing a component include, but are not limited to, the following:

(a) internal and external pressure, including static head
(b) weight of the component and normal contents under service and test conditions
(c) superimposed loads, such as other components, operating equipment, insulation, or corrosion resistant or erosion resistant linings and piping
(d) vibrations and earthquake loads
(e) reactions of supporting lugs, rings, saddles, or other types of supports
(f) temperature effects
(g) restrained thermal expansion
(h) anchor and support movement effects
(i) environmental loads
(j) dynamic effects of fluid flow

B-2122 Design Loads

B-2122.1 Design Pressure. NCA-2142.1(a) and NB/NC/ND/NE-3112.1 provide the required definitions for Design Pressure.

B-2122.2 Design Temperature. NB/NC/ND/NE/NF/NG-3112 and NCA-2142.1(b) provide the requirements for Design Temperature. The Design Temperature shall be used in computations involving the Design and coincident Design Mechanical Loads. The environmental temperature at the point under consideration shall be used in all computations where the use of the actual service pressure is required. Where a component is heated by tracing, induction coils, jacketing, or by internal heat generation, the effect of such heating shall be incorporated in the establishment of the Design Temperature.

B-2122.3 Design Mechanical Loads.

(a) The specified Design Mechanical Loads should be selected so that when combined with the effects of Design Pressure, they represent the most severe coincident loadings for which the Level A Service Limits on primary stress are applicable.

(b) The determination of most severe coincident loadings may result in specification of pairs of Design Conditions since the one most severe combination may not be readily predicted. The specification may specify the maximum Design Mechanical Load for any situation which, when taken with the Design Pressure, would result in the worst combination of Design Conditions even though they may not be coincident.

(c) The Design Mechanical Loads that are considered are somewhat dependent on the component, its location, its attachment to other components, and for a Class 2 or 3 component, whether Service Loadings are to be specified (refer to B-2112.3 and NCA-2142).

B-2123 Service Loads

In order to properly specify Service Limits for the various types of loadings, the Owner or Owner’s designee should recognize the basis for the establishment of those Limits. These are given in NCA-2142.2.

B-2123.1 Service Limits A and B.

(a) For Class 1, MC, and CS components and for Class 2 vessels designed to NC-3200, Service Limits A and B are provided in order to evaluate the effect of system operating loads on the fatigue life of the component. For a fatigue analysis the loads applicable to the component being considered should be described in terms of quantities that the designer may use XIII-3520. The variation with respect to time of pressure, temperature, flow rate, etc., as well as the number of times these changes occur in the life of the component, is needed. In this regard, a service cycle is defined in XIII-1300(ac) as: “... the initiation and establishment of new conditions followed by a return to the conditions which prevailed at the beginning of the cycle.” Thus, as an example, the conditions associated with plant startup do not constitute a service cycle. Startup and shutdown together constitute a service cycle, and if there are \(n\) startups in the Design Specification, there should be the same number of shutdowns.

(b) Figure B-2123-1 is an illustration of the time-dependent load information which the designer needs. It includes only the startup portion of a service cycle.

(c) Refer to B-6124 for the Class 2 and 3 piping requirements.

(d) For all other Class 2 and 3 components and supports, including piping supports, it is not necessary to define each service cycle in detail since no fatigue analysis is required. It is important for the designer to know the maximum loading condition on the component for these Service Limits.
than to provide different Stress Limits for various loadings. Specific guidance is provided in the approved Safety Analysis Report (SAR) for the plant.

**B-2126 Deformation Limits**

The Code does not provide specific deformation limits other than those that would be associated with a given allowable stress. If control of deformation is a requirement, the deformation limits should be provided.

**B-2130 MATERIALS**

**B-2131 General Requirements**

The Design Specification should provide information relative to materials as listed in (a) through (i).

- (a) any hydrostatic testing or service temperature limits
- (b) any reductions to design stress intensity values, allowable stress, or fatigue curves necessitated by environmental conditions
- (c) any restrictions on cladding materials
- (d) materials which are acceptable from the standpoint of environment and location
- (e) any restrictions on heat treating
- (f) any requirements with respect to cleanliness
- (g) impact test requirements (B-2132)
- (h) any corrosion or erosion allowances
- (i) postweld heat treatment times applied to the material or item after it is completed must be specified (NB/NC/ND/NE/NF/NG-4622)

**B-2132 Impact Tests**

For those cases where impact testing is optional, the Design Specification should state whether or not impact testing of the pressure-retaining material of the component or the support material is required. The test temperature should be specified and the tests become part of the appropriate Subsection.

**B-2133 Fracture Mechanics Data**

When the methods of Nonmandatory Appendix G are to be used to provide protection against nonductile fracture for materials that have specified minimum yield strengths at room temperature greater than 50 ksi (345 MPa) but not exceeding 90 ksi (620 MPa), the Design Specification shall include additional metal, weld metal, and heat-affected zone that are required to use Figure G-2210-1 in accordance with G-2110(b). Where these materials of higher yield strengths are to be used in conditions where radiation may affect the material properties, the effect of radiation on the $K_{lc}$ curve shall be determined for the material prior to its use in construction.

**B-2140 FABRICATION**

The Design Specification should specify any unusual restrictions on fabrication processes or techniques that would be deleterious to the suitability of the component in the expected service environment.

**B-2150 TESTING**

**B-2151 Pneumatic Test**

The Design Specification should identify if a pneumatic test should be used in lieu of hydrostatic testing for those components and appurtenances required to be pressure tested in accordance with the rules of this Section (NB/NC/ND/NE-6111, NB/NC/ND/NE-6112).

**B-2152 Restriction on Testing**

Any restrictions on the use of the test fluid should be provided (NB/NC/ND/NE-6112). When selecting a fluid for the test, it should be determined that the test fluid does not have deleterious effects and that the test fluid may be safely used at the pressure and temperature specified for the test.

**B-2153 Bellows Type Expansion Joints**

Any requirements that supplement hydrostatic or pneumatic testing of bellows type expansion joints should be included.

**B-2154 Leak Tightness**

Leak tightness requirements for areas, such as permanent seals, seats, and gasketed joints for pressure-retaining components or appurtenances, should be included (NB/NC/ND/NE-6224).

**B-2155 Additional Testing**

If testing in addition to pressure loads due to such testing should be classified in accordance with NCA-2142.3(b).

**B-2160 OVERPRESSURE PROTECTION**

**B-2161 General Requirements**

**B-2161.1 Scope.** For steady state or transient conditions of pressure and coincident temperature that are in excess of design or service loadings and their combinations and associated limits specified in the Design Specifications, system overpressure protection is required for vessels, piping, pumps, and valves in service and subjected to the consequences of the application of these conditions (refer to NB/NC/ND/NE-7110).

**B-2161.2 Integrated Overpressure Protection.** It should be recognized that the overpressure protection of pressure-retaining components should consider the overpressure protection of the pressure-retaining components that are imposed on the systems during all service loadings and testing conditions described in the component Design Specifications (refer to NB/NC/ND/NE-7120).
B-2162 Design Secondary Pressure
The design secondary pressure shall be specified in the Design Specification [refer to NB-7111(d) and NC/ND-7112].

B-2163 Maximum Anticipated Pressure and Temperature
The Design Specification should identify the maximum anticipated pressure and coincident temperature among any systems components under the operating conditions of the system as a consequence of any transients occurring either within the system or in associated systems which may affect the system for which overpressure protection is intended [refer to NB/NC/ND-7300]. Service conditions such as at startup and shutdown may require protection against nonductile failure [NB-3210(d)] at pressures lower than the component design pressure.

B-2164 Pressure Relief Valve Operating Requirements

B-2164.1 Blowdown Requirements. The Design Specification may specify blowdown requirements with a greater tolerance than the values stated in NB/NC/ND-7500.

B-2164.2 Popping Point Tolerance. The Design Specification may specify a popping point tolerance greater than the value stated in NB/NC/ND-7500.

B-2165 Pressure Relief Valve Operating Characteristics (Refer to ANSI N278.1)
As applicable, the following pressure relief valve operating characteristics should be specified in the Design Specification when overpressure protection is dependent upon these factors:

(a) set pressure
(b) set pressure range
(c) set pressure tolerance
(d) discharge capacity with due allowance for the effect of the back pressure on the capacity
(e) accumulation
(f) blowdown
(g) static and dynamic back pressure, minimum and maximum
(h) response time (maximum time delay between attainment of set pressure or reception of the energizing signal to valve lift)

B-2166 Rupture Disk Devices
Rupture disk device burst pressure tolerance and manufacturing design range should be specified in the Design Specification.

B-2200 OPERABILITY

B-2210 INTRODUCTION
Operability requirements are outside the scope of this Section [NCA-2142(b)]; however, the Owner or Owner’s designee is required to identify any such requirements in the Design Specifications (NCA-3252).

B-2220 ACTIVE PUMPS OR VALVES
The Design Specification should indicate if the specified pump or valve must perform a mechanical motion during the course of accomplishing a system safety function during or following the specified plant event. Such a pump or valve is designated as an active component.

B-2300 REGULATORY REQUIREMENTS
In the process of preparing a Design Specification, it is important to refer to and rely on the requirements contained in SAR documents since they provide the basis for complying with existing regulatory requirements. Conflicts between a Design Specification and the SAR could lead to construction of items not in compliance with the license requirements. A reference list of regulatory documents is available at http://www.nrc.gov/.
ARTICLE B-4000
SPECIFIC PUMP REQUIREMENTS

In addition to the Design Specification requirements indicated in Article B-2000, Generic Requirements, the Design Specification for pumps should include the other requirements of B-4110 and B-4120.

B-4110 GENERAL REQUIREMENTS
Covered by B-2110.

B-4120 DESIGN
B-4121 Loads From Connected Piping
The forces and moments produced by the connected piping on each pump inlet and outlet should be included (NB/NC/ND-3415).

B-4122 Earthquake Loadings
NB/NC/ND-3417 provide the requirements for consideration of earthquake loading.

B-4200 OPERABILITY REQUIREMENTS FOR PUMPS
B-4210 GENERAL REQUIREMENTS

The inclusion of functional operability requirements in the Design Specifications should be based on the functional requirements of the pump being specified. These requirements should be specified only if the pumps are considered to be active pumps.

B-4220 DESIGN
The Design Specification should include all applicable and pertinent information considered important to the functional operability of the pump.

B-4230 QUALIFICATION
B-4231 Methods
The method of pump qualification, if any, for functional operability should be defined in the Design Specification. Qualification by analysis, test, or combinations thereof should be specified. Available codes or standards which cover these areas should be referred to and used to the maximum extent possible.

B-4232 Analysis
Acceptable methods of analysis should be identified. The following areas, as a minimum, should be addressed:
(a) required analysis;
(b) load combinations, including deadweight, thermal loads, nozzle loads, seismic loads, etc.;
(c) allowable stresses for the various loading conditions.

B-4233 Testing
Acceptable methods of testing should be identified. The following areas, as a minimum, should be addressed:
(a) required tests and test sequences
(b) imposed loads and pump function during tests
(c) acceptance criteria

B-4240 FUNCTIONAL OPERABILITY PRODUCTION TESTS
Any special functional operability tests to be conducted on production pumps should be specified in the Design Specification.

B-4250 DOCUMENTATION
Documentation requirements for functional qualification or production tests should be specified.

B-4300 REGULATORY REQUIREMENTS
Regulatory requirements are covered in B-2300.
ARTICLE B-5000
SPECIFIC VALVE REQUIREMENTS

B-5100 CERTIFIED DESIGN SPECIFICATION REQUIREMENTS

In addition to the Design Specification requirements indicated in Article B-2000, Generic Requirements, the Design Specification for valves should include the other requirements of B-5110 and B-5120.

B-5110 GENERAL REQUIREMENTS

Covered by B-2110.

B-5120 DESIGN

B-5121 Class 1 Valves

B-5121.1 Pipe Reactions for Valves Designed to Alternative Design Rules. NB-3512.2 provides the requirements concerning pipe reactions.

B-5121.2 Earthquake Loadings. NB-3524 provides the requirements concerning earthquake loadings.

B-5121.3 Level C Service Limits. NB-3526 provides the requirements concerning valve function during loading for which Level C Service Limits are specified.

B-5121.4 Pipe Reaction Stress. NB-3526.2 provides the requirements concerning pipe reaction stress computation for Level C Service Limits.

B-5121.5 Level D Service Limits. NB-3527 provides the requirements concerning valve function during loadings for which Level D Service Limits are specified.

B-5121.6 Hydrostatic Tests. NB-3531.2(c) provides the requirements concerning alternative test pressures, seat leakages, and test durations.

B-5121.7 Body Contours at Weld Ends. NB-3544.8 provides the requirements concerning alternative body contours at weld ends of valves.

B-5121.8 Bypass Piping. The Design Specification shall state which organization is responsible for the bypass piping design, if the responsible organization is not the piping system designer [NB-3546.3(b)].

B-5122 Class 2 Valves

B-5122.1 Alternative Rules. The Design Specification shall specify whether the alternative rules of ND-3513 are permitted to be used.

B-5122.2 Hydrostatic Tests. NC-3514 provides the requirements concerning alternative test pressures, seat leakages, and test durations.

B-5123 Class 3 Valves

B-5123.1 Alternative Rules. The Design Specification shall specify whether the alternative rules of ND-3513 are permitted to be used.

B-5123.2 Hydrostatic Tests. ND-3514 provides the requirements concerning alternative test pressures, seat leakages, and test durations.

B-5200 OPERABILITY REQUIREMENTS FOR VALVES

B-5210 INTRODUCTION

Operability requirements are outside the scope of this Section (NCA-2142); however, the Owner or Owner’s designee is required to identify any valve operability requirements in the Design Specification [NB-3526(b) and NB-3527].

B-5220 DESIGN

The Design Specification should include all applicable and pertinent information required. A document pertaining to this information is ANSI N278.1. Additional information not covered in ANSI N278.1, but considered important to the functional operability of the valve should also be included. NB-3524, NC-3520, and ND-3520 provide guidance for analysis of valves with extended masses.

B-5230 QUALIFICATION

B-5231 Methods

The method of valve qualification, if any, for functional operability should be defined in the Design Specification. Qualification by analysis, test, or combinations thereof should be specified. Available Codes or Standards which cover these areas should be referenced and used to the maximum extent possible.

B-5232 Analysis

The methods of analysis should be identified. The following areas, as a minimum, should be addressed:

(a) required analysis
(b) load combinations, including seismic, end loads, mechanical loads, etc.
(c) allowable stresses for the various loading conditions
ARTICLE B-6000
SPECIFIC PIPING REQUIREMENTS

For the editors: paragraph citations highlighted in yellow will need to be verified during editorial review as they may change due to other records tied to the NC ND consolidation.

B-6100 CERTIFIED DESIGN SPECIFICATION REQUIREMENTS

In addition to the Design Specification requirements indicated in Article B-2000, Generic Requirements, the Design Specification for piping should include the other requirements of B-6110 and B-6120.

B-6110 GENERAL REQUIREMENTS

Covered by B-2110.

B-6120 DESIGN

B-6121 Seismic

For piping, the loadings, movements, anchor motions, and number of cycles due to seismic events should be given. The associated Service Loadings which occur with, or as a result of, the specified seismic events should be stated.

B-6122 Other Dynamic Loads

Dynamic loadings, such as those resulting from sudden valve or pump operation, should be given. As a minimum, the information needed to determine this loading should be given (such as pressures, temperatures, flow rates, valve operating times).

B-6123 Peak Pressure

In categorizing Service Loadings into appropriate Service Limits, the Design Specification should include the peak pressure.

B-6124 Fatigue Consideration for Class 2 and 3 Piping

For Class 2 and 3 piping, it is not necessary to define each service cycle in detail. However, the maximum range of conditions and the total number of occurrences of all service cycles to which the piping system will be subjected shall be identified (NC/ND-3611.2(e)). For example, the minimum temperature conditions could be 40°F (5°C) while the maximum is 456°F (235°C). If all other service cycles did not impose a temperature condition less than the minimum or greater than the maximum, it is not required to be specified, unless the total number of occurrences of all service cycles exceeds 7,000. In this case, the range of temperature and the number of occurrences for each service cycle shall be specified. In determining the total number of service cycles, all service cycles shall be considered including those that impose a temperature condition less than the maximum range of temperature.
C-1100 INTRODUCTION

C-1110 OBJECTIVE

The objective of this Appendix is to provide a guide for use by Certificate Holders in the preparation of Design Reports required by NCA-3551.1. Desirably, such Design Reports should be uniform as to format for all of the nuclear industry. Such uniformity is helpful in making for easier review by the Owner (NCA-3260), Inspectors, regulatory agencies, or independent groups. For NF supports designed by load rating (NF-3280), the preparation of a load capacity data sheet in accordance with NCA-3551.2 fulfills the requirements for preparation of a Design Report. The contents of this Appendix constitute only suggestions and are nonmandatory.

C-1120 BASIS

In order to meet the requirements of NCA-3551, the Design Report should be based upon analysis or testing adequate to demonstrate the validity of the structural design to sustain and meet in every respect the requirements and provisions of the relevant certified Design Specifications and the requirements of this Section; the Report should include, as a minimum, the results, conclusions, and other considerations which show that the structural design meets these requirements.

C-1130 FORMAT

C-1131 General Requirements

Since a major purpose of the Design Report is to facilitate an independent review of its content, it is important that it be simple to follow and free from ambiguity. Nomenclature, definitions, and symbols used should be in agreement with those established in Subsection NB for Class 1 components, Subsection NE for Class MC vessels, in Subsection NF for supports, in Subsection NG for Class CS core support structures, and in Subsection NC for vessels designed in accordance with NC-3200. Where additional terms, definitions, or expressions are required, they should be clearly defined and explained and adequately referenced. It is not the intention to limit the choice of analytical methods or computational techniques used for obtaining the values and results required for the Design Report.

C-1132 Presentation of Analysis

The analysis in the Design Report should be in three sections: Thermal Analysis, Structural Analysis, and Fatigue Evaluation. The desiderata listed in (a) through (j) should be adhered to.

(a) Pages and figures in each section of the Report should be consecutively numbered
(b) Reference data taken from other parts of the calculations should have the proper page number and section of the Report listed
(c) A general description of the method of analysis should be given
(d) All reference sources should be listed
(e) All computer programs should be properly identified and described
(f) Stresses should be tabulated for each area of investigation
(g) Areas which have the most severe stress condition for design conditions or for any specified transient should be listed in the Report, along with the stress values in these areas
(h) Results should be summarized and a general summary of all stresses should be made in each section of the Report
(i) Drawings and sketches necessary for an understanding of the analysis should be part of the Report
(j) The Report should include copies of sufficient computer printouts to justify the governing stress values used in the Design Report and enable independent review. Copies of any manual calculations prepared which establish the final design should also be included.

C-1140 BASIC INFORMATION

It should be noted that the references in this Appendix to basic information which is to be obtained from the certified Design Specifications (NCA-3250) are predicated on the requirement of NCA-3252 that such information be provided.
C-1320 METHODS OF CALCULATIONS

The Certificate Holder should submit a short description of the calculation methods used in connection with the stress analysis. All computer programs used in making calculations should be verified by comparing the program with the results of an appropriate analytical or experimental solution. The basic theories on which the calculations are based and the assumptions should also be included.

C-1330 PRINCIPAL STRESSES FOR EACH GEOMETRY

In calculating stress components, the requirements of NB-3200, NC-3200, NE-3200, NF-3220, NF-3230, or NG-3200 should be followed. The following are typical of stress components that should be considered:

(a) Mechanical stresses generated by
   (1) pressure load
   (2) deadweight load
   (3) piping load
   (4) externally applied load
   (5) seismic loads
   (6) dynamic loads
(b) Thermal stresses generated by
   (1) radial gradient
      - thermal stress
      - thermal discontinuity stress
   (2) longitudinal gradient
      - thermal stress
      - thermal discontinuity stress

C-1340 ALLOWABLE LIMITS

Each individual stress component and combination of the stress components should satisfy the requirements of Article XIII-3000, NC-3220, NE-3220, NF-3220, NF-3230, or NG-3220.

C-1400 FATIGUE EVALUATION

C-1410 SCOPE OF FATIGUE EVALUATION

Fatigue evaluation when required should include the considerations and investigations described in this subarticle.

C-1420 LOCATIONS OF STRESS CONCENTRATIONS

Stress concentration should be investigated at any geometrical changes in the structure, such as difference in wall thickness, joints and corners, and junctions of dissimilar metals. A list of the locations subject to fatigue evaluation should be included in the Report. For piping, $K$ indices are given for standard piping components in NB-3600 which represent elastic stress concentration factors.

C-1430 FATIGUE STRENGTH REDUCTION FACTORS AS FUNCTION OF LOCATIONS AND TYPES OF STRESS

Fatigue strength reduction factors should be numerically listed for the stresses where they are to be applied. The references and methods of finding the fatigue strength reduction factors should be included in the Report.

C-1440 PROPER STRESS CONCENTRATION OR FATIGUE STRENGTH REDUCTION FACTOR APPLICATION TO STRESSES

The numerical value of the individual stress components should be listed with and without the stress concentration or fatigue strength reduction factor applied. Factors should be applied to each individual stress component and not applied to the total stress at a point or to the stress intensity.

C-1450 COMBINED STRESSES AND ALLOWABLE NUMBER OF CYCLES

Where the rules do not specifically control this, as they do in NB-3500 and NB-3600, methods of combining stresses, determining principal stresses, determining alternating stress intensity, and determining cumulative damage effects and allowable number of cycles should be shown in the Report. These results should be reconciled with the required values.
ARTICLE P-1000
CERTIFIED MATERIAL TEST REPORTS

P-1100  INTRODUCTION

The requirements for a Certified Material Test Report (CMTR) are stated in NCA-3860. However, the material requirements vary with the class of construction, the product form of material, the requirements of the material specification, and the manufacturer’s procedures. Since changes in any of these requirements may be made by Addenda or new editions of the Code, it is important for the purchaser and the supplier to know the applicable edition and Addenda, so that the reported results can be compared with the requirements to determine whether or not the material is in compliance with the Code.

P-1200  GENERAL REQUIRED INFORMATION

The items of information given in (a) through (i) below are required in the CMTRs for metallic material (as defined by NCA-1220 and NB/NC/ND/NE/NF/NG-2100) used in Section III, Division 1, construction.

(a) Name of certifying organization (P-1200(j)).

(b) Number and expiration date of the organization’s Certificate of Authorization or Quality System Certificate (Materials). Alternatively, if the organization was qualified by a party other than the Society, the revision and date of the written program under which the material is being certified.

(c) Purchaser’s order or contract number.

(d) Description of the material, including specification number, grade, class, type, and nominal size, as applicable. For pipe made to specifications which include both seamless and welded pipe, the report shall designate which type it is.

(e) Description of material identification marking.

(f) Description of material, tests, and examinations required by the Material Specification and this Section.

(g) Reports of weld repairs performed, if any, as required by NB/NC/ND/NE/NF/NG-2500, including radiographic films, when radiography is required.

(h) Charpy V-notch and drop-weight test results required by NB/NC/ND/NE/NF/NG-2210, when those paragraphs are applicable.

(i) Nondestructive examinations performed and accepted as required by NB/NC/ND/NE/NF/NG-2500.

P-1300  INFORMATION REQUIRED UNDER SPECIFIC CIRCUMSTANCES

The information given in (a) through (i) is required under specific circumstances.

(a) Heat treatment data, as follows:

(1) temperatures (or temperature ranges) and times

(2) heat treatment conditions when no specific temperatures (or temperature ranges) or times are required by the material specification

(3) the minimum solution annealing temperature used for austenitic stainless steels and high nickel alloys

(4) recorded temperature ranges and actual times at temperature, and heating and cooling rates, for postweld heat treatment of materials that are repaired by welding, when postweld heat treatment is required by NB/NC/ND/NE/NF/NG-2500

(5) recorded temperatures and actual times at temperature for test coupons when required by NB/NC/ND/NE/NF/NG-2210, when those paragraphs are applicable.

(b) Hydrostatic test pressure required by the material specification (for pipes) if the hydrostatic test has not been performed, if it is deferred.

(c) Ferrite Number for all A-No. 8 welding material except type 16-8-2, as required by NB/NC/ND/NE/NF/NG-2433.
(d) The grain size, reported in accordance with ASTM E112, when a fine grain size is specified for metallic materials, in addition to applicable paragraphs above, the process, the preheat and interpass temperature, the type of chemical analysis (filler metal/undiluted deposit), the shielding gas composition, and the Ferrite Number shall be reported as required by NB/NC/NE/NF/NG-2400 and as applicable.

(f) A list of chemical analyses, tests, examinations, and heat treatments required by the Material Specification that were not performed.

P-1400  EXECUTION

(a) All requirements of the material specification and this Section need not be performed by the same organization. In that case the certifying organization shall ensure that each organization, providing material or services, is identified on the CMTR along with the activities for which it is responsible. Alternatively, the CMTR’s furnished by the other organizations may be referenced on and attached to the CMTR of the organization which supplies the material.

(b) The CMTR shall include a dated statement affirming that the contents of the report are correct and accurate.

(c) Signing or notarization of the CMTR is not required.