ASME RTP-1–2025
(Revision of ASME RTP-1–2023)

Reinforced Thermoset Plastic Corrosion-Resistant Equipment

AN AMERICAN NATIONAL STANDARD



The American Society of Mechanical Engineers

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CONTENTS

Foreword xi

Statement of Policy on the Use of the ASME Single Certification Mark and Code Authorization in Advertising xii

Statement of Policy on the Use of ASME Marking to Identify Manufactured Items xii

Committee Roster xiii

Correspondence With the RTP Committee xv

Introduction xvii

Summary of Changes xviii

Part 1 **General Requirements** 1

1-100 Introduction 1

1-200 User's Basic Requirements Specification 1

1-300 Fabricator's Design Report 3

1-400 Inspection 3

1-500 Fabricator's Quality Control Program 4

Part 2 **Materials** 13

2-100 Scope 13

2-200 Laminate Compositions 13

2-300 Materials 13

Subpart 2A **Requirements for Representative Flat Laminates** 14

2A-100 Introduction 14

2A-200 Laminate Requirements 14

2A-300 Requirements for Physical and Mechanical Properties 15

2A-400 Test Methods 17

2A-500 Records 17

2A-600 Additional Standard Laminate Compositions for Subpart 2A 18

Subpart 2B **Requirements for Laminates Developed Using the Lamination Analysis Method (Type X)** 18

2B-100 Laminate Composition 18

2B-200 Requirements for Physical and Mechanical Properties 18

2B-300 Test Methods 18

2B-400 Records 19

Subpart 2C **Permissible Tolerances for Laminate Thickness Variation** 19

2C-100 Tolerance for Average Spot Thickness 19

2C-200 Tolerance for Thickness of a Major Part 19

2C-300 Exceptions and Adjustments 19

Part 3 **Design** 20

3-100 Scope 20

3-200 General 20

3-300 Definitions and Related Requirements 20

Subpart 3A	**Design by Rules**	21
3A-100	Loadings	21
3A-200	Pressure and Axial Loads Design	23
3A-300	External Pressure Design	28
3A-400	Intermittent Load Design	31
3A-500	Large Diameter RTP Equipment Body Flanges	32
3A-600	Vessels Supported by Shell Attachments	32
3A-700	Reinforcement of Circular Openings	32
3A-800	Secondary Bond Shear Stress	33
Subpart 3B	**Design by Stress Analysis**	33
3B-100	Introduction	33
3B-200	Design Acceptability	34
3B-300	Loading	35
3B-400	Design	35
3B-500	Stress Criteria	35
3B-600	External Pressure	36
3B-700	Attachments	36
Part 4	**Fabrication**	37
4-100	Scope	37
4-200	Body Flanges	37
4-300	Shell Joints	37
4-400	Flanged Nozzles	44
4-500	Manways	44
4-600	Reinforcement of Cutouts	44
4-700	Tolerances	45
4-800	Balsa Wood Cored Plates	45
Part 5	**Overpressure Protection**	57
5-100	Basis for Design	57
5-200	Protection Against Overpressure	57
5-300	Type of Overpressure Protection	57
5-400	Location of Overpressure Protection Devices	57
5-500	Installation Practices	57
5-600	Overpressure Device Set Pressure	57
5-700	Relief Device Sizing	57
5-800	Discharge Lines From Pressure Relief Devices	57
5-900	Responsibility for Design and Selection	58
Part 6	**Inspection and Tests**	59
6-100	Scope	59
6-200	Inspector	59
6-300	Inspection and Responsibility	59
6-400	Conditions for Inspection	60
6-500	Equipment Design	60
6-600	Materials	60
6-700	Fabrication	60
6-800	Fabricator's Quality Assurance Program	60

6-900	Final Inspection	60
Part 7	**Shop Qualification**	69
7-100	Scope	69
7-200	General	69
7-300	Fabricator's Facilities and Equipment	69
7-400	Personnel	69
7-500	Quality Control Program, Document Handling, and Record System	69
7-600	Demonstration of Capability (Demonstration Laminates)	69
7-700	Minimum Test Values From Demonstration Laminates	72
7-800	Demonstration Vessel	72
7-900	Identifying Demonstration Laminates	72
7-1000	Laboratory Test and Test Report Requirements for Demonstration Laminates	72
Part 8	**Certification**	75
8-100	Scope	75
8-200	General	75
8-300	Certification Process	75
8-400	ASME RTP-1 Certificate of Authorization Holder	75
8-500	Issuance of Certification	75
8-600	Designated Oversight	76
8-700	Data Reports	76
8-800	ASME RTP Certified Mark and Certified Designator	76

Mandatory Appendices

M-1	Reinforcement Materials Receiving Procedures	78
M-2	Matrix Materials Receiving Procedures	88
M-3	Calculations Using the Classical Lamination Theory (CLT) Analysis Method	95
M-4	Quality Control Program	123
M-5	Qualification of Laminators and Secondary Bonders	125
M-6	Demonstration Vessel	132
M-7	Repair Procedures	141
M-8	Acoustic Emission Examination	146
M-9	Glossary	147
M-10	Reference Documents	151
M-12	Dual Laminate Vessels	153
M-13	Balsa Wood Receiving and Inspection Procedures	190

Nonmandatory Appendices

NM-1	Design Examples	192
NM-2	Design of Integral Body Flanges	211
NM-3	Seismic, Wind, and Snow Loadings	232
NM-4	Hold-Down Lug Design	239
NM-5	Ring Support of Vessels	250
NM-6	Example of a Fabricator's Quality Control Program	263
NM-7	Acceptance Inspection by User's Inspector	277
NM-8	Handling and Shipping	286

NM-9 Installation of RTP Vessels . . . 289
NM-10 Requirements and Responsibilities of User (or User's Agent), Fabricator, Inspector, and Certified Individual . . . 292
NM-11 Design for 250-lb Concentrated Load on a Torispherical Head . . . 296
NM-12 RTP Flange Design . . . 298
NM-13 Stress Analysis Methods . . . 302
NM-15 Flat Cored Plate Design . . . 327
NM-16 External Pressure Design Example for Cylindrical Shells . . . 330
NM-17 Stiffener Design Calculations . . . 333

Figures

3-1 Torispherical Heads . . . 26
3-2 Toriconical Head Dimensions . . . 27
3-3 Stiffener Details for Half-Round, Trapezoidal, and Filament Wound Band Configurations 30
4-1 Fabrication Tolerances . . . 38
4-2 Joint Arrangement . . . 40
4-3 Flat-Bottom Tank Knuckle Detail . . . 41
4-4 Support Skirt Attachment Detail . . . 43
4-5 Nozzle Flange Dimensions for Class 150 Bolting — U.S. Customary Units . . . 46
4-5M Nozzle Flange Dimensions for Class 150 Bolting — SI Units . . . 47
4-6 Flanged Nozzle Lay-Up Method . . . 48
4-7 Flush Nozzle Installation . . . 49
4-8 Penetrating Nozzle Installation . . . 50
4-9 Bottom Drain Detail . . . 51
4-10 Nozzle Installation and Cutout Reinforcement Location Alternate . . . 52
4-11 Nozzle Gussets . . . 53
4-12 Flange Tolerances . . . 54
4-13 Flat Cored Bottom Knuckle Detail . . . 55
7-1 Dimensions for Tensile Test Specimen . . . 74
8-1 Official ASME Certification Mark With RTP Designator . . . 76
M3-1 Moment Resultants . . . 95
M3-2 Force Resultants . . . 96
M3-3 Geometry and Notation of an *n*-Layered Laminate . . . 96
M3-4 Coordinate Systems . . . 97
M5-1 Pipe Test Piece . . . 128
M5-2 Secondary Bond Test Assembly . . . 128
M5-3 Secondary Bond Test Specimen . . . 130
M6-1 ASME RTP-1 Demonstration Vessel . . . 138
M6-2 Post-Test Sectioning of Vessel for Final Inspection and Display . . . 139
M6-3 Witness of Hydrotest of ASME RTP-1 Demonstration Vessel (Attachment No. 3) . . . 140
M12C-1 Support Ledges Showing Recommended Weld Locations Away From Thermoformed Bends 167
M12D-1 Maximum Offset Allowed for Joints Between Sheets With Different Thicknesses . . . 169
M12D-2 Visual Features of Hot Gas Welds . . . 172
M12D-3 Illustrations of Flow Lines . . . 172
M12D-4 Heat-Affected Zone Patterns . . . 173

M12D-5	Butt Fusion Welds Showing Melt Flow Lines	173
M12D-6	Nozzle Construction for Penetrating Nozzle	174
M12D-7	Nozzle and Manway Construction and Installation	175
M12D-8	Bottom Nozzle Construction and Installation	177
M12G-1	Dual Laminate Demonstration Vessel	181
M12G-2	Post-Test Sectioning of Dual Laminate Demonstration Vessel for Final Inspection and Display	186
NM1-1	Toriconical Head	193
NM1-2	Stress Intensity in a Toriconical Head	195
NM1-3	Horizontal Tank	197
NM1-4	Pressure Distribution	198
NM1-5	Saddle Reaction	199
NM1-6	Stress Along Top Meridian, Initial Try	200
NM1-7	Stress Along 45-deg Meridian, Initial Try	201
NM1-8	Stress Along 90-deg Meridian, Initial Try	202
NM1-9	Stress Along 135-deg Meridian, Initial Try	203
NM1-10	Stress Along Bottom Meridian, Initial Try	204
NM1-11	Stress Along Top Meridian, Final Try	206
NM1-12	Stress Along 45-deg Meridian, Final Try	207
NM1-13	Stress Along 90-deg Meridian, Final Try	208
NM1-14	Stress Along 135-deg Meridian, Final Try	209
NM1-15	Stress Along Bottom Meridian, Final Try	210
NM2-1	Values of F (Integral Flange Factors)	220
NM2-2	Values of f (Hub Stress Correction Factors)	221
NM2-3	Values of T, U, Y, and Z (Terms Involving K)	222
NM2-4	Values of V (Integral Flange Factors)	223
NM2-5	Design of Flat-Face Integral Body Flanges With Full-Face Gaskets (Example Calculation — 72-in. Flange at 30 psi)	224
NM4-1	Wound-On Hold-Down Lug	240
NM4-2	Secondary Bonded Hold-Down Lug	241
NM4-3	Moment Coefficient, M_L	243
NM4-4	Uplift Coefficient, P_G	243
NM4-5	Anchor Clips	245
NM4-6	Shear Ledge	247
NM5-1	Lugs on Band	251
NM5-2	Moment Coefficient, M_L	252
NM5-3	Split-Ring Flange	253
NM5-4	Ring Support of Vessels	255
NM5-5	Geometric Quantities	256
NM5-6	Ring Design Chart for Three Lugs	257
NM5-7	Ring Design Chart for Four Lugs	258
NM5-8	Ring Design Chart for Eight Lugs	259
NM5-9	Example Cross Section	260
NM5-10	Lug	261
NM6-1	Organization Chart	265
NM7-1	Recommended Fabrication Tolerances	284

NM8-1 Lifting Vessel With Spreader Bar 286
NM8-2 Strongback for Lifting 287
NM8-3 Use of Strongbacks 288
NM9-1 Flat-Face Valve Flange to Flat-Face RTP Nozzle Flange and Full-Face Gasket 289
NM9-2 Raised-Face Valve Flange to Flat-Face RTP Nozzle Flange With Filler Ring and Full-Face Gasket 290
NM9-3 Flange Bolt Tightening 290
NM10-1 ASME RTP-1 Flowchart 295
NM11-1 Stress Function 297
NM12-1 Flange Dimensioning Details 298
NM12-2 Flange Loading Conditions 299
NM13A-1 Sign Conventions for Cylindrical Segments 304
NM13B-1 Sign Conventions for Spherical Segments 309
NM13C-1 Sign Conventions for Flat Plates 314
NM13C-2 Simply Supported Flat Plate 314
NM13C-3 Edge Loads on Flat Plates 315
NM13C-4 Flat Plate Vessel Head 315
NM13C-5 Flat Plate to Cylinder Joint 316
NM13D-1 Example Pressure Vessel 319
NM13D-2 Forces and Moments in Pressure Vessel Example 319
NM13D-3 Hemispherical Head 321
NM13D-4 Cylindrical Shell 321
NM13D-5 Flat Plate Head 322
NM15-1 Equivalent Solid and Cored Plates 328
NM17-1 Stiffener Moment of Inertia for a Half-Round 333
NM17-2 Stiffener Moment of Inertia for a Trapezoidal Stiffener 335
NM17-3 Stiffener Moment of Inertia for a Filament Wound Band 337

Tables

2A-1 Standard Laminate Composition Type I 15
2A-2 Standard Laminate Composition Type II 16
2A-3 Minimum Values of Flat Laminates 16
4-1 Flange Flatness Tolerance 39
4-2 Typical Dimensions of Manways 54
4-3 Shear Bond Length 54
6-1 Minimum Nozzle Flange Thickness Checks 62
6-2 RTP Visual Inspection Acceptance Criteria 66
7-1 Required Resins and Acceptable Fabrication Processes for Demonstration Laminates . 70
7-2 Dimensional Requirements for Hand Lay-Up and Spray-Up Demonstration Laminates . 71
7-3 Reinforcement Requirements for Hand Lay-Up and Spray-Up Demonstration Laminates 71
M3-1 Properties for Materials in the Design Example 113
M3-2 Lamina Input for CLT Calculations 115
M3-3 Strains, Stresses, and Strength Ratios 120
M3-4 Woven Roving Layer Modeled as a Balanced and Symmetric Three-Ply Laminate 121
M6-1 User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) 134

M8-1 Acceptance Criteria per Channel . . . 146
M12B-1 ASTM Specifications for Thermoplastic Polymers . . . 154
M12B-2 Typical Thermoplastic Polymer Properties . . . 155
M12B-3 Thermoplastic Sheet Visual Inspection Acceptance Criteria . . . 158
M12D-1 Visual Weld Defects . . . 170
M12E-1 Lining Visual Inspection Acceptance Criteria . . . 179
M12G-1 User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) . . . 182
M12H-1 Weld Strength Requirements . . . 187
NM1-1 Example 1, Vessel With a Toriconical Lower Head . . . 196
NM1-2 Wall Thickness in a Horizontal Tank . . . 205
NM2-1 Typical Body Flange Dimensions and Recommended Bolt Torque Values for RTP Body Flanges . . . 214
NM2-2 Body Flange Design Using Full-Face Gaskets, Maximum Stress Less Than 3,000 psi — Type II Laminates . . . 215
NM2-3 Body Flange Design Using Full-Face Gaskets, Maximum Stress Less Than 1,800 psi — Type I Laminates . . . 217
NM2-4 Values of *T*, *Z*, *Y*, and *U* (Factors Involving *K*) . . . 225
NM13C-1 Multiplying Factors . . . 313
List of SI Units for Use With ASME RTP-1 . . . 340
Commonly Used Conversion Factors . . . 341

Forms

1-1 User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) . . . 6
1-2 Fabricator's Data Report (As Required by the Provisions of ASME RTP-1) . . . 10
1-3 Fabricator's Partial Data Report . . . 12
M1A-1 Veil and Mat Reinforcement Log Sheet . . . 79
M1B-1 Roving Reinforcement Log Sheet . . . 81
M1C-1 Fabric Reinforcement Log Sheet . . . 83
M1D-1 Milled Fiber Reinforcement Log Sheet . . . 86
M2E-1 Resin Log Sheet . . . 92
M2E-2 Curing Agents Log Sheet . . . 93
M2F-1 Common Additives Log Sheet . . . 94
M5-1 Laminator Qualification Report . . . 126
M5-2 Secondary Bonder Qualification Report . . . 127
M12B-1 Thermoplastic Sheet or Roll Receiving Log . . . 157
M12B-2 Welding Material Receiving Log . . . 160
M12B-3 Bonding Resin Receiving Log . . . 161
M12B-4 Conductive Material Receiving Log . . . 163
M12B-5 Thermoplastic Shape Receiving Log . . . 165
M13-1 Balsa Wood Core Inspection Sheet . . . 191
NM2-1 Design of Flat-Face Integral Body Flanges With Full-Face Gaskets . . . 219
NM6-1 Mixing Data Sheet . . . 269
NM6-2 Component Data Sheet . . . 270
NM6-3 Document Control Sheet . . . 271

NM6-4 Document Distribution List 272
NM6-5 Document Preparation and Distribution Responsibility 273
NM6-6 Nonconformity Correction Report 274
NM6-7 QC Manual Master Revision List 276
NM7-1 RTP Equipment Inspection Requirements 278
NM7-2 Inspection Checklist for RTP Equipment 279
NM7-3 Inspection and Test Plan 282

SI Units 339

FOREWORD

The function of the Reinforced Thermoset Plastic (RTP) Corrosion-Resistant Equipment Committee is to establish rules of safety governing the design, fabrication, and inspection during construction of such equipment, and to interpret these rules when questions arise regarding their intent. In formulating the rules, the Committee considers the needs of users, material manufacturers, fabricators, and inspectors of this equipment. The objective of the rules is to afford protection of life and property, and to provide a margin for deterioration in service so as to give a reasonably long safe period of usefulness. Advancements in design and material and the evidence of experience are recognized.

The rules established by the Committee are not to be interpreted as approving, recommending, or endorsing any proprietary or specific design or as limiting in any way the Fabricator's freedom to choose any method of design or any form of construction that conforms to the rules of this Standard.

This Standard contains mandatory requirements, specific prohibitions, and nonmandatory guidance for materials, design, fabrication, examination, inspection, testing, certification, and pressure-relief activities. This Standard does not address all aspects of these activities, and those aspects that are not specifically addressed should not be considered prohibited. This Standard is not a design handbook and cannot replace education, experience, and the use of engineering judgment. The phrase *engineering judgment* refers to technical judgments made by knowledgeable designers experienced in the application of this Standard. Engineering judgments must be consistent with the philosophy of this Standard, and such judgments must never be used to overrule mandatory requirements or specific prohibitions of this Standard.

The first edition of this Standard was issued on December 31, 1989.

Following approval by the ASME RTP Committee, ASME RTP-1–2025 was approved by the American National Standards Institute as an American National Standard on September 26, 2025.

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CORRESPONDENCE WITH THE RTP COMMITTEE

General. ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Standard should be sent to the staff secretary noted on the committee's web page, accessible at https://go.asme.org/RTPcommittee.

Revisions and Errata. The committee processes revisions to this Standard on a continuous basis to incorporate changes that appear necessary or desirable as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published in the next edition of the Standard.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive email notifications of posted errata.

This Standard is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Standard.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. Upon request, the committee will issue an interpretation of any requirement of this Standard. An interpretation can be issued only in response to a request submitted through the online Interpretation Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic email confirming receipt.

ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Standard requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers can track the status of their requests at https://go.asme.org/Interpretations.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Interpretations are published in the ASME Interpretations Database at https://go.asme.org/Interpretations as they are issued.

Committee Meetings. The RTP Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/RTPcommittee.

INTRODUCTION

GENERAL

The use of reinforced thermoset plastic (RTP) vessels, with maximum allowable working pressure (MAWP) and maximum allowable external working pressure (MAEWP) not exceeding 15.0 psig (103 kPag) external and/or 15.0 psig (103 kPag) internal above any hydrostatic head, that contain corrosive and otherwise hazardous materials, dictates the need for rules and/or stress analysis concerning materials of construction, design, fabrication, quality control, and inspection of such equipment. In developing rules for RTP, the committee has adapted the principles of rules included in the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, wherever they are applicable.

Adaption of standard rules to RTP requires recognition of differences that exist between metallic materials and RTP. These differences are addressed in the remainder of this Introduction.

MATERIALS AND ASSEMBLY

In the absence of ASTM standards, RTP laminate specifications (Part 2) have been developed for use with this ASME Standard. These specifications include laminate composition and properties. Laminates (composites) manufactured by contact molding and by filament winding are covered.

These materials of construction are not available in commerce as mill shapes such as sheet and plate for forming and joining by the Fabricator. They are produced in situ on a mandrel or mold by the Fabricator during fabrication of RTP equipment components. Each Fabricator, as part of the Fabricator's shop, must demonstrate capability to produce laminates meeting the requirements of the laminate specifications.

Assembly of components such as shells, heads, and nozzles requires joining by secondary bonding. This operation involves fit-up, surface preparation, and overwrapping with a laminate of composition equivalent to the laminates being joined. Secondary Bonders must be qualified individually by the procedures detailed in Mandatory Appendix M-5.

DESIGN

Design by formulas and by stress analysis are both included in this Standard. Consideration is given both to ultimate strength and to limiting strain. Time and temperature dependence of RTP laminate properties are recognized.

The ultimate stress consideration is required to ensure safety against catastrophic failure over a reasonably long term. The design factors of Subparts 3A and 3B include consideration of variability of quality in the labor-intensive fabricating operation. The strain considerations are required to ensure long-term operation under cyclic stress (fatigue) without cracking the resin matrix of the composite laminate, thus maintaining maximum corrosion resistance. More than 20 years of successful experience, together with test data, have shown these considerations to be valid.

INSPECTION

Reliance is placed on careful auditing of the Fabricator's Quality Control Program and close visual inspection of equipment during fabrication and of finished equipment.

NONMANDATORY APPENDICES

Nonmandatory Appendices are provided in this Standard for reference only. The content of Nonmandatory Appendices is not a requirement even when referenced in mandatory parts of this Standard.

UNITS

Either U.S. Customary units or SI units may be used to demonstrate compliance with the requirements of this Standard. It is not permissible to use a combination of both systems of units. Values are listed in the Standard with U.S. Customary units as the primary units and SI units shown parenthetically. The SI unit values have been converted from the U.S. Customary unit values. Conversion of units shall be performed to ensure that dimensional consistency is maintained. For either system of units, the Qualified Designer is responsible for ensuring that all units are consistent and correct.

A supplement to the Standard is included as a convenience to the user to provide typical SI units and commonly used conversion factors. Additional conversion factors are available in IEEE/ASTM SI 10.