



180 Technology Parkway
Peachtree Corners, GA 30092
404-636-8400

FINAL APPROVED

TC/TG/MTG/TRG MINUTES COVER SHEET

(Minutes of all Meetings are to be distributed to all persons
listed below within 60 days following the meeting.)

TC/TG/MTG/TRG No. TC 4.1 DATE 2/7/2026

TC/TG/MTG/TRG TITLE Load Calculation Data & Procedures

DATE OF MEETING Monday 2/2/2026 LOCATION Caesar's Palace Las Vegas, Umbria Boardroom

MEMBERS PRESENT	YEAR APPTD	MEMBERS ABSENT	YEAR APPTD	EX-OFFICIO MEMBERS AND ADDITIONAL ATTENDANCE
Chip Barnaby	2022	Ardeshir Moftakhari	2022	Lee Benzel (Summer Consultants)
Liam Buckley	2024			Bob Doeffinger (ZMM)
Glenn Friedman	2024			Ed Janowiak (ACCA)
Suzanne Levisieur	2022			Rolando Legarreta (Alegro Engr)
Jim Pegues	2024			James Lowry (ZMM)
Rachel Spitler	2022			Shilei Ma (GTI Energy)
Stephen Roth	2024			Elyse Malherek (Big Ladder)
				Mark Malkin (U of Wisconsin)
				Brian Rock (Kansas U.)
				Jeff Spitler (Okla. State)
				Larry Sun (DMG)
				Graham S. Wright (PHIUS)

DISTRIBUTION: All Members of TC/TG/MTG/TRG plus the following:

TAC Section Head: Kyle Gluesenkamp	SH4@ashrae.net
All Committee Liaisons As Shown On TC/TG/MTG/TRG Rosters (Research, Standards, ALI, etc.)	Staff: shammerling@ashrae.org
Mike Vaughn, Manager Of Research & Technical Services	MORTS@ashrae.net

Note: These draft minutes have not been approved and are not the official, approved record until approved by the TC.

TC 4.1 Web Site: <https://tc0401.ashraetcs.org/>



ASHRAE Technical Committee 4.1

ASHRAE TC 4.1
Load Calculation Data & Procedures
Full Committee Meeting Agenda
2026 ASHRAE Winter Conference
Hybrid Meeting
In-Person: Caesar's Palace Las Vegas, Umbria Boardroom (PS)

Summary of Votes Taken

	Motion	Result	Vote
1	Approve 2025 Phoenix summer meeting minutes	Passed	6-0-0-1-CNV
2	Submit "Demystifying HVAC Loads and Equipment Selection" seminar proposal for Austin Summer Conference	Passed	6-0-0-1-CNV
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Summary of Action Items

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1	Rachel Spitler	Update PTAR for 3 rd Edition of Load Calculation Application Manual and circulate to TC members
2	All TC Members	Review updated PTAR for 3 rd Edition of Load Calculation Application Manual and provide feedback to Rachel Spitler by February 18
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5	Jim Pegues	Send a Doodle Poll in February to demonstration draft initial review group to schedule the initial Handbook demonstration draft review meeting in early May.

1. **Call to order [2:16 PM PDT]** Rachel Spitler

2. **ASHRAE Code of Ethics Commitment** Rachel Spitler

"In ASHRAE meetings, we will act with honesty, fairness, courtesy, competence, inclusiveness and respect for others, which exemplify our core values of excellence, commitment, integrity, collaboration, volunteerism and diversity, and shall avoid all real or perceived conflicts of interest."
(See full ASHRAE Code of Ethics: <https://www.ashrae.org/about/governance/code-of-ethics>)

3. **Roll call – Determination of a Quorum** Jim Pegues

7 of 8 voting members present. Quorum exists



ASHRAE Technical Committee 4.1

4. Introductions All

5. Scope, Mission Statement Rachel Spitler

Scope: TC 4.1 is concerned with the identification and compilation of engineering data and the development of procedures for calculating heating, cooling, refrigeration, and ventilating loads of structures.

Mission Statement: To serve practitioners by advancing the data and procedures of load calculations.

6. Agenda additions

None

7. Liaison reports Liaisons

a. Section Head	Kyle Gluesenkamp
b. Chapter Technology Transfer	Christopher Adams
c. Research	Davide Ziviani
d. Handbook	Eric Granzow
e. Staff, Research/Tech Services	Steven J Hammerling
f. Standards	Mr Philip J Naughton
g. TAC Chairman	Dr. Satheesh Kulankara

Note: No liaisons were present at the meeting.

8. Chair's Report Rachel Spitler

- a. TC Chairs Breakfast
 - Research Advisory Panel is conducting a survey on TC member views of ASHRAE research. To participate, scan the QR code on the TC 4.1 agenda.
 - For Las Vegas, 131 seminars were proposed and 65 seminars were accepted.
 - Program tracks have been announced for Austin (Summer 2026) and Chicago (Winter 2027). Conferences and Expositions Committee (CEC) is requesting more sessions oriented to practicing engineers.
 - ASHRAE announced that starting in Austin (Summer 2026) it is mandatory for all TC subcommittee meetings to be virtual, ideally held ahead of the Annual Conference or the Winter Conference. Justification for this change is the increasing cost of conference space. Contact Steve Hammerling (shammerling@ashrae.org) if you want to provide feedback on this change.

9. Approval of minutes from 2025 Annual Meeting Rachel Spitler

Motion: Approve 2025 Phoenix Summer Meeting Minutes

Motion By: Suzanne Levisur

Second By: Jim Pegues

Vote: 6-0-0-1-CNV (for-against-abstain-absent-Chair-Not-Voting)



ASHRAE Technical Committee 4.1

10. Subcommittee reports

a. Programs:

James Lowry

- Fundamentals of Loads seminar proposed for Las Vegas conference was not accepted.
- February 25 is the submission deadline for Austin
- Seminar proposal for Summer Conference in Austin – “Demystifying Loads and HVAC Equipment Selection” for the Workforce Development track. YEA is interested in co-sponsoring the seminar. Seminar would cover what equipment manufacturers need for equipment selection and how to provide that data. Submit for 60 to 90 attendees. Three speakers. Rachel volunteered to be session chair. James cannot attend the Austin conference. Speakers: Larry Sun, Glenn Friedman, Jim Pegues. Topics would be (1) What does a vendor need? (Larry) (2) How to get from room loads to what the rep firm needs? (Jim) (3) What are the consequences / what do you do with it? (Glenn). Possibility to add a fourth speaker who is a YEA member who has faced this challenge of providing proper and sufficient data to a vendor rep and can describe that challenge.

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Motion By: Glenn Friedman

Second By: Jim Pegues

Vote: 6-0-0-1-CNV (for-against-abstain-absent-Chair-Not-Voting)

b. Research:

Rachel Spitler

- 1816-RP – Reporting the Energy Use and Heat Gain from Medical Imaging Equipment – Data collected and analyzed showed unexpected trends and conflicting data. An emergency PMS meeting was called to determine how to move forward.
- 1923-RP – Preparing Climatic Design Condition Data for the 2025 ASHRAE Handbook - Fundamentals and Standard 169. - Project nearly complete. TC 4.2 voting to accept final report at this conference. Technical paper is final deliverable to be submitted.
- 1857-RP – Improved Simplified Methodology for Describing and Calculating Heat Conduction between Building and the Ground. – Work has started. A PMS meeting has not been held yet.
- 1959-RP – Update People Load Data for Cooling Load Calculations – The Project Evaluation Subcommittee (PES) met on Sunday to review bids for this project and is prepared to recommend a selection to the full TC. That proposal will be made to the full committee in executive session at the end of this meeting. Generally the PES rolls over and becomes the membership of the Project Monitoring Subcommittee (PMS). PES members all agree to roll over to the PMS.
- 1850-WS – Evaluation of ASHRAE’s Design Day Procedure Against Recorded Weather Data. – TC42 is revising the work statement before resubmitting to RAC. TC 4.2 wants to confirm TC 4.1 still needs heating design day profile analysis added to the scope of this project. TC 4.1 confirmed it does need this scope change. TC 4.2 wants help revising the work statement. Chip Barnaby and Jim Pegues to meet with Carrier Brown, research committee chair of TC 4.2 on February 9 to discuss further.



ASHRAE Technical Committee 4.1

- 1860-WS – Simplified Method for Calculating Heating Warmup Load – TC 8.11 (Unitary and Room Air Conditioning and Heat Pumps) confirmed they will approve co-sponsorship of this research at their Las Vegas meeting. TC 4.1 had previously approved the work statement (WS). Chris Wilkins subsequently made some editorial changes to that draft. TC will revote to approve.

Motion: Approve submission of WS for Simplified Method for Calculating Heating Warmup Load to RAC with TC 8.11 as co-sponsors.

Motion By: Jim Pegues

Second By: Chip Barnaby

Vote: 6-0-0-1-CNV (for-against-abstain-absent-Chair-Not-Voting)

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- PTAR – 3rd Edition of Load Calculation Applications Manual. Next steps: First, Rachel Spitler will update the PTAR draft to update dates and references and other details required to “modernize” the draft. Rachel will then circulate to the committee. TC 4.1 voting members will then review the PTAR and provide comments. Submit comments to Rachel Spitler by February 18. Subsequently there will be a letter ballot to approve submission to RAC.

Liam Buckley proposed conducting a market survey to determine what load calculation methods tool vendors anticipate providing over the next 5 years and what methods educators anticipate using to teach engineers to do load calculations. Intended to guide what methods should be included in the Load Calculation Applications Manual.

c. Handbook

Jim Pegues

- Updates to Chapters 17 and 18 published in 2025 Handbook – Fundamentals last summer.
- Reorganization of chapter material, started in 2023, is continuing. Outline for reorganized material has been refined with committee feedback and approval. Next step is to construct a demonstration draft by pasting existing material into the new framework. This will serve as a proof of concept and will show how much work will remain to fill gaps to complete the reorganization before the publication submission deadline (July 2028). That will allow a go / no-go decision to be made at the Summer Conference in June. Goal is to complete demonstration draft by May 1, engage with initial review group (Chip Barnaby, Rolando Legarreta, Chris Wilkins, Rachel Spitler) for initial review and feedback. Then make revisions and present rev 2 of demonstration draft at Handbook Subcommittee virtual meeting in mid June.

Discussion:

- Chapter 17 (Residential Load Calculations) had one or more formal reviews in recent years. Can we find the reviewers and ask for detailed feedback?



ASHRAE Technical Committee 4.1

- Be careful about merging residential and non-residential material too much. For some aspects of heat gain data collection and calculations residential and non-residential are distinct and need to be clearly separated. In other details they are similar.
- Separation may be needed more in the new Chapter 17 (Workflow) because that will be more heavily used by practitioners. Practitioners need concentrated cookbook material focused on their specific application. Those using Chapter 18 (Theory) may be more tolerant of mixing of residential and non-residential material. Readers of the Theory chapter are likely to be more intensely involved in the load calculation mechanics. Further, the fundamental theory is really the same across residential and non-residential.
- Remember there are some load components that are more important in residential than in non-residential. Basement heat loss is one example – very important in residential, and less so in non-residential. Another reason to carefully separate residential and non-residential material in the Workflow chapter.

d. Standards

Glenn Friedman

- Standard 183-2024 – *Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings*
- Standard 203-2018 (RA 2021) – *Method of Test for Determining Heat Gain of Office Equipment Used in Buildings*.
- No activity is necessary on either standard. Next reauthorization will be in 2028

e. Web Site

Jim Pegues

- Web site is up to date.

11. Old Business

Rachel Spitler

- a. none

12. New Business

Rachel Spitler

- a. none

13. Adjourn [3:37 PM PST]

Motion: Adjourn

Motion By: Suzanne Levisieur

14. Executive Session

- Objective: Review and approve contractor selection recommendation from the 1959-RP project evaluation subcommittee (PES).
- PES consists of Chris Wilkins, Suzanne Levisieur, Rolando Legarreta, Glenn Friedman
- PES analyzed bidders and selected a winner to recommend to RAC. The identity of the bidder cannot be stated here because it is confidential until RAC approves the recommendation.

Motion: Recommend to RAC to accept bid for 1959-RP from *[selected bidder]*.

Motion By: Glenn Friedman

Second By: Suzanne Levisieur

Vote: 5-0-1-1-CNV (for-against-abstain-absent-Chair-Not-Voting)

Abstained vote was from a new voting member who was not familiar with the project details



ASHRAE Technical Committee 4.1

Attachments:

Attachment 1 – Full Committee Agenda

Attachment 2 – Research Subcommittee Report

Attachment 3 – Handbook Subcommittee Report



ASHRAE Technical Committee 4.1

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e. Web Site

Jim Pegues

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11. Old Business

Rachel Spitler

- a. none

12. New Business

Rachel Spitler

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13. Adjourn [3:37 PM PST]

Motion: Adjourn

Motion By: Suzanne Levisieur

14. Executive Session

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Motion By: Glenn Friedman

Second By: Suzanne Levisieur

Vote: 5-0-1-1-CNV (for-against-abstain-absent-Chair-Not-Voting)

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ASHRAE Technical Committee 4.1

Attachments:

Attachment 1 – Full Committee Agenda

Attachment 2 – Research Subcommittee Report

Attachment 3 – Handbook Subcommittee Report

Attachment 1:
Full Committee Meeting Agenda



ASHRAE Technical Committee 4.1

ASHRAE TC 4.1 Load Calculation Data & Procedures

Full Committee Meeting Agenda

2026 ASHRAE Winter Conference
Hybrid Meeting

[\[https://teams.microsoft.com/meet/2596657707535?p=SdJB7XBcH7zVGWIUAO\]](https://teams.microsoft.com/meet/2596657707535?p=SdJB7XBcH7zVGWIUAO)

In-Person: Caesars Palace, Umbria Boardroom (PS)

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3. **Roll call – Determination of a Quorum** Jim Pegues

Chip Barnaby	6/30/2026	Ardeshir Moftakhari	6/30/2026
Liam Buckley	6/30/2028	Jim Pegues	6/30/2028
Glen Friedman	6/30/2028	Rachel Spitler	6/30/2026
Suzanne LeViseur	6/30/2026	Stephen Roth	6/30/2028

4. **Introductions** All

- a. In Person Sign-In sheet
- b. Updates to the agendas

5. **Scope, Mission Statement** Rachel Spitler

Scope: TC 4.1 is concerned with the identification and compilation of engineering data and the development of procedures for calculating heating, cooling, refrigeration, and ventilating loads of structures.

Mission Statement: To serve practitioners by advancing the data and procedures of load calculations.

6. **Agenda additions**



ASHRAE Technical Committee 4.1

7. Liaison reports (as they arrive)

Liaisons

- | | |
|----------------------------------|---------------------|
| a. Section Head | Kyle Gluesenkamp |
| b. Chapter Technology Transfer | Christopher Adams |
| c. Research | Davide Ziviani |
| d. Handbook | Eric Granzow |
| e. Staff, Research/Tech Services | Steven J Hammerling |
| f. Standards | Philip J Naughton |
| g. TAC Chairman | James S Bennett |

8. Chair's Report

Rachel Spitler

Research Advisory Panel (RAP) has a short questionnaire about research in TCs they would like to have TC members take. QR code below or contact the names listed below with any comments.



Roland Charneux rcharneux@pageaumorel.com, Steve

Hammerling shammerling@ashrae.org

- a. 65 seminars accepted, 131 submitted for Las Vegas. Tracks are up for Austin and preliminary tracks are available for Chicago too. A mini-track geared at practicing engineers with 4-page case study or applications papers is also being considered/developed for Chicago.
- b. Subcommittees will not be allowed an in-person meeting space at conferences starting in ASHRAE. Subcommittees will be required to meet virtually, ideally prior to the meeting. Steve Hammerling can be contacted for comments or questions.

9. Approval of minutes from 2025 Annual Meeting

Rachel Spitler

10. Subcommittee reports

- | | |
|---------------|-----------------|
| a. Programs: | James Lowry |
| b. Research: | Ardi Moftakhari |
| c. Handbook: | Jim Pegues |
| d. Standards: | Glenn Friedman |
| e. Web Site: | Jim Pegues |

11. Old Business

Rachel Spitler

Load Calculations Applications Manual PTAR

12. New Business

Rachel Spitler

13. Adjourn

Rachel Spitler

Attachment 2:

TC 4.1 Research Subcommittee Report



ASHRAE Technical Committee 4.1

Research Subcommittee - Agenda

TC 4.1 Load Calculation Data and Procedures
Sunday, Feb 1, 2026

Research Subcommittee Chair: Ardeshir Moftakhari ardeshir@okstate.edu

Research Liaison for Section 4: Davide Ziviani rl4@ashrae.net & dziviani@purdue.edu

Agenda:

1. TC 4.1 sponsored ongoing projects:

1.1 RP 1816: Reporting the Energy Use and Heat Gain from Imaging Equipment.

Sponsoring Committees TC 9.06 (Healthcare Facilities), TC 4.1, and 4.7 (Energy Calculations)

TC 4.1 liaison on the PMS: Glenn Friedman

PI: Walt Vernon, Contractor: Mazzetti

Last update [Glenn]: No update. More analysis is required on data and loads for medical equipment.

1.2 1923-RP – Prepare Climatic Design Conditions for the 2025 ASHRAE Handbook – Fundamentals and ASHRAE Standard 169

Sponsoring Committees TC 4.2, co-sponsored by TC 4.1

PI: Michael Roth, Klimaat Consulting

TC 4.1 liaison on the PMS: Jim Pegues

- This project aims to provide the most recent data (2004-2023) for publication in the handbook.
- Last update [Jim]:
 - a. Project completed
 - b. PMS – Unanimously approved final report last fall.
 - b. TC 4.2 to vote on accepting final report on Tuesday
 - c. Technical paper remains – ASHRAE Journal, ASHRAE Transactions, or STBE article. TO DO

1.3 RP 1857: Improved simplified methodology for describing and calculating heat conduction between buildings and the ground.

This project's results will affect the following Handbook Chapters, Special Publications, etc.:

Handbook of Fundamentals, Chapters 17, 18, and 19. Standard 90.1

Sponsoring Committees: TC 4.7, TC 4.1, and TC 4.4

TC 4.1 liaison on the PES: Glenn Friedman

Last Update [Glenn]:

- No update
- Background: The project has started after a long delay. The project is modeling focus only and no fundamental research. The PI went through the existing methods, proposed a tool comparison matrix, and currently running simulation study for the detailed ground heat conduction calculations.

2. Work statements and RTARs:



ASHRAE Technical Committee 4.1

2.1 1850-WS Evaluation of ASHRAE's Design Day Procedure Against Recorded Weather Data

Project sponsored by TC 4.2, co-sponsored by TC 4.1, TC 6.5.

Steve and Glenn were on the original PES in 2020. Went to bid in 2020. Bidder not approved by RAC.

Summer 2025 – Scope revised to add cold day profiles for heating design as requested by TC 4.1

Last update:

- Positive consensus to co-sponsor this effort to update heating design day
- Glenn and Chip to volunteer representing TC 4.1 in revising WS

2.2 1999-WS – Prepare Climatic Design Conditions for the 2029 ASHRAE Handbook – Fundamentals and ASHRAE Standard 169

Last Update [Jim]:

- a. TC 4.1 is co-sponsor
- b. WS has been approved by RAC
- c. Project due to be released for bidding March 15. Bidding likely to close May 15.
- d. PES due to evaluate bidders ahead of Austin meeting.

2.3 PTAR for updating the load calculation manual

Led by Jeff Spitler, Steve Bruning

Last Update [Rachel]:

- PTAR Discussion in the main committee

2.4 1980-RTAR Simplified Methods for Calculation of Heating Warm-Up Loads

Lead: Chris Wilkins

- The RTAR looks for a new simplified method to account for warmup heating load with heat pumps.
- TC 8.11 did not agree to co-sponsor this RTAR.
- Last update [Chris]:
 - TC may consider resubmitting RTAR for Austin meeting

3 Projects for bidding

3.1 1959-TRP “Update People Load Data for Cooling Load calculations”

Lead: Chris Wilkins

This project will focus on updating the people load data for the handbook.

Last Update [Chris]:

- PES met, discussed proposals, and sent their recommendation to the RAC

4 Potential research topics or tasks

N/A

Attachment 3:

TC 4.1 Handbook Subcommittee Report



ASHRAE Technical Committee 4.1

TC 4.1 Handbook Subcommittee Report

February 1, 2026

Handbook Subcommittee Chair:

james.f.pegues@carrier.com

rev1

Agenda:

1. Status and Schedule – 2029 Handbook - Fundamentals
2. Proposed Reorganization of Chapters 17 and 18 for 2029 Handbook - Fundamentals

Discussion:

1. Status and Schedule – 2029 Handbook - Fundamentals

- a. Planning has been underway since June 2023
- b. Standard schedule for current publication cycle

Work Phase	Date or Timeframe	Description
1. Review	Jun 2025 – Jan 2026	Review chapter to identify revisions and additions.
2. Construction	Jan 2026 – Dec 2027	Make revisions and additions
3. Approval	Jan 2028 - Jun 2028	TC 4.1 votes to approve revisions
4. Submission	Jul 2028	Submission of revised chapters to ASHRAE staff.
5. Publication	Jun 2029	Handbook published and sent to members.

2. Proposed 2029 Load Calculation Chapter Reorganization

- a. Objective
 - To better serve primary audience (consulting engineers and early career engineers), significantly reorganize material in Chapters 17 and 18.
- b. Current Reorganization Concept
 - Develop 2 chapters: (1) Workflow, (2) Theory. Addresses key needs and resolves usage issues with existing material.
 - Chapter 17 – Load Calculation Workflow –A kind of “cookbook” or “manual of procedures” for how to calculate loads: ‘What do I do first?’ ‘What do I do next?’ Fills important need for new engineers. Includes tables of reference data for heat gains and RTS factors. Light on math, equations, and technical detail. Refers to sections in Theory chapter for that discussion. Includes examples.



ASHRAE Technical Committee 4.1

- Chapter 18 – Load Calculation Theory – Explains the underlying theory and mathematics for Radiant Time Series Method, Heat Balance Method, and design heating calculation. Serves as reference material.
- c. Plan of Attack (revised based on discussion Sunday Feb 1)
- Develop and refine outline for reorganized chapter material
 - Construct demonstration draft of reorganized material for review
 - Review by TC 4.1 volunteer reviewers (May-June)
 - Assessment of gaps, level of effort, feasibility of completing reorganization
 - Go / No-Go decision point (Summer Conference, late June, Austin TX).
 - If decision is GO – Work with TC 4.1 volunteers to revise and refine, fill in gaps (July-2026 – Dec 2027)
 - If decision is NO-GO – Devise action plan for incremental updates to existing Chapters 17 and 18.
- d. Recent Activity
- Revised outline based on Phoenix meeting feedback (See Tables 1a, 1b, 2a, 2b)
 - Marked outline to indicate which sections are adaptations of existing material, which are new material to be written (see Tables 2a, 2b)
 - Identified page and table source for adapted material (see Tables 2a, 2b)
- e. Next Steps
- Meet with HQ Handbook staff to inform and coordinate approach to revision (Feb)
 - Construct demonstration draft based on outline shown on following pages, using source material from 2025 Handbook - Fundamentals. (Feb-Apr)
 - Meet with TC 4.1 volunteer reviewers to begin pre-Austin meeting review process (Chip Barnaby, Rolando Legarreta, Chris Wilkins, Rachel Spitler)

Table 1a. Chapter 17 - 2029 ASHRAE Handbook – Proposed High Level Outline – rev 2026-01-30

Outline	Comments
Chapter 17 – Load Calculation Workflow	
1. Introduction	Explain purpose, organization of chapter
2. Data Collection Workflow	Cookbook for collecting input data for load calculations
3. Heating Calculation Workflow using Instantaneous Heat Loss Method	Cookbook for single point steady state heating load calculation
4. Heating Calculation Workflow using 24-Hour Steady Periodic Method	Cookbook for 24-hour steady periodic heating load calculation
5. Cooling Load Calculation Workflow using Heat Balance Method	Cookbook for calculating cooling loads via HBM
6. Cooling Load Calculation Workflow using Radiant Time Series	Cookbook for calculating cooling loads via RTSM
7. Cooling Load Calculation Workflow using Residential Heat Balance Method	Cookbook for calculating cooling loads via Residential HBM
8. Cooling Load Calculation Workflow using Residential Load Factor Method	Cookbook for calculating cooling loads via RLF Method
9. System Load Calculation & System Sizing Workflow	Cookbook for calculating system loads and sizing airflow rates
References	

Table 1b. Chapter 18 - 2029 ASHRAE Handbook – Proposed High Level Outline – rev 2026-01-30

Outline	Comments
Chapter 18 – Load Calculation Theory	
1. Introduction	Explain purpose, organization of chapter.
2. Fundamentals Principles of Load Calculations	Fundamental terms and concepts similar to 2025 content
3. Steady State Load Calculations / Peak Heating Load Calculation	Basic theory, principles, equations for calculating steady state loads
4. Dynamic Load Calculation Principles	Basic theory, principles for calculating dynamic loads
5. Dynamic Cooling Load Calculations: Heat Balance Method	Application of theory for calculating dynamic cooling loads via HBM
6. Dynamic Heating Load Calculations: Heat Balance Method	Application of theory for calculating dynamic heating loads via HBM
7. Dynamic Cooling Load Calculations: Radiant Time Series Method	Application of theory for calculating dynamic loads via RTSM
8. Dynamic Cooling Load Calculations: Residential Heat Balance Method	Application of theory for calculating dynamic loads via Residential HBM
9. Dynamic Cooling Load Calculations: Residential Load Factor Method	Application of theory for calculating dynamic loads via RLF Method
10. HVAC System Loads and Equipment Sizing	Extra considerations for system level load calculations and sizing
References	

Table 2a. Chapter 17 - 2029 ASHRAE Handbook – Proposed Second Level Outline – rev 2026-01-30

Outline	Adapt	New	Adapted Material from 2025; comments	2025 Page
Chapter 17 – Load Calculation Workflow				
1. Introduction			Purpose and content of this chapter. Overview of chapter organization	
2. Data Collection Workflow				
2.1 Workflow Overview			Provide a high-level overview of objective and steps.	
2.2 Outdoor Design Conditions and Climatic Data			Reference tables in Climatic Data chapter as needed.	18.3-5
2.3 Indoor Design Conditions				18.4
2.4 Building Geometry			Floor plans, areas, orientations, rooms, and room usage	18.3
2.5 Envelope Assemblies and Materials			Include 2025 Table 21 – Thermal Properties of Materials, Table 18 – Solar Absorptance values.	
2.6 Fenestration Data and Performance			Reference tables in Fenestration chapter.	18.5
2.7 Internal Heat Gains and Operating Schedules			Include 2025 Table 17 – radiative / convective splits	18.5
Occupants			Include 2025 Table 4 – Occupant Heat Gains	18.6
Lighting			Include 2025 Table 5 – Lighting Power Density by Space Usage, Table 6 – Lighting Heat Gain Parameters	18.6
Electric Motors			Include 2025 Tables 7a, 7b – Motor BHPs	18.7
Appliances			Include 2025 tables for cooking appliances, hospital and laboratory equipment, office equipment, computer equipment ware washing equipment, laboratory equipment (8A, 8B, 8C, 8D, 8E, 8F, 9, 10, 11A, 11B, 11C, 11D, 12, 13,14)	18.8-20
Other Sources of Heat Gain				
2.8 Infiltration Rates				18.14-20
2.9 Latent Heat Gain from Moisture Diffusion				18.20
2.10 Other Latent Heat Gains				18.20
3. Heating Calculation Workflow using Instantaneous Heat Loss Method			Cookbook for single point steady state heating load calculation	
3.1 Workflow Overview			Provide a high-level overview of process steps.	
3.2 Calculate Loads due to Above Grade Exterior Wall Heat Loss			Using the equations with collected data to calculate loads	18.44-47
3.3 Calculate Loads due to Below Grade Exterior Wall Heat Loss			Ditto	18.44-47
3.4 Calculate Loads due to On or Below Grade Floor Heat Loss			Ditto	18.44-47
3.5 Calculate Loads due to Roof Heat Loss			Ditto	18.44-47
3.6 Calculate Loads due to Interior Wall Heat Loss			Ditto	18.44-47
3.7 Calculate Loads due to Fenestration Heat Loss			Ditto	18.44-47

Outline	Adapt	New	Adapted Material from 2025; comments	2025 Page
3.8 Calculate Loads due to Infiltration Loss			Ditto	18.44-47
3.9 Calculate Room Sensible Heating Load			Summation of component loads to obtain room totals	
3.10 Example Heating Load Calculation			Reconfigure 2025 example to demonstrate this workflow	18.63-64
4. Heating Calculation Workflow using 24-Hour Steady Periodic Method			Cookbook for 24-hour steady periodic heating load calculation	
4.1 Workflow Overview			Provide a high-level overview of the rationale for a 24-hour steady-periodic design heating calculation. Explain potential applications. Explain the workflow. This is a placeholder at this point. Not sure if more material than the overview will be needed. This is TBD as of rev2.	
5. Cooling Load Calculation Workflow using Heat Balance Method			Cookbook for calculating cooling loads via HBM	
5.1 Workflow Overview			Provide a high-level overview of the workflow process steps. This might be the only section because Heat Balance has to be calculated with software. So data collection establishes input to that software. There is nothing more from a workflow standpoint.	18.21-26
6. Cooling Load Calculation Workflow using Radiant Time Series				
6.1 Workflow Overview			Provide a high-level overview of process steps.	
6.2 Calculate Loads due to Internal Heat Gain				18.52
Occupants			Using the equations with collected data to calculate loads	18.52
Lighting			Ditto	18.52
Electric Motors			Ditto	18.52
Appliances			Ditto	18.52
Load due to Other Sources of Internal Heat Gain			Ditto	18.52
6.3 Calculate Loads due to Exterior Wall and Roof Heat Gain			Ditto. Include Tables 19, 20, 22, 23, 24	18.52
6.4 Calculate Loads due to Interior Wall Heat Gain			Ditto	18.52
6.5 Calculate Loads due to Fenestration Heat gain			Ditto	18.52
6.6 Calculate Loads due to Infiltration			Ditto	18.52
6.7 Calculate Room Sensible and Latent Cooling Loads			Summation of component loads to obtain room totals	
6.8 Example Cooling Load Calculation – Radiant Time Series			Reconfigure 2025 example to demonstrate this workflow	18.50-63
7. Cooling Load Calculation Workflow using Residential Heat Balance Method			Cookbook for calculating cooling loads via Residential HBM	
7.1 Workflow Overview			As of rev2 this is a placeholder. More evaluation needed to determine how to organize the material for this section. Those details will be coming in a later revision to the outline.	17.2
8. Cooling Load Calculation Workflow using Residential Load Factor Method			Cookbook for calculating cooling loads via RLF Method	

Outline	Adapt	New	Adapted Material from 2025; comments	2025 Page
8.1 Workflow Overview			As of rev2 this is a placeholder. More evaluation needed to determine how to organize the material for this section. Those details will be coming in a later revision to the outline.	17.2-11
8.2 Example Cooling Load Calculation – Residential Load Factor Method			Adapt example from Residential chapter.	17.13-15
9. System Load Calculation & System Sizing Workflow			Cookbook for calculating system loads and sizing airflow rates	
9.1 Workflow Overview			Overview of the objectives and workflow	
9.2 Calculate system loads			Discussion of calculating system loads such as ventilation, fan heat gain	18.47-50
9.3 Workflow for calculating supply airflow rates			Discussion of one key use for peak loads – calculating supply airflow	
9.4 Workflow for calculating supply fan airflow rates			Discussions of coincident peak load and airflow; sum of peaks	
3.10 Apply Safety Factor, if Necessary			Application of cooling and heating safety factor, and considerations	18.47
References				18.65-67

Table 2b. Chapter 18 - 2029 ASHRAE Handbook – Proposed Second Level Outline – rev 2026-01-30

Outline	Adapt	New	Comments, adapted material from 2025	2025 Page
Chapter 18 – Load Calculation Theory				
1. Introduction			Purpose and content of this chapter; its relationship to Chapter 17	
2. Fundamentals of Load Calculations			1. Cooling Load Calculation Principles	18.1
2.1 Terminology			1.1 Terminology	18.1
2.2 Heat Flow Rates			1.1 Terminology / Heat Flow Rates	18.1-2
Space Heat Gain or Loss (sensible and latent)				18.1-2
Space Load				18.1-2
Space Heat Extraction Rate / Heat Addition Rate				18.1-2
Cooling and Heating Coil Load				18.1-2
3. Steady State Load Calculations Principles				
3.1 Key Principles of Steady State Load Calculations			New	
3.2 Application for Peak Heating Load Calculation			7. Heating Load Calculation	18.44, 17.11-12
3.3 Steady State Heat Loss Calculations			7.1 Heat Loss Calculations	18.44
Calculation of Heat Loss for Above Grade Surfaces				18.45
Calculation of Heat Loss for At or Below Grade Surfaces				18.45
Infiltration Heat Loss				18.46
3.4 Heating Safety Factor and Load Allowances			7.2 Heating Safety Factor and Load Allowances	18.47
3.5 Other Heating Load Considerations			7.3 Other Heating Load Considerations	18.47
Table A. Summary of Peaking Heating Load Calculation Equations			New	
4. Dynamic Load Calculation Principles				
4.1 Key Principles of Dynamic Load Calculations			New	
4.2 Application to Peak Cooling Load Calculation			1.2 Cooling Load Calculation Methods	18.2-3
4.3 Internal Heat Gains			2. Internal Heat Gains	18.5
4.3.1 Occupants			2.1 People	18.6
4.3.2 Lighting			2.2 Lighting	18.6
4.3.3 Electric Motors			2.3 Electric Motors	18.7
4.3.4 Appliances and Equipment			2.4 Appliances	18.7-14
4.4 Opaque Envelope Heat Gain			New	
4.5 Fenestration Heat Gain			4. Fenestration Heat Gain	18.21

Outline	Adapt	New	Comments, adapted material from 2025	2025 Page
Direct Solar, Diffuse Solar, and Conductive Heat Gain			4.1 Fenestration Direct Solar, Diffuse Solar, and Convective Heat Gain	18.21
Exterior Shading			4.2 Exterior Shading	18.21
4.6 Infiltration Heat Gain			3.1 Infiltration	18.14-20
4.7 Latent Heat Gain from Moisture Diffusion			3.2 Latent Heat Gain from Moisture Diffusion	18.20-21
4.8 Latent Heat Gain from Other Sources			3.3 Other Latent Loads	18.21
5. Dynamic Cooling Load Calculations: Heat Balance Method			5. Heat Balance Method	
5.1 Key Principles of the Heat Balance Method			5. Heat Balance Method and 5.1 Assumptions	18.21-22
5.2 Calculation Procedure			5.2 Elements	18.22
5.2.1 Overview			5.2 Elements	18.22
5.2.2 Outdoor Face Heat Balance			In 5.2: Outdoor Face Heat Balance	18.22
5.2.3 Wall or Roof Conduction Process			In 5.2: Wall Conduction Process	18.22-23
5.2.4 Indoor Face Heat Balance			In 5.2: Indoor Face Heat Balance	18.23
LW Radiation Exchange Among Surfaces				18.23
SW Radiation from Lights				18.23
LW Radiation from Internal Sources				18.23
Transmitted Solar Heat Gain				18.23
Using SHGC to Calculate Solar Heat Gain			In 5.2: Using SHGC to Calculate Solar Heat Gain	18.23-24
Indoor Air Heat Balance			In 5.2: Air Heat Balance	18.25
Space Load			5.3 General Zone for Load Calculation	18.25
5.2.5 Input Data Required			5.5 Input Required	18.26-27
5.2 Heat Balance Mathematical Description			5.4 Mathematical Description	18.25-26
6. Dynamic Heating Load Calculations: 24-Hour Steady Periodic Loads				
6.1 Key Principles for 24-Hour Steady Periodic Design Htg Load Calc			In rev 2 this is a placeholder. Need to determine content here explaining theory and application of Heat Balance for 24-hour steady periodic calculation of peak heating loads.	
7. Dynamic Cooling Load Calculations: Radiant Time Series Method			6. Radiant Time Series Method	18.27
7.1 Key Principles of the RTS Method			6.1 Assumptions and Principles, 6.2 Overview	18.27-28
7.2 Calculation Procedure			6.3 RTS Procedure	18.29
7.2.1 Overview			6.3 RTS Procedure	18.29
7.2.2 Opaque Envelope Heat Gain			6.4 Heat Gain Through Exterior Surfaces	18.29
Sol Air Temperature			6.4 Sol Air Temperature	18.29
Conduction Time Series			6.4 Conduction Time Series	18.30
7.2.3 Heat Gain Through Interior Surfaces			6.5 Heat Gain Through Interior Surfaces	18.30-31

Outline	Adapt	New	Comments, adapted material from 2025	2025 Page
7.2.4 Calculating Cooling Load			6.6 Calculating Cooling Load	18.32-44
Opaque Envelope Load Components			Use Table 29 material	18.52
Fenestration Load			Use Table 29 material	18.52
Internal Loads			Use Table 29 material	18.52
Infiltration Load			Use Table 29 material	18.52
Other Latent Loads			Use Table 29 material	18.52
Table A. Summary of RTS Load Calculation Procedures			Table 29. Summary of RTS Load Calculation Procedures	18.52
8. Dynamic Cooling Load Calculations: Residential Heat Balance Method				
8.1 Key Principles for Residential Heat Balance Method			In rev 2 this is a placeholder. Determine content here explaining theory and application of Heat Balance for residential peak cooling load calculations.	17.2
9. Dynamic Cooling Load Calculations: Residential Load Factor Method				
9.1 Key Principles for 24-Hour Steady Periodic Design Htg Load Calc			In rev 2 this is a placeholder. Determine content here explaining theory and application of the Residential Load Factor Method.	17.2-11
10. HVAC System Loads and Equipment Sizing			8. System Heating and Cooling Load Effects	18.47
10.1 Zoning			8.1 Zoning	18.47
10.2 Ventilation Loads			8.2 Ventilation	18.47
10.3 Air Heat Transport Systems			8.3 Air Heat Transport Systems	18.47
On/Off Control Systems				18.47
Variable Air Volume Systems				18.48
Constant Air Volume Reheat Systems				18.48
Mixed Air Systems				18.48
Heat Gain from Fans				18.49
Duct Surface Heat Transfer				18.49
Duct Leakage				18.49
Ceiling Return Air Plenum Temperatures				18.49-50
Ceiling Plenums with Ducted Return				18.50
Underfloor Air Distribution Systems				18.50
10.4 Use of Peak Room Loads to Calculate Supply Airflow Rates			In rev 2 this is a placeholder. To be refined/elaborated in a later revision	
10.5 Central Cooling and Heating Plants			8.4 Central Plants	18.50-51
11. Previous Cooling Load Calculation Methods			10. Previous Cooling Load Calculation Methods	18.64-65
References			References	18.65-67