ENERGY STAR®
Residential Dishwasher Version 7.0 Draft 1 Specification

Stakeholder Webinar

March 26, 2020

Meeting Details

- Slides and related materials will be available on the Dishwasher Product Development Web page:
  - www.energystar.gov/RevisedSpecs
  - *Follow link to "Version 7.0 is in Development" under "Dishwashers"*

- Audio provided via teleconference:

  U.S. Phone Number: 877-423-6338
  International Phone Number: +1-571-281-2578
  Participant Code: 436598

  - Phone lines will be muted at the start of the presentation
  - Please leave your line on mute unless speaking during the call for questions
  - Press *6 to unmute your line and when you are finished with your question or comment, *6 to mute

Introductions

Ga-Young Park
U.S. Environmental Protection Agency

Katharine Kaplan
U.S. Environmental Protection Agency

Steve Leybourn
ICF

Introductions and Background

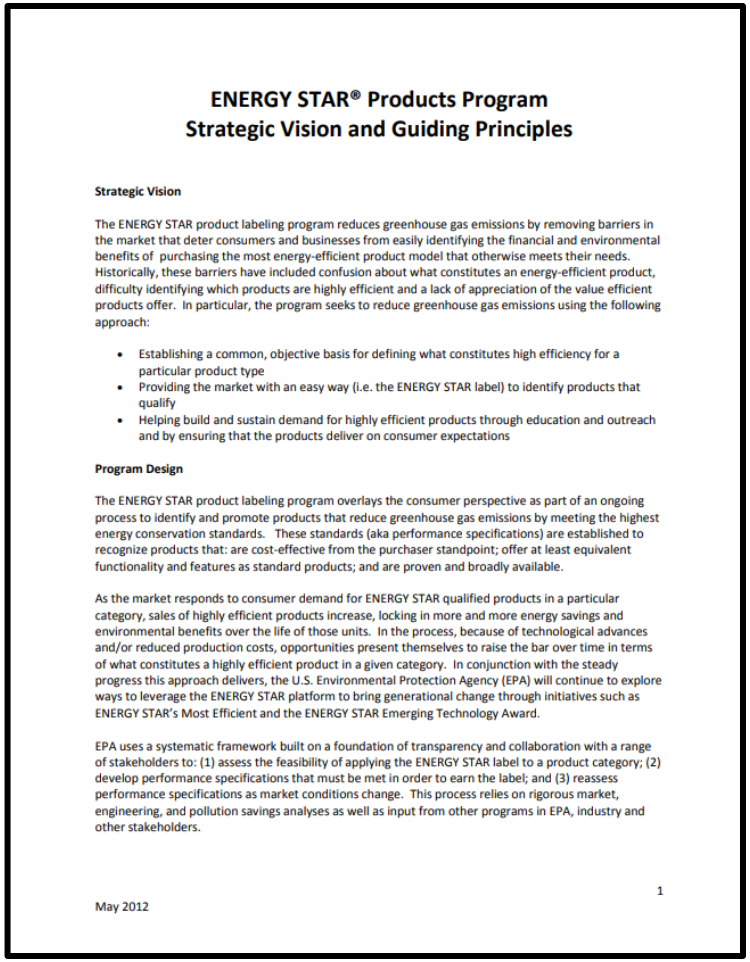
Time	Topic
1:00–1:10	**Background**
1:10–2:00	Version 7.0 Draft 1 Specification - Definitions - Scope - Data & Analysis - Efficiency Levels - Connected Criteria
2:00–2:15	Savings & Payback
2:15–2:30	Timeline and Open Discussion

Webinar Goals

- Refresh stakeholders on ENERGY STAR principles and specification development process
- Engage with stakeholders on proposals shared in the Draft 1 Specification
- Present estimated energy savings from Draft 1 proposals
- Share expected next steps and schedule

ENERGY STAR Guiding Principles

- ENERGY STAR criteria are designed to balance a varied set of objectives, including:
  - Energy and/or water savings
  - Product performance maintained or enhanced
  - Purchasers can recover investment in increased efficiency within a reasonable time period
  - Efficiency is achieved through one or more technologies that is/are accessible to more than one manufacturer
  - Energy/water consumption can be measured and verified with testing
  - Label provides meaningful differentiation
- For more information see ENERGY STAR Products Program Strategic Vision and Guiding Principles



ENERGY STAR® Products Program
Strategic Vision and Guiding Principles

Strategic Vision

The ENERGY STAR product labeling program reduces greenhouse gas emissions by removing barriers in the market that deter consumers and businesses from easily identifying the financial and environmental benefits of purchasing the most energy-efficient product model that otherwise meets their needs. Historically, these barriers have included confusion about what constitutes an energy-efficient product, difficulty identifying which products are highly efficient and a lack of appreciation of the value efficient products offer. In particular, the program seeks to reduce greenhouse gas emissions using the following approach:

- Establishing a common, objective basis for defining what constitutes high efficiency for a particular product type
- Providing the market with an easy way (i.e. the ENERGY STAR label) to identify products that qualify
- Helping build and sustain demand for highly efficient products through education and outreach and by ensuring that the products deliver on consumer expectations

Program Design

The ENERGY STAR product labeling program overlays the consumer perspective as part of an ongoing process to identify and promote products that reduce greenhouse gas emissions by meeting the highest energy conservation standards. These standards (aka performance specifications) are established to recognize products that: are cost-effective from the purchaser standpoint; offer at least equivalent functionality and features as standard products; and are proven and broadly available.

As the market responds to consumer demand for ENERGY STAR qualified products in a particular category, sales of highly efficient products increase, locking in more and more energy savings and environmental benefits over the life of those units. In the process, because of technological advances and/or reduced production costs, opportunities present themselves to raise the bar over time in terms of what constitutes a highly efficient product in a given category. In conjunction with the steady progress this approach delivers, the U.S. Environmental Protection Agency (EPA) will continue to explore ways to leverage the ENERGY STAR platform to bring generational change through initiatives such as ENERGY STAR's Most Efficient and the ENERGY STAR Emerging Technology Award.

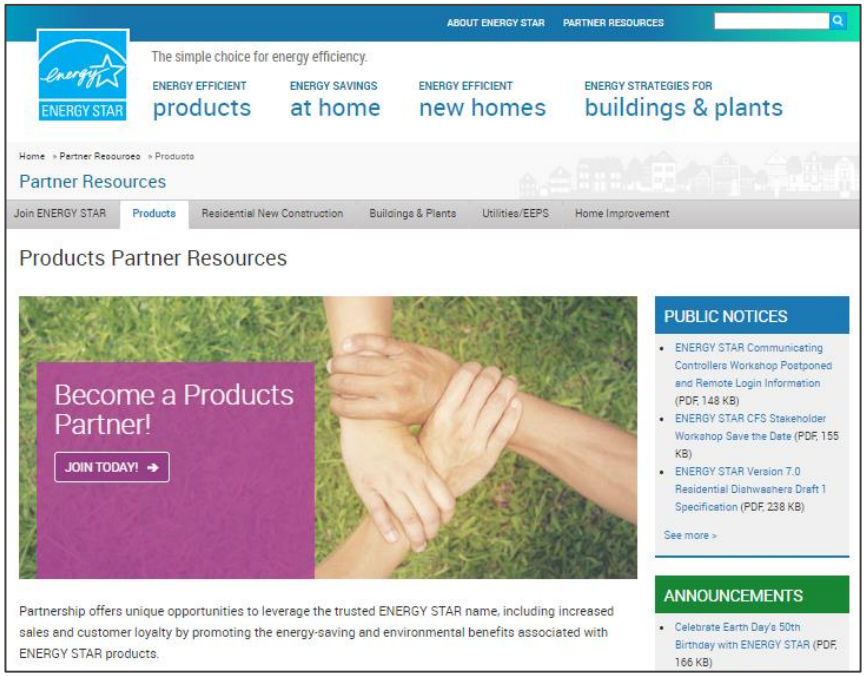
EPA uses a systematic framework built on a foundation of transparency and collaboration with a range of stakeholders to: (1) assess the feasibility of applying the ENERGY STAR label to a product category; (2) develop performance specifications that must be met in order to earn the label; and (3) reassess performance specifications as market conditions change. This process relies on rigorous market, engineering, and pollution savings analyses as well as input from other programs in EPA, industry and other stakeholders.

1

May 2012

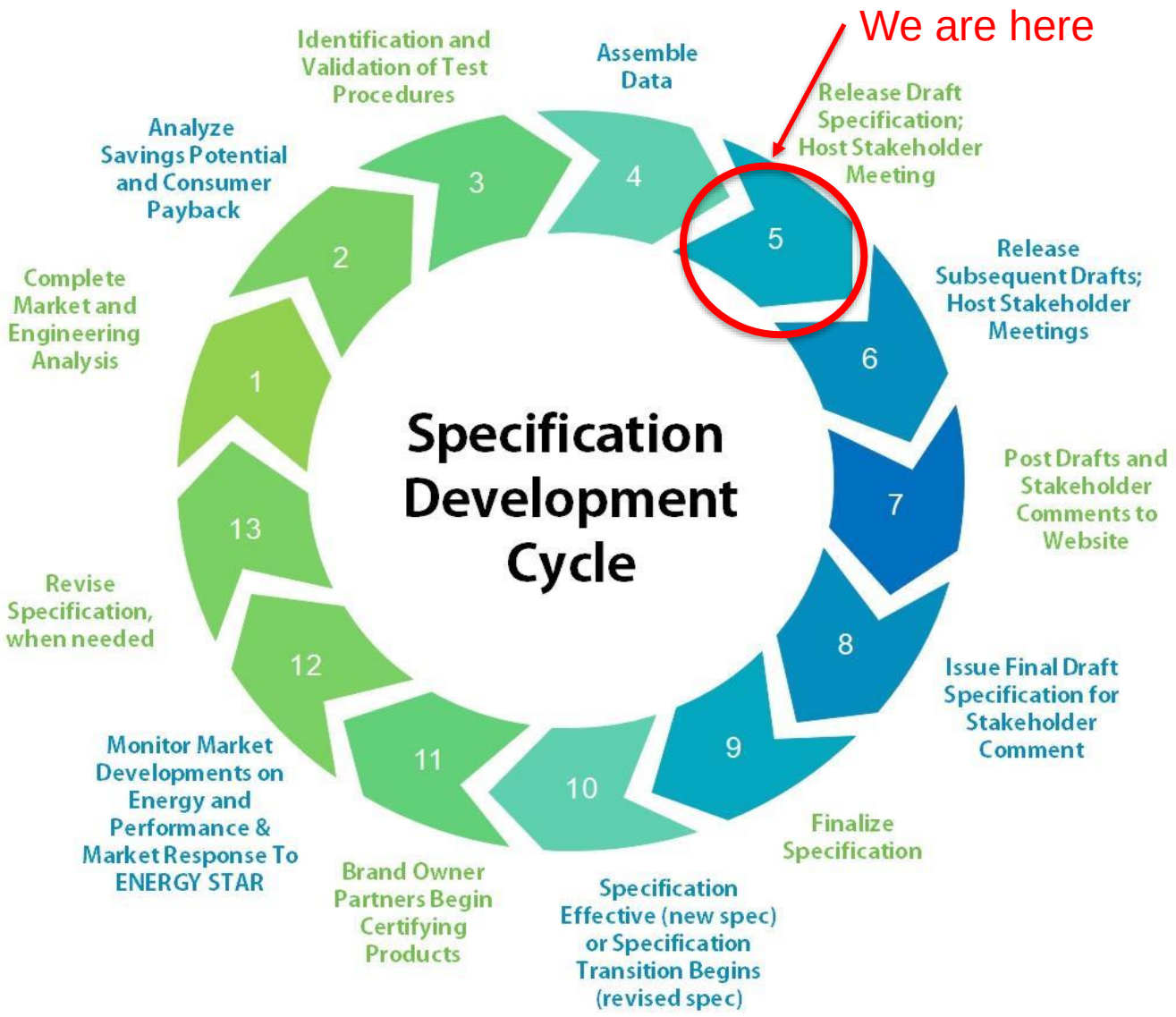
Specification Development

- ENERGY STAR follows EPA's Standard Operating Procedure through the specification development or revisions process, balancing:
  - The need to keep pace with evolution among leading products and continue to effectively differentiate for consumers
  - Production cycles, other factors important to the industry



https://www.energystar.gov/partner_resources/products_partner_resources

- Key elements of the stakeholder process:
  - Consistency, transparency, inclusiveness, responsiveness, and clarity
  - Stakeholder engagement is a vital aspect to the success of the ENERGY STAR program


We are here
Specification Development Cycle
1
Complete Market and Engineering Analysis
2
Analyze Savings Potential and Consumer Payback
3
Identification and Validation of Test Procedures
4
Assemble Data
5
Release Draft Specification; Host Stakeholder Meeting
6
Release Subsequent Drafts; Host Stakeholder Meetings
7
Post Drafts and Stakeholder Comments to Website
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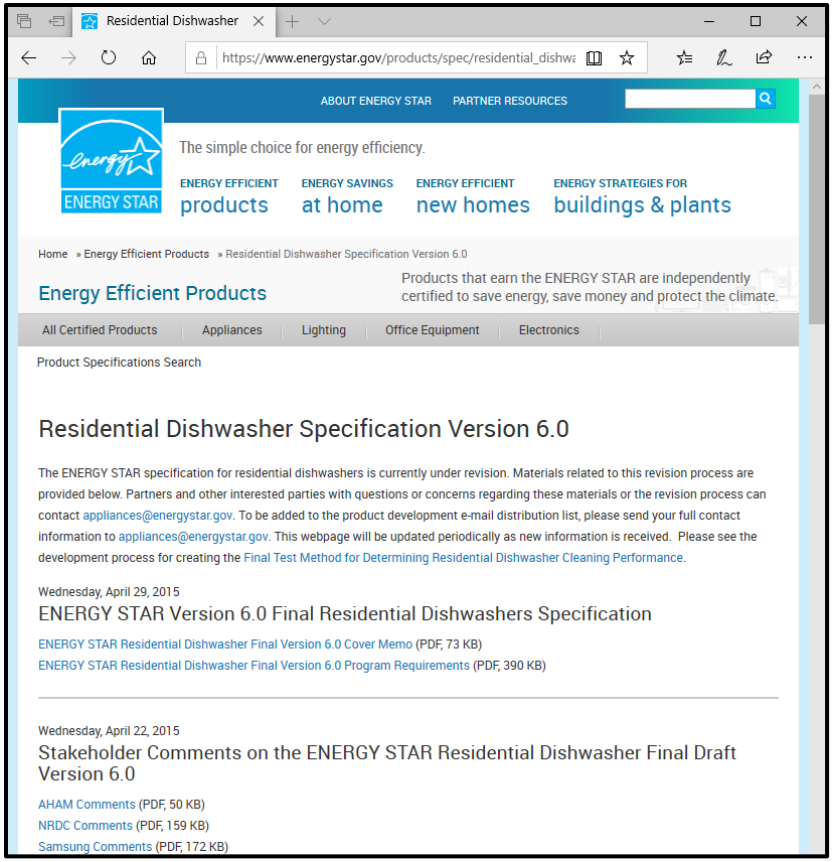
Issue Final Draft Specification for Stakeholder Comment
9
Finalize Specification
10
Specification Effective (new spec) or Specification Transition Begins (revised spec)
11
Brand Owner Partners Begin Certifying Products
12
Monitor Market Developments on Energy and Performance & Market Response To ENERGY STAR
13
Revise Specification, when needed

ENERGY STAR Residential Dishwashers History

- EPA finalized the Version 6.0 Residential Dishwasher specification in 2015 and went into effect on January 29, 2016.
  - Currently, there are 38 manufacturers participating, representing 62 brands, and covering 308 total base models.
- EPA released ENERGY STAR Most Efficient criteria with a minimum cleaning performance floor on October 3, 2014.



Version 7.0 Specification Background and Drivers

- EPA released a Version 7.0 Draft 1 Specification on March 11.

- Drivers for V7.0 Revision
  - Specifications are reviewed every 3 years.
  - According to shipment numbers in 2018, ENERGY STAR market penetration was ~90%.
  - Partners are requesting higher thresholds for ENERGY STAR certification to provide meaningful differentiation.

Version 7.0 Draft 1 Specification

Time	Topic
1:00–1:10	Background
1:10–2:00	**Version 7.0 Draft 1 Specification** - **Definitions** - **Scope** - **Soil-Sensors** - **Data & Analysis** - **Efficiency Levels** - **Connected Criteria**
2:00–2:15	Savings & Payback
2:15–2:30	Timeline and Open Discussion

Definitions

- Added Definitions – all associated with the optional connected criteria
  - *Consumer Override*
  - *Delay Appliance Load (DAL) Capability*
  - *Communications Link*
  - *Demand Response (DR)*
  - *Open Standards*
  - *Temporary Appliance Load Reduction (TALR) Capability*

- Removed Definitions – not referenced anywhere else in the specification
  - *Portable Dishwasher*

Scope

- Amended scope will include minimum per-cycle Cleaning Index score of 70 for heavy, medium, and light soil load cycles
  - Partner shall submit testing documentation at the time of certification and the cleaning performance will not be subject to verification testing

2) Scope

A. Included Products: Products that meet the definition of a dishwasher, demonstrate a minimum per-cycle Cleaning Index score of 70[4], and are a consumer product as specified herein are eligible for ENERGY STAR certification, with the exception of products listed in Section 2.B.

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[4] Using the ENERGY STAR Test Method for Determining Residential Dishwasher Cleaning Performance (Rev. Feb – 2014) for purposes of determining product eligibility.

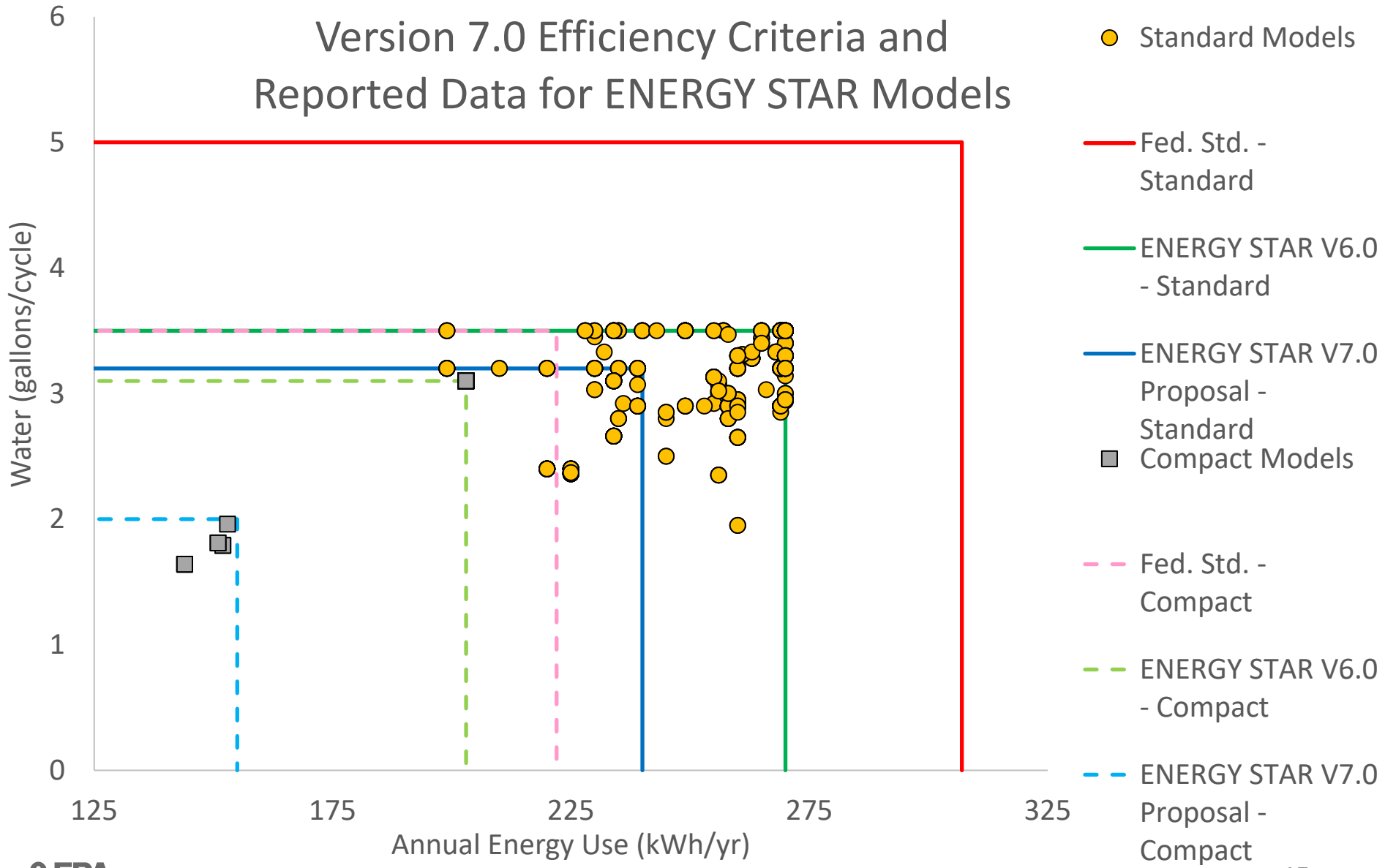
Soil-Sensors

EPA received a suggestion to only label dishwashers with a soil sensor ensure at least a minimum cleaning functionality. EPA seeks data or comments regarding the following topics:

- Data that show dishwashers with soil-sensor systems achieve cleaning index score of 70.
- Data that demonstrate the relationship between having a soil-sensor system and the product's energy and water consumption under testing of a variety of soil-levels.
- Capabilities or components of soil-sensor systems that ensure minimum cleaning performance and achieve greater water and energy efficiency.

EPA requests any data submitted by stakeholders include the model numbers, the name of the cleaning performance test used (a preference being for the ENERGY STAR cleaning performance test), and description of the soil sensor system. EPA will only share information from this data that is de-identified and aggregated.

Version 7.0 Efficiency Criteria and Reported Data for ENERGY STAR Models



Efficiency Metric

- In setting the efficiency criteria, EPA evaluated levels that reflect a meaningful increase from the federal standards using measured data from models on the ENERGY STAR QPL

ENERGY STAR Version 7.0 Draft 1 Efficiency Requirements

Key Product Criteria				
Level	Standard		Compact	
	Annual Energy Use (kWh/yr)	Water Use (gallons/cycle)	Annual Energy Use (kWh/yr)	Water Use (gallons/cycle)
Federal Standard	307	5.0	222	3.5
ENERGY STAR Version 7.0 Draft 1	240	3.2	155	2.0
% Better Than Federal Standard	*22%*	*36%*	*30%*	*43%*

Product Availability

Product Availability and Percentage of Total Using Reported Values

	Base Model Count of the Rated Values at each Level	
	Total Models	ENERGY STAR V7.0
Standard-Size	331	51
Pass Rate	*100%*	*15%*
Count of Brands	*50*	*27*

Product Availability and Percentage of Total Using Measured Values with a 5% Engineering Factor

	Base Model Count of Measured Values with a 5% Engineering Factor at each Level	
	Total Models	ENERGY STAR V7.0
Standard-Size	331	98
Pass Rate	100%	28%
Count of Brands	50	36

Optional Connected Criteria

- Optional connected criteria were introduced in the Version 6.0 specification
  - Currently, ~1% of ENERGY STAR certified residential dishwasher models are connected
- Updating optional connected criteria section to add clarity and consistency with more recent revisions to other appliance specifications
- EPA seeks feedback on any new developments on common protocols and configurations for control and data sharing, and data security standards
- Connected Allowance not revisited for residential dishwashers at this time
- Developing ENERGY STAR test method to validate the demand response capabilities of residential dishwashers
  - Manufacturers encouraged to submit products to DOE for test method development. Please contact Bryan Berringer for more information.

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Residential Consumer Savings: Energy & Water Use

Proposed Version 7.0 Criteria

	Annual Savings			Lifetime Savings		
	Electricity (kWh/yr)	Gas (therms/yr)	Water (gallons)	Electricity (kWh)	Gas (MMBtu)	Water (gallons)
Standard	67	0.28	387	804	3.37	4,644
Compact	67	0.26	323	804	3.13	3,870

Assumptions: (1) The baseline used to calculate savings was the DOE Standard (2) Elec. Emissions Factor = 1.559 lbs CO2E/kWh, (3) $0.1299/kWh, (4) Gas Emissions Factor = 116.98 lbs CO2/MMBtu, (5) $1.0793 $/Therm, (6) $0.01054 $/gal, (7) a lifetime of 12 years for dishwashers was used, per Appliance Magazine, Portrait of the U.S. Appliance Industry 1998.

Residential Consumer Savings: Dollars & Payback
Proposed Version 7.0 Criteria

Annual Savings (Lifetime Savings)				Cost	
Electricity	**Gas**	**Water**	**Total**	**Price Premium**	**Pay Back Period**
$8.70 ($104.44)	$3.03 ($36.32)	$4.08 ($48.95)	$15.81 ($189.71)	$47.74	3.7
Assumptions: Prices of $0.1299 per kWh; $1.0793 per therm; $0.01054 per gallon were applied to estimate consumers' cost savings.					

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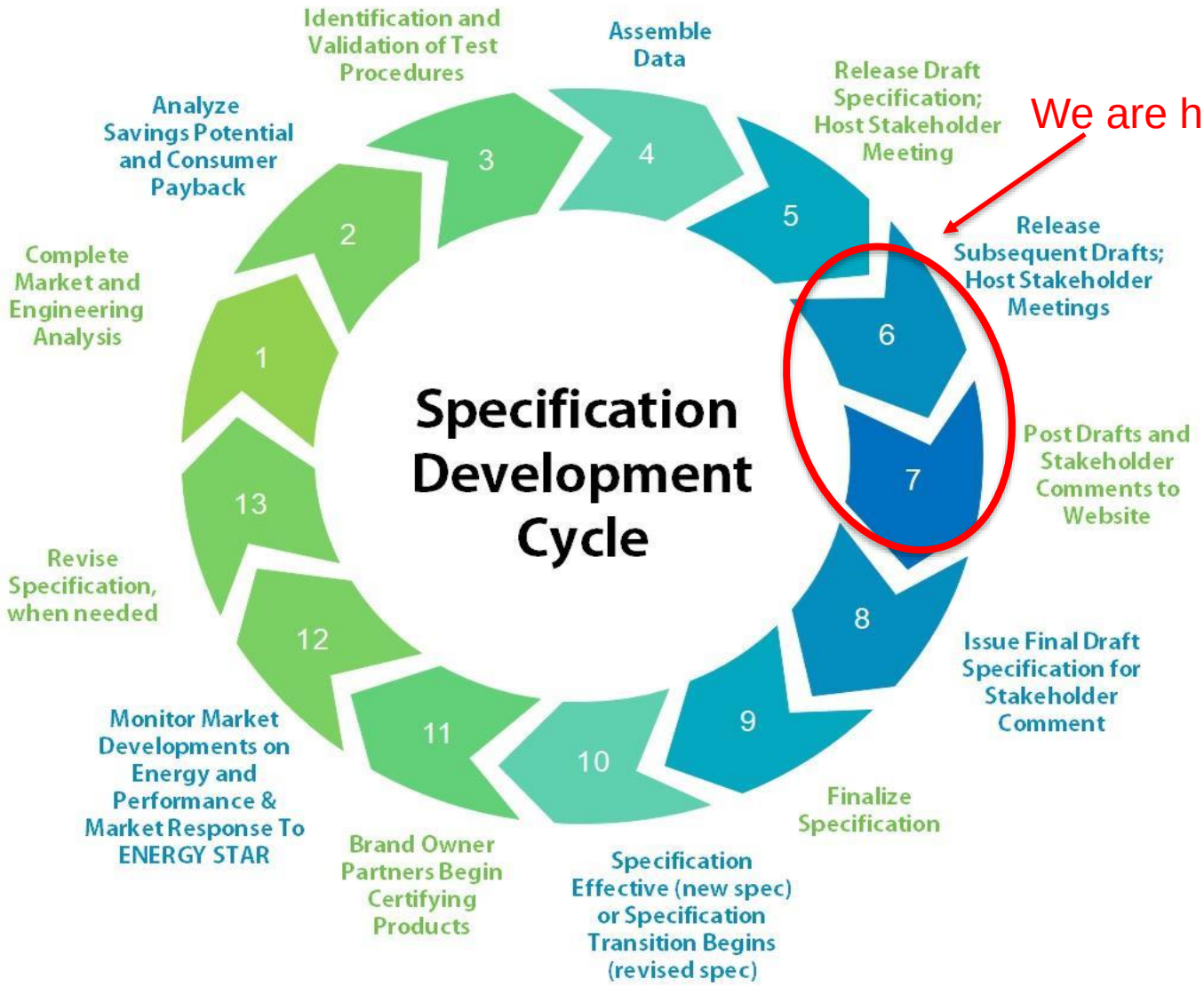
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Next Steps

Event	Date
Version 7.0 Draft 1 Specification	*March 10, 2020*
Version 2.0 Draft 1 Webinar	**March 26, 2020**
Draft 1 Comments Due*	**May 11, 2020**
Release Subsequent Drafts of Specification	**Summer 2020**
Publish Final Version 7.0 Specification	**Q3 2020**
Version 7.0 Specification Effective Date	**Q2 2021**

*Comment due date has been extended for all stakeholders from April 7, 2020 to May 11, 2020 following a request for extension. The expected timeline for specification publication and effective date has been adjusted accordingly.

Webinar Wrap-up and Comment Deadline

- EPA and DOE appreciate the opportunity to discuss Draft 1.
- Comments are due on **May 11, 2020.**
- Please send all comments to:

appliances@energystar.gov

- Unless marked as confidential, all comments will be posted to the Residential Dishwasher product development page at https://www.energystar.gov/products/spec/residential_dishwasher_specification_version_7_0_pd

Open Discussion

Key Contacts

Specification Development

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- Steve Leybourn, ICF
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Test Method

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- Mansi Thakkar, Guidehouse, f/k/a Navigant
  Mansi.Thakkar@guidehouse.com
- Judy Reich, Navigant Guidehouse, f/k/a Navigant
  jreich@guidehouse.com

Appendix

Test Setup

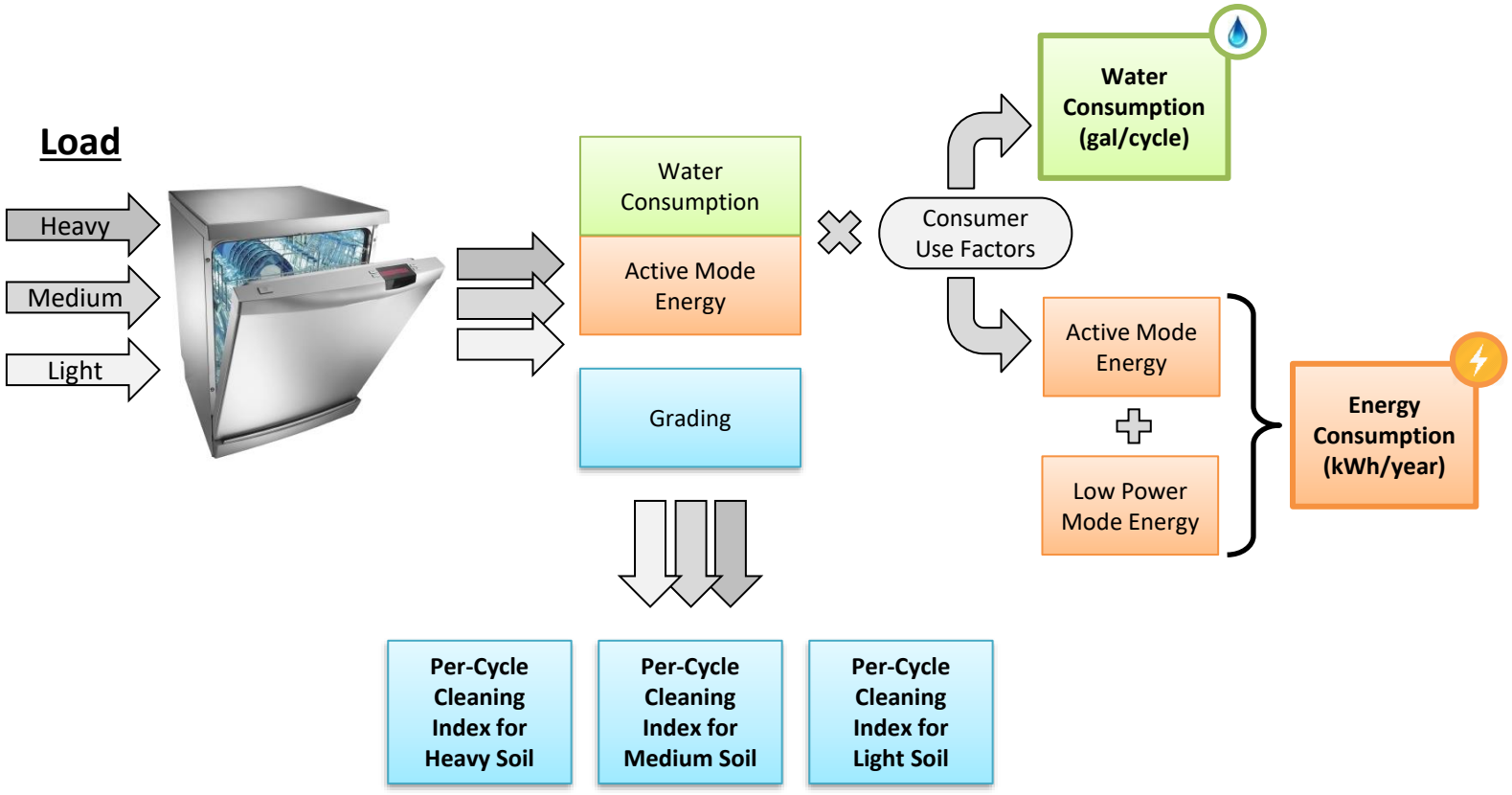
- Setup requirements as specified in 10 CFR 430, Subpart B, Appendix C1.
- Water hardness as specified in section 4.8.3 of ANSI/AHAM DW-1-2010.
  - Between 0 and 85 parts per million (ppm) of calcium carbonate.
- Lighting setup as specified in section 5.10 of ANSI/AHAM DW-1-2010.
  - Room with diffused lighting.
  - Lamp with a color temperature of 3500 – 4500 Kelvin.
  - Lamp should be installed over grading area to avoid direct glare.
  - Illuminance measured at relevant plane shall be 1000 – 1500 lux.

Cleaning Performance Test for Soil Sensing Normal Cycle

Appendix C1

Test Cycle Settings:

- "Normal" Cycle
- Three Test Loads
  - Heavy Soil
  - Medium Soil
  - Light Soil



Cleaning Performance Test for Non-Soil Sensing Normal Cycle

Appendix C1

Test Cycle Settings:
- "Normal" Cycle
- Clean Test Load

Load

Clean

Water Consumption (gal/cycle)

Active Mode Energy

+

Low Power Mode Energy

Energy Consumption (kWh/year)

Cleanability

Test Cycle Settings:
- "Normal" Cycle
- Three Test Loads
  - Heavy Soil
  - Medium Soil
  - Light Soil

Load

Heavy

Medium

Light

Grading

Per-Cycle Cleaning Index for Heavy Soil

Per-Cycle Cleaning Index for Medium Soil

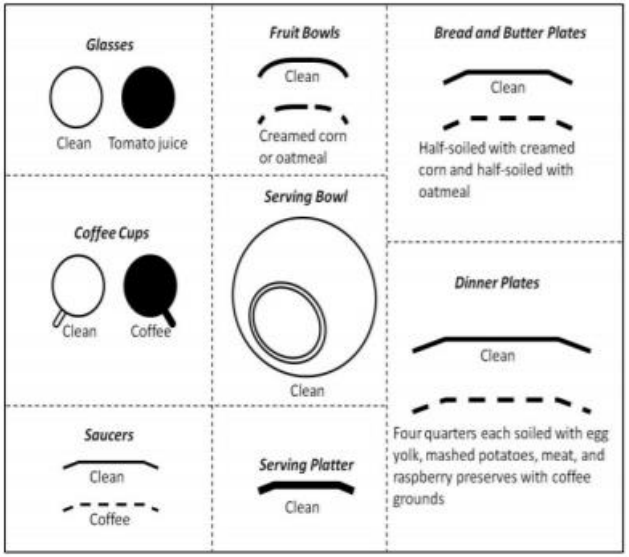
Per-Cycle Cleaning Index for Light Soil

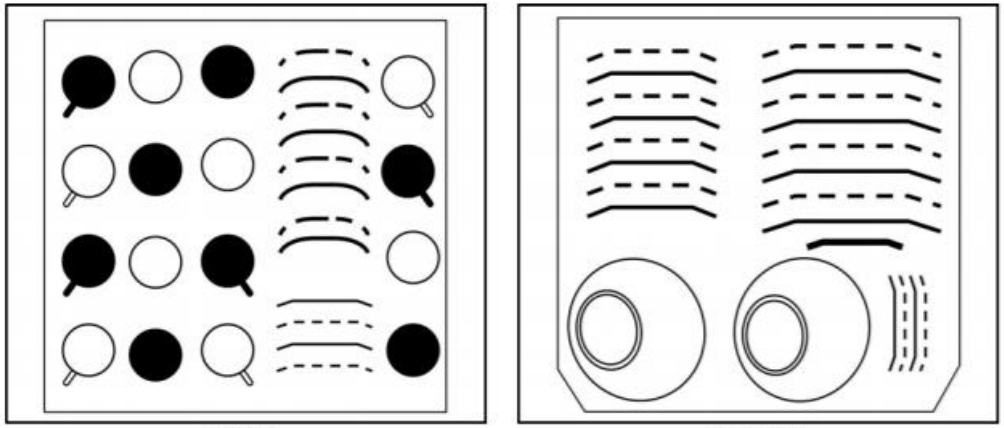
Loading Requirements

- Loading requirements as specified in 10 CFR 430, Subpart B, Appendix C1.

- Additional requirements:
  - Each item of test load shall alternate clean and soiled items.
  - Similar items shall be loaded in consecutive racks.
  - Empty rack spaces between different items are acceptable if:
    - Capacity of test unit is greater than the number of place settings required by the test method.
    - Loading guidance in the use and care manual specifies empty spaces while loading.
  - Clean items shall be loaded first.

Illustrative Example of Loading at Sensor Heavy Load for a Standard Dishwasher





Grading and Calculation of Cleaning Index

- For each test cycle, each item is graded on a scale from 0 to 9 as specified in section 5.10 of ANSI/AHAM DW-1-2010.

- The per-cycle cleaning index is calculated as follows:

$$CI_i = 100 - \frac{(12.5 \times N_{1,i} + 25 \times N_{2,3,i} + 50 \times N_{4,5,6,i} + 75 \times N_{7,8,i} + 100 \times N_{9,i})}{N}$$

Where:

- *N is the total number of items in the test load*
- *$N_{1,i}$ is the total number of items in the test load with a grade of 1*
- *$N_{2,3,i}$ is the total number of items in the test load with a grade of 2 and/or 3*
- *$N_{4,5,6,i}$ is the total number of items in the test load with a grade of 4, 5, and/or 6*
- *$N_{7,8,i}$ is the total number of items in the test load with a grade of 7 and/or 8*
- *$N_{9,i}$ is the total number of items in the test load with a grade of 9*
- *i is the test cycle type (heavy, h; medium, m; or light, l)*