

DOCUMENT RESUME

ED 025 898

EF 001 888

Food Service Refrigerators and Food Service Storage Freezers. Standard No. 7, Revised April 1966.

National Sanitation Foundation, Ann Arbor, Mich.

Pub Date Apr 66

Note-44p.

Available from-National Sanitation Foundation, Ann Arbor, Michigan

EDRS Price MF-\$0.25 HC-\$2.30

Descriptors-Design, \*Equipment Standards, \*Food Service, Food Standards, \*Public Health, \*Refrigeration, \*Sanitation

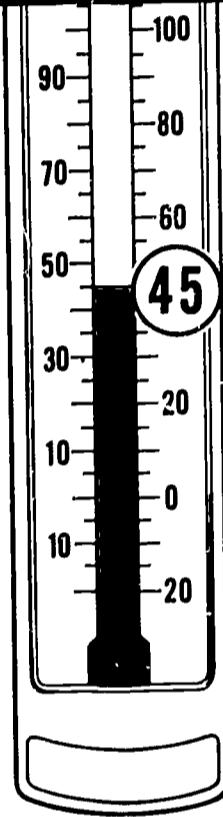
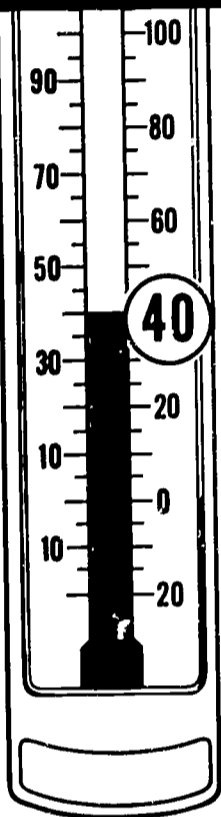
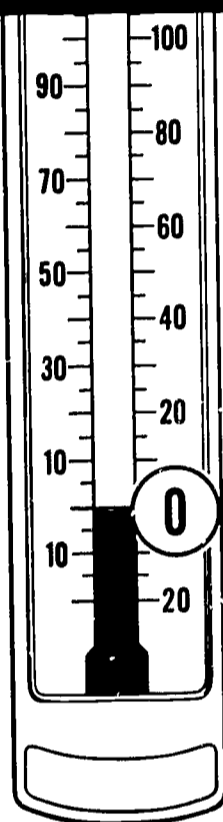
This standard covers the sanitation and performance requirements for new food service refrigerators and food service storage freezers of the type generally used in the food service industry. It covers cabinets operating in the freezers, above or below freezing temperature, designed for the storage or display of varieties of food products. Topics covered include reach-in refrigerators and reach-in frozen food cabinets, walk-in refrigerators and walk-in cabinets and open and closed refrigerators. This publication also includes a section on recommended installation procedures and practices. (RH)

ED0 25 898



NATIONAL SANITATION FOUNDATION

# STANDARDS



## FOOD SERVICE REFRIGERATORS and STORAGE FREEZERS

Standard Number

**7**

PREPARED BY THE JOINT COMMITTEE ON FOOD-EQUIPMENT STANDARDS



SEAL OF APPROVAL

To identify equipment that has met  
NSF Basic Criteria C-2  
Special Equipment and/or Devices  
(Colors: blue, gray and white.)

**NATIONAL SANITATION FOUNDATION**

**STANDARD No. 7**

Relating to

**FOOD SERVICE REFRIGERATORS  
AND  
FOOD SERVICE STORAGE FREEZERS**

As Revised by  
**NATIONAL SANITATION FOUNDATION**  
The Joint Committee on Food Equipment Standards  
April 1966

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE  
OFFICE OF EDUCATION

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*and published by the*  
**NATIONAL SANITATION FOUNDATION**  
ANN ARBOR, MICHIGAN

This is one of a series of nationally uniform sanitation standards and criteria established by the National Sanitation Foundation.

**Current Standards and Criteria include:**

- No. 1 Soda Fountain and Luncheonette Equipment
- No. 2 Food Service Equipment
- No. 3 Spray-Type Dishwashing Machines
- No. 4 Commercial Cooking and Warming Equipment
- No. 5 Commercial Hot Water Generating Equipment
- No. 6 Dispensing Freezers
- No. 7 Commercial Refrigerators and Storage Freezers
- No. 8 Commercial Powered Food Preparation Equipment
- No. 9 Diatomite Type Filters for Swimming Pool Equipment
- No. 10 Sand Type Filters for Swimming Pool Equipment
- No. 11 Recessed Automatic Surface Skimmers
- No. 12 Automatic Ice Making Equipment
- No. 14 Thermoplastic Materials, Pipe, Fittings, Valves, Traps and Joining Materials
- No. 15 Thermoset Plastic Pipe, Fittings, Valves, Tanks, Appurtenances, Joining Materials, and Thermoset Plastic Coatings for Use in Potable Water Supply Systems
- No. 16 Film Badge Services
- No. 17 Centrifugal Pumps for Swimming Pools
- No. 18 Manual Food and Beverage Dispensing
- No. 19 Chemical Feeders for Swimming Pools
- No. 20 Bulk Milk Dispensers
- C-1 Vending Machines
- C-2 The Evaluation of Special Equipment and/or Devices
- C-4 Re-inforced Plastic Tanks
- C-5 Special Criteria for Cartridge Type Drinking Water Filters
- C-6 Basic Criteria for the Construction of Continuous Cloth Towel Dispensers
- C-7 Plastic Lined Asbestos-Cement Pipe and Coupling for Sewers
- C-8 Pitless Well Adapters

## **The National Sanitation Foundation**

### **PURPOSE AND ORGANIZATION**

IN 1944, A SMALL GROUP of industrial and public health leaders were discussing mutual problems involving sanitation. They realized that more solutions to modern sanitation problems affecting industry and the public health could be developed through mutual understanding and cooperative action than through ordinances, inspections and law enforcement alone.

It occurred to them that great strides could result from the creation of an independent but authoritative liaison organization which would be a clearing house through which business and industry and health authorities could work together for the solution of their common problems and for the common good.

They foresaw that, through such an organization, they could jointly seek new facts in sanitary science to bring it up to date with technological advances of industry and with modern problems of the health officer in the field.

They could sponsor educational programs and sanitation services which would win everyone's cooperation in a nation-wide program designed to promote superior sanitation in modern products and services, and in the daily lives of the people.

Thus was born the National Sanitation Foundation. The Foundation is a non-profit, non-commercial organization seeking solutions to all problems involving cleanliness. It is dedicated to the prevention of illness, the promotion of health and the enrichment of the quality of American living through the improvement of the physical, biological and social environment in which we live today.

Distinguished representatives of the public health profession, of business and industry, and of the public serve on its Board of Trustees, Council of Public Health Consultants, Industrial Advisory Board and various committees.

The National Sanitation Foundation is endorsed by health agencies, both official and voluntary. More than 350 industrial and business firms have contributed nearly three quarters of a million dollars to its support. The Foundation is now in its twenty-third year of operation.

## **SUGGESTIONS CONCERNING REGULATIONS GOVERNING THE SANITATION OF FOOD SERVICE REFRIGERATORS AND FOOD SERVICE STORAGE FREEZERS**

It is strongly recommended that these Standards representing a cross section of opinion of workers in the field of environmental health be accepted and followed by enforcement officials. However, their incorporation in detail into local sanitary codes does not appear to be necessary and is likely to be cumbersome.

In municipalities, counties, and health districts in which the adoption of legislation by reference is considered legal, the following regulation should serve to implement the use of the Standard for Food Service Refrigerators and Food Service Storage Freezers.

**ALL FOOD SERVICE REFRIGERATORS AND FOOD SERVICE STORAGE FREEZERS INSTALLED ON OR AFTER \_\_\_\_\_ IN FOOD SERVICE ESTABLISHMENTS IN THIS JURISDICTION SHALL MEET THE NATIONAL SANITATION FOUNDATION STANDARDS FOR SUCH EQUIPMENT.**

or, if considered desirable, it will be simpler to adopt the following more general regulation applying to all standards in the food service field:

**ALL EQUIPMENT INSTALLED ON OR AFTER \_\_\_\_\_ FOR USE IN THE PREPARATION OF FOOD IN FOOD SERVICE ESTABLISHMENTS IN THIS JURISDICTION SHALL MEET NATIONAL SANITATION FOUNDATION STANDARDS.**

In fact, the adoption of this broad regulation will save time as well as advertising and printing costs as, no doubt, many different standards will be adopted. Otherwise, each standard will require the adoption of a specific regulation.

Wherever the legality of adopting legislation by reference is not recognized, delete the portion of either of the above regulations after the word "SHALL" and substitute therefore the words "BE OF A TYPE APPROVED BY THE HEALTH OFFICER." The health officer may be guided by the National Sanitation Foundation Standards in his approval of types.

## PREFACE

This Standard, covering COMMERCIAL REFRIGERATORS AND STORAGE FREEZERS, is the seventh of a series of N.S.F. Standards. These Standards are issued in recognition of the long-felt need for a common understanding of the problems of sanitation involving industry and administrative health officials whose obligation it is to enforce regulations.

Sanitation in the United States, or in any country, can be as good or as bad as:

1. The people who work at it; i.e., sanitation personnel
2. The joint effort of public health, industry, and business
3. The education, or the understanding, of the public

It is a mistake to think of any one of the three factors as more or less important than the other—as much a mistake as saying that ignition is more or less important than carburetion in the operation of an engine. How the three factors are developed and coordinated will determine the success or failure of national, state, and local efforts to improve sanitation.

The National Sanitation Foundation offers the key to securing the much needed uniformity in the field of sanitation. The aim also is to improve environmental health as well as sanitation.

This Standard has gone through many drafts during the years of its preparation. It is the result of considerable study on the part of health men, consultations with technical representatives of industry, and field investigations of the National Sanitation Foundation's staff.

The improvement of environmental health and sanitation and the establishment of uniform requirements have been the primary aim in the preparation of this material. It is recognized that continued scientific progress will require changes in Standards over long periods.

The adoption of these Standards offers health officials an opportunity to present a united front in securing the basic equipment to make safe and clean food service possible as demanded by the general public. It gives users of such equipment the assurance of



meeting health standards and passing inspection. Also, this gives manufacturers the advantage of applying uniform construction methods with confidence that equipment conscientiously built to meet these Standards will be generally acceptable.

Finally, as an aid to all concerned in recognizing approved equipment, the National Sanitation Foundation has established a policy under which the use of its insignia, nSf, will be authorized on equipment of types that meet the standards herein established for Commercial Refrigerators and Storage Freezers.

Permission to use the National Sanitation Foundation Seal of Approval will be granted only after an investigation of the applicant's manufacturing methods and, where deemed necessary, tests of equipment shows compliance with the Standard. Continuance of the agreement is dependent upon continued evidence of compliance with the Standard upon periodic re-examination of equipment in factory and field.

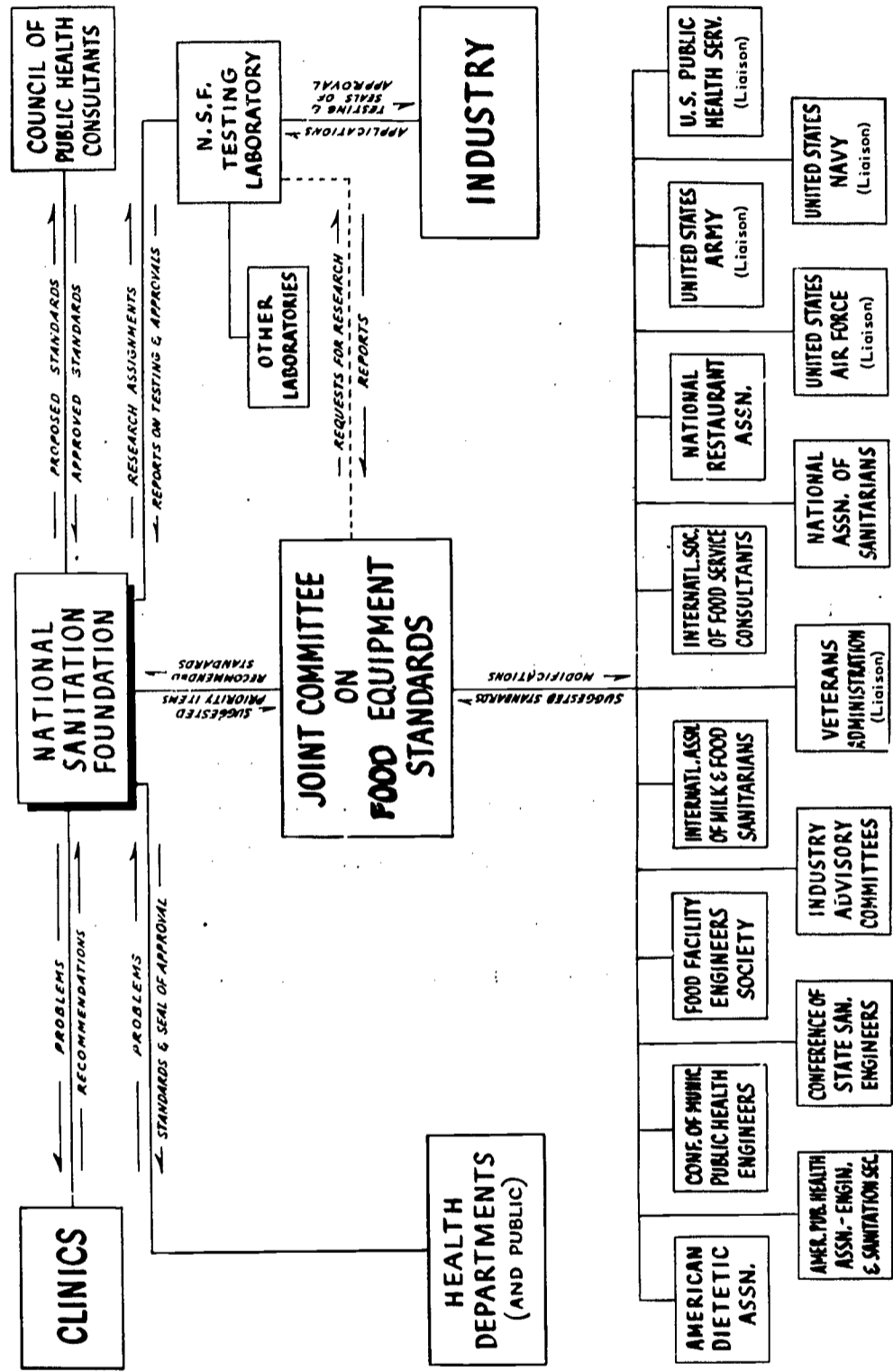
Our sincere appreciation is extended to all members of the committee herein listed who so willingly devoted their time to the development of this and other Standards. Special credit and thanks are due the members of the Special Public Health Sanitation Committee and of the Joint Committee on Food Equipment Standards for the long hours spent in review, discussion and correspondence as well as to the Industry Advisory Committee for its untiring efforts through the years in which this work has been in progress.

Henry F. Vaughan, Dr. P. H., President  
The National Sanitation Foundation

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**ORGANIZATION CHART  
NATIONAL SANITATION FOUNDATION PROGRAM  
FOR STANDARDIZING, TESTING AND APPROVING EQUIPMENT**



## COMMITTEES PARTICIPATING IN THE PREPARATION OF THIS STANDARD

### NATIONAL SANITATION FOUNDATION JOINT COMMITTEE ON FOOD EQUIPMENT STANDARDS\*

- Chairman: C. L. Senn, Health Department, Los Angeles, California  
W. C. Miller, Jr., Washington, D. C., liaison representative of the  
U. S. Public Health Service
- K. K. Jones, State Board of Health, Indianapolis, Indiana, Chairman  
of the Food Equipment Committee of the International Association  
of Milk and Food Sanitarians
- W. F. Bower, Oregon State Board of Health, Portland, Oregon, repre-  
senting the National Association of Sanitarians
- R. M. Brown, State Department of Health, Baltimore, Maryland  
Chairman, Committee on Milk and Food Sanitation, Conference  
of State Sanitary Engineers
- M. S. Hilbert, Health Department of Wayne County, Michigan,  
Chairman Committee on National Sanitation Foundation Equip-  
ment Standards of the Conference of Municipal Public Health  
Engineers
- R. B. Watts, Ohio State Department of Health, Columbus, Ohio rep-  
resenting Engineering Section, American Public Health Ass-  
ociation
- V. E. Cordell, Chicago, Illinois, representing the National Restaurant  
Association
- Colonel C. W. Bryan, USAF (MSC) Washington 25, D. C., liaison  
representative of the Department of the Air Force
- CDR H. W. LeBleu, MSC, USN, Washington, D. C., liaison representa-  
tive of the Department of the Navy
- Lt. Col. R. G. McCall, MSC (Army) Washington, D. C., liaison repre-  
sentative of the Department of the Army
- Lt. CDR R. T. Goerner, Jr., Washington, D. C., liaison representative  
of the Department of the Navy
- Lt. Col. V Harry Adrounie, USAF, MSC, Washington, D. C., liaison  
representative of the United States Air Force Medical Service
- Secretary: C. A. Farish, National Sanitation Foundation Testing  
Laboratory, Ann Arbor, Michigan

\* Individuals indicated as representing organizations or agencies are appointed by their respective groups and generally are supported by a committee or task group from within their organization or agency.

### **SPECIAL PUBLIC HEALTH COMMITTEE**

Chairman: M. S. Hilbert, Wayne County Dept. of Health, Eloise,  
Michigan  
M. B. Crabill, Omaha-Douglas County Health Dept., Omaha, Neb-  
raska  
E. Ludewig, New York City Dept. of Health, New York, New York  
A. F. Parrish, State Dept. of Public Health, Atlanta, Georgia  
R. L. Tarbett, State Dept. of Public Health, Berkeley, California  
T. E. Sullivan, State of Indiana Board of Health, Indianapolis, Indiana  
J. W. Smith, State Department of Health, Richmond, Virginia

### **INDUSTRY ADVISORY COMMITTEE**

H. Traulsen (Chairman)	Traulsen & Co., Inc. Flushing, New York
W. Whalen	Foster Refrigeration Corp. Hudson, New York
J. P. Heilweil	Glenco Refrigeration Corp. Philadelphia, Pennsylvania
E. N. Northey, Jr.	Herrick Refrigerator Co. Waterloo, Iowa
H. Ruslander	Jewett Refrigeration, Inc. Buffalo, New York
W. T. McCall	McCall Refrigerator Corp. Hudson, New York
M. Silver	Silver Refrigeration Mfg. Corp. Brooklyn, New York
A. Raymond	Victory Metals Mfg. Corp. Plymouth Meeting, Pa.
R. H. Koppin	Chrysler & Koppin Company Detroit, Michigan
J. H. Elliott	Elliott-Williams Co., Inc. Indianapolis, Indiana

**National Sanitation Foundation  
COUNCIL OF PUBLIC HEALTH CONSULTANTS**

Chairman: M. D. Hollis, Assistant Surgeon-General, U. S. Public Health Service, Washington, D. C.

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R. Eliassen, Massachusetts Institute of Technology, Cambridge, Mass.  
A. H. Fletcher, State Department of Health, Trenton, New Jersey  
H. H. Hasson, W. K. Kellogg Foundation, Battle Creek, Michigan  
H. G. Hanson, U. S. Public Health Service, Cincinnati, Ohio  
M. S. Hilbert, Wayne County Health Department, Eloise, Michigan  
C. W. Klassen, State Department of Public Health, Springfield, Ill.  
F. Korff, City Health Department, Baltimore, Maryland  
D. Lee, Florida State Board of Health, Jacksonville, Florida  
J. Logan, Northwestern University, Evanston, Illinois  
W. L. Mallmann, Michigan State University, East Lansing, Michigan  
W. S. Mangold, University of California, Berkeley, California  
S. Milliken, Public Health Federation of Greater Cincinnati Area, Cincinnati, Ohio  
B. A. Poole, State Board of Health, Indianapolis, Indiana  
J. D. Porterfield, M. D., Department of Health, Health Service, Washington, D. C.  
C. Senn, Department of Health, Los Angeles, California  
W. F. Snyder, National Sanitation Foundation, Ann Arbor, Michigan  
J. Trichter, Department of Health, New York, New York  
H. A. Whittaker, National Academy of Sciences, Washington, D. C.

## INTRODUCTION

The preservation of perishable food has always been of primary concern to human beings. Our forefathers found that if they lowered the temperature of food, it would stay fresh longer and therefore, keep longer. For centuries cool caves, wells and running streams were the only place to cool or refrigerate food. By 1775, men were cutting ice from lakes, ponds and rivers and storing it in caves, cellars and buildings for use in summer. They found that if they packed the ice in sawdust or wood shavings, it would slow down its melting.

In 1865, freezing of fish started on a commercial scale in the United States. The system was called "Weather Freezing", and of course, could only be used in the winter time.

The extreme mild winter of 1889-90 brought about a shortage of ice. By this time, the forerunners of our present refrigerators were wooden boxes which used ice for keeping products cold. The shortage created a great demand for ice. This challenged man's ingenuity, and around this time, many artificial ice-making plants were started. It was not until 1914, however, that the first practical mechanical refrigerator was placed on sale in America. Much progress was made from that point on and especially in the 1930's and the post-war area following World War II.

This progress is especially apparent in our modern commercial kitchens of today. Here the old wooden ice box has been replaced by gleaming refrigerator cabinets, which are called by many other names. Some of these names are dough retarders, roll-ins, walk-ins, salad refrigerators, reach-ins and tray storage refrigerators.

Indeed, the refrigerator and freezer cabinets have undergone some dramatic changes during the past fifteen years. We no longer purchase a refrigerator and haphazardly place the food inside. Now, the cabinet is built around a need for a particular storage or food handling.

Mobile refrigerators and freezers on casters or roll-in cabinets supplied with removable mobile pan racks, have been developed to prepare food in one location and move it to other locations and yet keep it under refrigeration.

With refrigerators located in their proper place in the working area, many steps are saved and much of the mealtime turmoil is

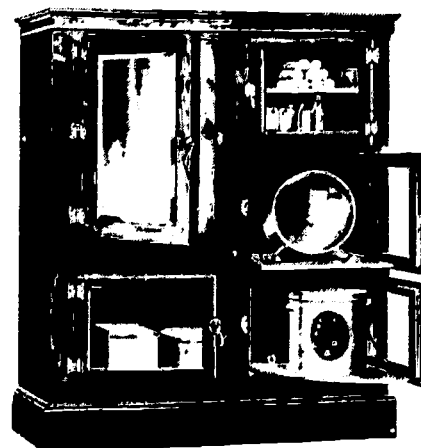
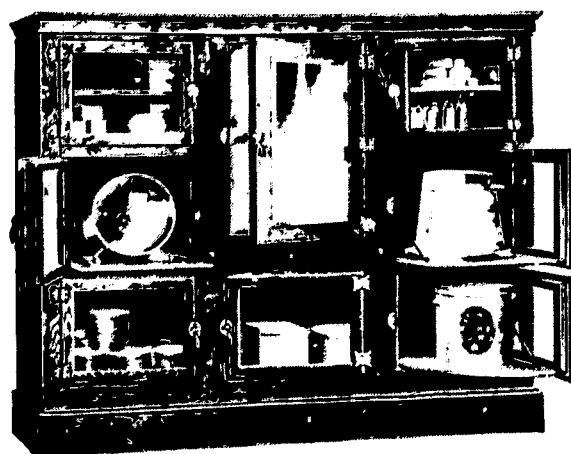
eliminated. Thus, the refrigerator has become an important working tool in today's processing of food in our kitchens.

NSF Standard No. 7 has set forth specifications which were badly needed to insure that the sanitary requirements in such an important piece of food storage equipment be rigidly adhered to. It establishes a basic standard, and is the result of many people working together towards a goal of better and sanitary food storage for Homo sapiens.



California "NO-ICE"  
Refrigerator — 1911

Crosley "ICY BALL"



Ice Boxes — KOCH 1913



**The National Sanitation Foundation**

**STANDARD NO. 7**

Relating to

**FOOD SERVICE REFRIGERATORS AND  
FOOD SERVICE STORAGE FREEZERS**

**The National Sanitation Foundation**

STANDARD NO. 7  
Relating to

**FOOD SERVICE REFRIGERATORS AND  
FOOD SERVICE STORAGE FREEZERS**

**1. GENERAL**

1.00 **COVERAGE:** This Standard covers the sanitation and performance requirements for new food service refrigerators and food service storage freezers of the type generally used in the food service industry. It is intended to cover cabinets operating in the freezing, above freezing, or below freezing temperature ranges, and designed for the storage and/or display of varieties of food products. It applies to reach-in refrigerators and reach-in frozen food cabinets; walk-in refrigerators and walk-in frozen food cabinets; undercounter refrigerators and undercounter frozen food storage cabinets; and open and closed refrigerators. This publication also includes a section on recommended installation procedures and practices.

1.01 **MINIMUM REQUIREMENTS:** These are minimum requirements and variations may be accepted when they tend to make units more resistant to wear, corrosion, or more easily cleanable. Units which have components, or parts, which are covered under existing NSF Standards or Criteria, shall comply with the applicable requirements thereof.

1.02 **ALTERNATE MATERIALS:** Wherever specific materials are mentioned, it is understood that the use of materials equally satisfactory from the standpoint of sanitation and durability will be acceptable.

1.03 **REVIEWS AND REVISIONS.** Subsequent to the printed publication of this Standard, complete review of the Standard shall be conducted at intervals of not more than three years to determine what changes, deletions or additions, if any, are necessary to maintain current and effective requirements consistent with new technology and progress. These reviews shall be conducted by appropriate representatives from the public health, industry, and user groups. Final adoption of revisions shall be in accordance with the procedures established by the NSF Joint Committee for Food Equipment Standards.

2.00 GENERAL: For the purpose of this Standard the following definitions shall apply:

2.01 FOOD SERVICE: Food service shall mean operations connected with the preparation and/or service of food, which at the time of service, is ready for direct consumption on or off the premises.

2.02 READILY ACCESSIBLE: Readily accessible shall mean exposed, or easily exposed without the use of tools, for proper and thorough cleaning and visual inspection.

2.03 ACCESSIBLE: Accessible shall mean readily exposed for proper and thorough cleaning and inspection with the use of only simple tools, such as a screw driver, pliers or open-end wrench.

2.04 READILY (OR EASILY) REMOVABLE: Readily (or easily) removable shall mean capable of being taken away from the main unit without the use of tools.

2.05 REMOVABLE: Removable shall mean capable of being taken away from the main unit with the use of only simple tools, such as a screw driver, pliers or open-end wrench.

2.06 READILY (OR EASILY) CLEANABLE: Readily (or easily) cleanable shall mean readily accessible and of such material, finish, and so fabricated that soil may be completely removed by normal cleaning methods.

2.07 FOOD: The word food shall mean any raw, cooked, or processed edible substance, beverage or ingredient used or intended for use or for sale in whole or in part for human consumption.

2.08 TOXIC: The word "toxic" shall refer to the adverse physiological effect to man.

2.09 CORROSION - RESISTANT: Corrosion - resistant materials are those which maintain their original surface characteristics under the prolonged influence of the foods to be contacted and of the cleaning compounds and bactericidal solutions that may be used, and other conditions of the "use" environment.

2.10 FOOD ZONE: The term "food zone" or "food contact surfaces" includes those surfaces of the equipment with which the food normally comes in contact, and those surfaces with which the food is likely, in normal operation, to come into contact and drain back onto surfaces normally in contact with the food or into the food. For the purposes of this Standard the refrigerated interior of reach-in refrigerators and reach-in storage freezers shall be considered "Food Zone".

2.11 SPLASH ZONE: The terms "splash zone" or "splash contact surface" shall mean those surfaces, other than food contact surfaces which are subject to routine splash, spillage and contamination during normal use.

2.12 NON-FOOD ZONE: The term "non-food zone" or "non-food contact surface" shall mean all exposed surfaces not in the food or splash zones.

2.13 SEALED: Spaces required to be "sealed" shall have no openings that will permit seepage.

2.14 CLOSED: Spaces required to be "closed" shall be fitted together snugly leaving no openings large enough for the entrance of insects or rodents. An opening of 1/32 inch or less shall be considered closed.

2.15 REFRIGERATION: Refrigeration shall mean the process of removing sensible and/or latent heat from a substance generally for the purpose of preservation.

2.16 REFRIGERATORS: Equipment designed in such a way that it encloses an area in which the atmosphere is mechanically refrigerated and controlled as to temperature and which is used to retard the deterioration of foods being held therein. As used in this Standard, the word "refrigerator" shall include those items of food service equipment that are used for the refrigerated holding of non-frozen foods and are known by such names as, but not limited to, reach-ins (front opening or pass through), dough retarding refrigerators, walk-ins, beverage coolers, salad refrigerators, display refrigerators, cook's refrigerators, multiple temperature refrigerators and back-bar or under-counter refrigerators.

2.17 STORAGE FREEZERS: Equipment or parts of equipment having the same general function as refrigerators (as defined in 2.16) but designed for use in the holding of frozen foods.

2.18 PREFABRICATED WALK-IN REFRIGERATORS AND STORAGE FREEZERS: Walk-in refrigerators and freezers shall for the purpose of this Standard include those units commonly known as walk-ins, and in addition shall include roll-in type units.

2.19 INTERNAL ANGLE OR CORNER: Internal angles or corners shall be defined as the intersection of two or more planes at 135 degrees or less.

2.20 JOINTS AND SEAMS: The terms "joints" and "seams" shall

be interpreted to mean the line of meeting of two or more pieces of material.

2.21 SMOOTH: The word "smooth" is used to define a surface free of pits and inclusions and having a cleanability equal to the following:

Food Zone: Number 3 (100 grit) finish on Stainless Steel. Splash and Non-Food Zone: Commercial grade hot rolled steel free of visible scale.

### 3. MATERIALS

3.00 GENERAL: Only such materials shall be used in the construction of refrigerators and freezers as will withstand wear, penetration of vermin, the corrosive action of refrigerants and foods, cleaning compounds and normal exposures in the use environment and will not impart an odor to the food.

3.01 FOOD ZONE: Surface materials in the food zone shall be non-toxic, stable and non-absorbent; and shall not impart odors to, nor contribute to the adulteration of the food. Exposed surfaces in the food zone shall be finished so as to be smooth and easily cleanable.

3.02 SPLASH CONTACT SURFACES: Splash contact surfaces shall be smooth, and of an easily cleanable and corrosion-resistant material, or shall be rendered corrosion-resistant with a material which is non-cracking, non-chipping and non-spalling. Paint shall not be used.

3.03 PAINT: Paint is a satisfactory finish for normally dry, non-wearing surfaces in the non-food zone. Lead based paint shall not be used.

3.04 WELDING: When welded seams are used, the weld area and deposited weld material shall be equally as corrosion resistant as the parent material.

3.05 GASKETS: Gaskets shall be made of materials, such as resilient rubber, rubber-like materials, or plastic. Such materials shall be non-toxic, stable, odor free and non-absorbent.

3.06 BREAKER STRIPS: Exposed breaker strips shall be made of a material which is non-toxic, odor free, non-absorbent and stable.

3.07 CUTTING BOARDS: Cutting boards, if applied, shall be of hard maple or other acceptable material.

3.08 **SHELVES:** Shelves provided by the refrigerator or freezer manufacturer shall conform to the requirements of Items 3.00 and 3.01.

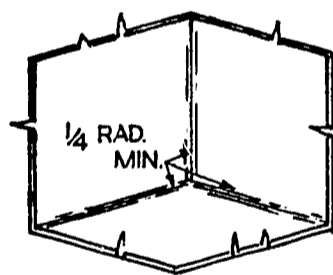
3.09 **HARD SOLDER:** Hard solder (silver solder) shall be of such formulation as to be non-toxic under use conditions; shall be corrosion-resistant; and shall, consistent with good industrial practice in the refining of its constituent elements, be free of cadmium, antimony, bismuth and other toxic materials.

#### 4. DESIGN AND CONSTRUCTION— REFRIGERATORS AND FREEZERS

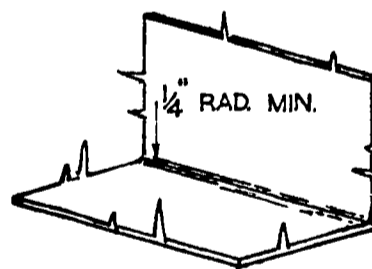
4.00 **GENERAL.** The food zone and those portions of the splash and non-food zone requiring routine cleaning shall be so designed and constructed as to be free of obstruction to cleaning and shall be easily cleanable.

4.01 **CORNERS OR ANGLES - INTERNAL** (angles of  $135^\circ$  or less): All internal corners or angles in the food zone shall have a minimum continuous and smooth radius of not less than  $\frac{1}{4}$  inch.\* All other corners and angles should be rounded wherever it will make cleaning easier.

NOTE: USE OF SOLDER OR FILLET MATERIAL TO OBTAIN THE DESIRED INTERNAL RADIUS IS NOT ACCEPTABLE



INTERSECTION OF 3 PLANES



INTERSECTION OF 2 PLANES

#### 4.01 - CORNERS OR ANGLES - INTERNAL

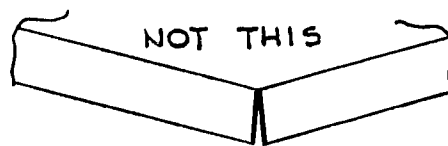
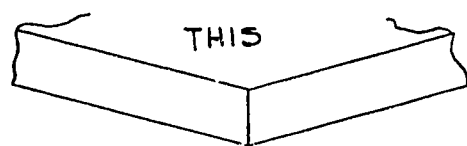
Figure I

NOTE: The provisions of this Item are interpreted to preclude exposed fastener heads other than those that are readily removable and those located on the breaker strip.

\* The juncture between the walls of the base and top of the top opening undercounter equipment such as soda fountains, sandwich units and creamers, shall be exempt from this provision.

4.02 CORNERS OR ANGLES - EXTERNAL (Angles greater than 135°): All exposed external angles and corners in the food zone shall be closed, sealed and smooth.

NOTE: ALL EXTERNAL CORNERS OR ANGLES ARE TO BE CLOSED AND FINISHED SMOOTH



MAKE TIGHT BY WELDING, TACK WELDING & SOLDERING, OR BY PROVIDING A FLAP & SOLDERING

### 4.02 - CORNERS OR ANGLES - EXTERNAL

4.03 SOLDERING: Solder shall not be used in the food zones, provided, however, hard solder may be used in the food zone to effect refrigeration and condensate line connections and as a filter for structurally sound joints and seams.



4 Half door Reachin

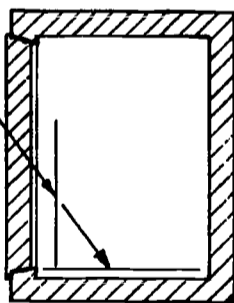
4.04 WELDING: Welded areas included in surfaces in sections that require routine cleaning and in food contact surfaces, shall be ground and polished smooth to match the parent material. The weld area should have a structural strength at least equal to the adjoining materials.

4.05 JOINING AND SEAMS

4.051 NON-FOOD ZONE: Joints and seams in the non-food zone shall be closed.

4.052 FOOD ZONE: Joints and seams in the food zone shall be closed and sealed. All open horizontal or vertical joints or seams shall be above the liquid overflow level of the food storage compartment of the refrigerator or freezer, with the exception of joints or seams at the breaker strip: Provided, however, that in dry chest-type refrigerators and freezers, all horizontal and vertical seams shall be at least 3 inches above the bottom of the food storage compartment. Shelf supports, and other interior accessories and appurtenances, including floor racks shall be designed in conformance with the requirements for the food zone (Item 4.01): Provided, however, that readily removable pilasters and shelves which are easily cleanable shall not be included in the provision.

**FOOD SERVICE REFRIGERATORS AND FREEZERS - ALL  
HORIZONTAL AND VERTICAL SEAMS SHALL BE ABOVE  
THE LIQUID OVERFLOW LEVEL OF THE FOOD STORAGE  
COMPARTMENT**



**4.052 JOINTS & SEAMS**

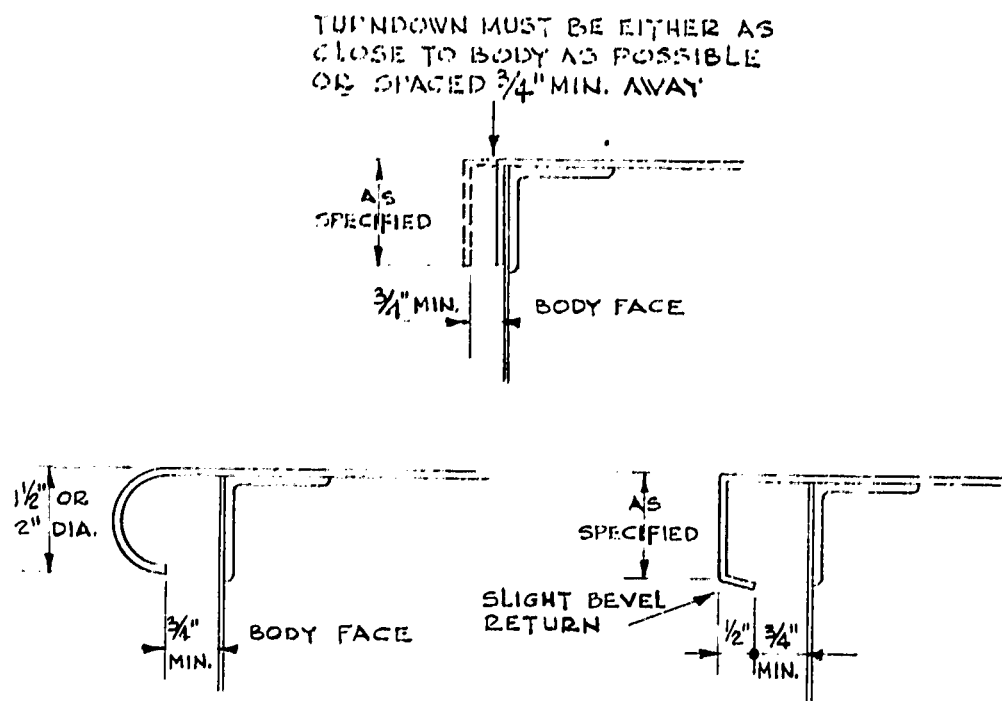
**EFFECTIVE JULY 1, 1969**

All joints and seams in the food zone shall be filled and finished to conform with Item 3.01.



4.06 WORKED SURFACES: Food contact surfaces which, during the course of fabrication are so worked as to reduce their corrosion-resistant characteristics, shall receive such additional treatment as is necessary to render, or return, them to a corrosion-resistant state.

4.07 EDGES AND NOSING: Edges and nosings on refrigerated food service equipment shall, where exposed on horizontal surfaces, be made integral with tops, regardless of profiles; and where exposed to fingers and cleaning, they shall be made smooth.

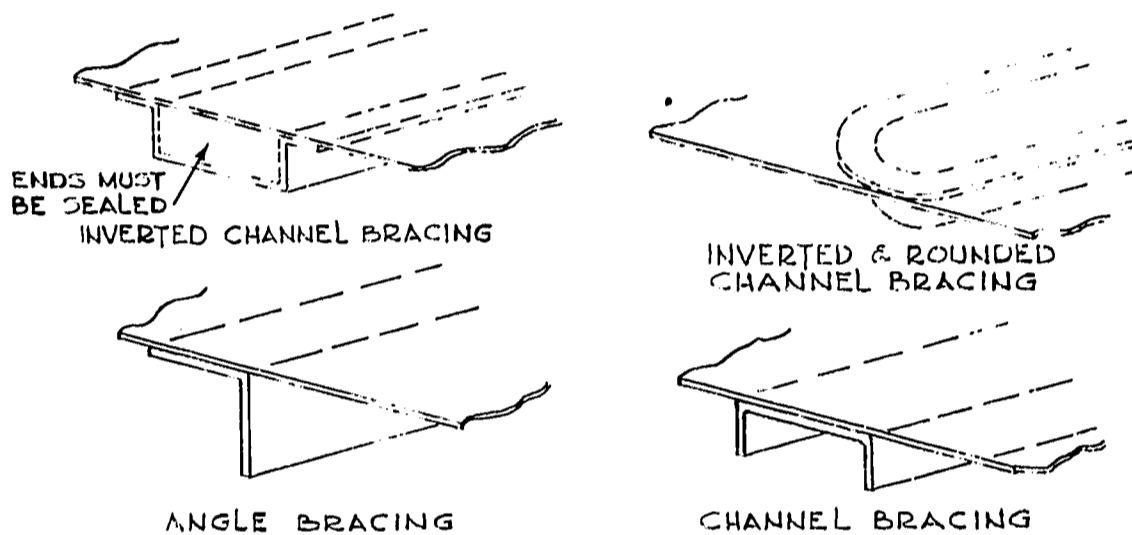


#### 4.07 - EXPOSED EDGES & NOSINGS

4.071 FLANGES: Where edges of tops or shelves are flanged down and turned back, the return under flange shall, unless closed, be angled down and the space between the top and the flange shall not be less than  $\frac{3}{4}$  inch. The space between the sheared edge of tops or shelves and the frame angle or cabinet body shall not be less than  $\frac{3}{4}$  inch to provide access for cleaning.

4.08 REINFORCING AND FRAMING: Reinforcing and framing members not totally enclosed or within walls, are to be placed in such a manner as to be easy to clean. All framing and reinforcing members shall be so placed as to eliminate harborage for vermin. The ends of all hollow sections of reinforcing and framing members shall be closed. Horizontal angle reinforcing and gussets shall not

be placed where food or garbage may accumulate thereon. Where angles are used horizontally, they shall have one leg turned down wherever the nature of the equipment permits, or shall be formed integral with the sides as for use with removable shelves or for drawer slides. All vertical channel sections shall be either completely closed or open to the floor. The use of wood shall be prohibited in the product zone, except as provided in 4.19. Wood used as framing and reinforcing shall be treated so as to be rendered moisture resistant.



#### 4.08 - REINFORCING & FRAMING MEMBERS UNDER TOPS & SHELVING

4.09 **FIXED PANELS:** Where fixed panels are applied to the outside or inside, or set into angle or other reinforced body or counter frames, the method of fastening shall be such as to minimize projections and openings.

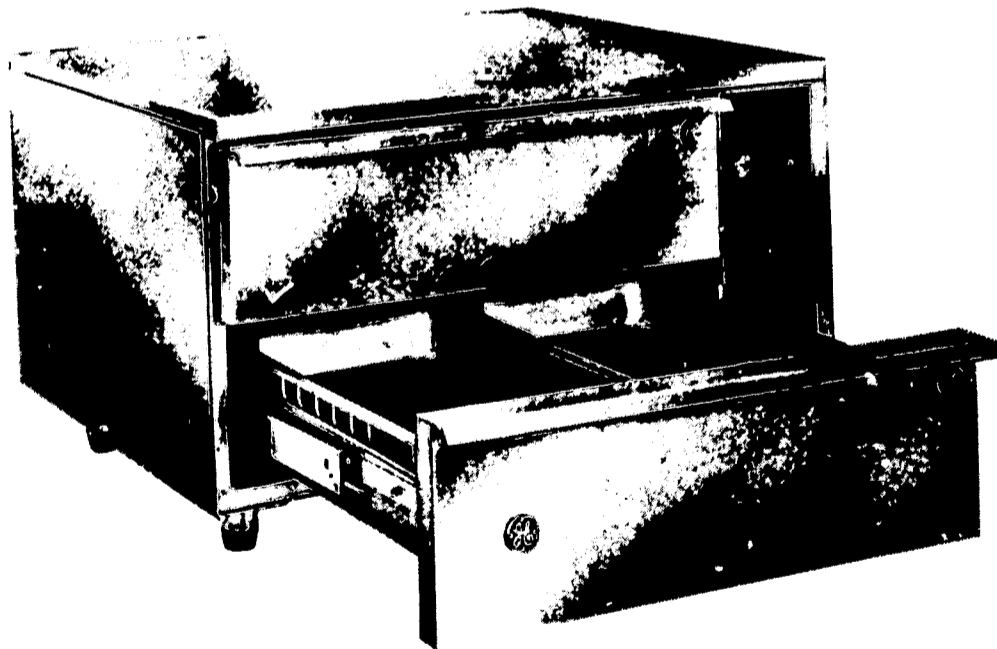
4.10 **REMOVABLE PANELS:** Where necessary for inspection and maintenance, easily removable panels shall be provided. They shall be of adequate size to serve the purpose intended, but otherwise confined in size and so constructed that one person can handle them. Removable panels shall conform with applicable construction requirements for the zone in which they are to be used.

4.11 **VENEERED PANELS:** When veneered panels are used, the veneer shall be applied so as to assure complete and permanent bonding of or between the materials. Air voids and open spaces between the materials shall be eliminated.

4.12 PAINTING: Painted finishes may be used in the non-food zone where they improve sanitation by preventing oxidation or condensation. Non-food contact surfaces subject to corrosion and which require cleaning shall be rendered more resistant to corrosion by plating or painting.

4.13 DOORS AND COVERS (SPLASH ZONE): Doors and covers shall be manufactured to conform with standard of manufacture for the cabinet proper, and shall be sized to fit and close properly. Doors and covers to enclose opening and provide access to interior compartments shall be fabricated in either of two basic types of construction, i.e., single or double panel. Sliding doors, when used, shall slide freely and be readily removable. Hinges in the splash zone shall be easy to clean and of simple take-apart design and construction. Piano type hinges are not permissible in the splash zone.

4.131 SINGLE PANEL: Single panel construction shall be such as to minimize the collection of soil particles, spillage, and other foreign matter and preferably without channel sections at the bottom. If channel sections are used, they shall be inverted or shall be shallow and wide enough to be easily cleanable.



**Drawer Refrigerator**

4.132 DOUBLE PANEL: Double panel doors and covers shall be fabricated in such a manner as to minimize the collection of food particles, spillage and foreign matter thereon. Hollow sections of such doors shall be closed and sealed provided that vent openings into the hollow space may be provided when necessary; but when provided, they shall be effectively screened against vermin, protected against the entrance of seepage or spillage, and the space between the panels shall be accessible.

4.14 TRACKS AND GUIDES: All tracks and guides for doors, covers and access panels shall be built in such a manner as to be easily cleaned and to minimize the collection of food particles, condensation, spillage and foreign matter. The following are examples of design features which are in compliance with this requirement:

4.141 Providing overhead door suspension with lower guides which are constructed integral with the bottom.

4.142 Providing clean-out holes at ends of track or guide.

4.143 Stopping tracks or guides  $\frac{1}{2}$  inch minimum short of the opening frame at each end.

4.144 Forming tracks or guides integral with interior bottoms and without square corners.

4.145 Providing clear open slots continuous or at intervals.

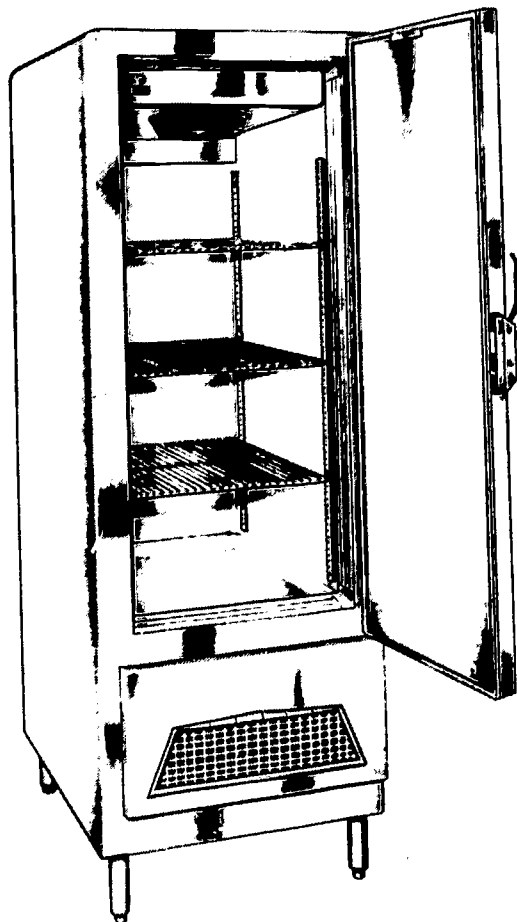
4.146 Providing readily removable T strips in channel type bottom tracks.

4.15 OPENINGS TO FOOD ZONES: Openings to food zones shall be provided with covers, doors or other means provided to assure adequate protection against contamination of stored foods to prevent dirt, dust, insects, rodents, seepage, condensation or spillage from entering the food zone.

4.151 COVERS AND DOORS: When covers or doors are provided to prevent contamination from reaching the food zone, they shall be so designed as to provide a flange which overlaps the opening, and shall be sloped to provide drainage from the door or cover surface. Doors and covers shall be designed with sufficient clearance to avoid contact with foods which they cover. Hinges or pivots shall be designed to be easily cleaned and of **simple** take-apart design and construction. Piano hinges are not permissible in the food zone. Sliding

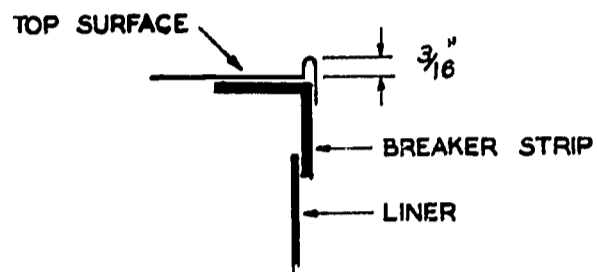
or hinged covers or doors over food zones shall be constructed in such a manner as to prevent seepage of liquids, condensation, or other foreign materials into the food zone and liquid or solid accumulations on doors and covers from falling into the food zone when the doors and covers are opened. All covers are to be readily removable as a unit or in sections. They shall be free from all unnecessary cracks, crevices, and exposed horizontal ledges. Doors and covers for freezers shall be so designed and constructed, or otherwise protected, to prevent their freezing shut.

4.152 TOP OPENINGS: All top openings over the food zone shall be protected by a raised rim at least 3/16 inch above the level to which liquids may accumulate.



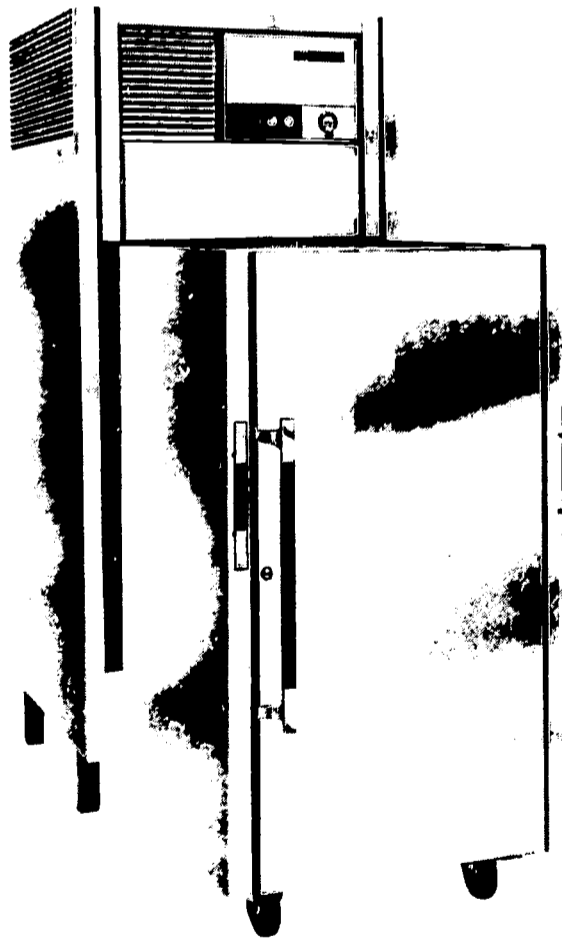
**Single-full length door Reachin**

4.153 ENTRY PORTS: All joints and seams where piping, thermometers, equipment, rotary shafts and other functional parts extend into food zones shall be closed and sealed at the point of entry into the food zone.



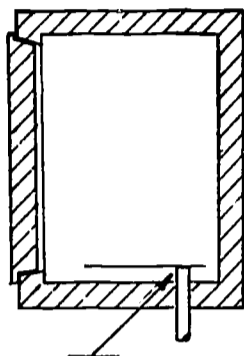
4.153 TOP OPENINGS

4.154 DRAINS: Drains, other than condensate drains, shall be eliminated from the food zone: Provided, however, that in case of dry chest-type refrigerators, or in cases where refrigerators are specifically designed for holding products in cracked ice, a drain may be used. Such drain shall be at least 1 inch I.P.S.



Mobil Reachin Refrigerator

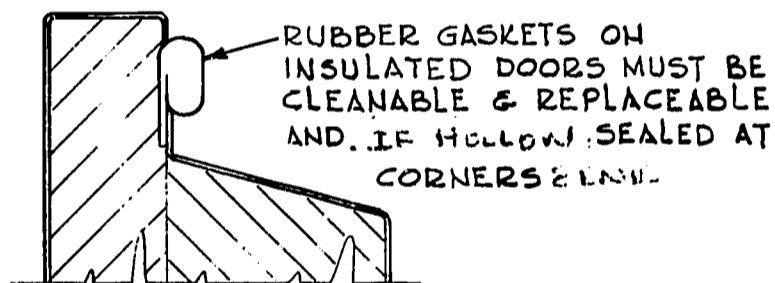
and properly installed. Condensate drains shall be so located as to prevent their use as a drain for the food zone.



CONDENSATION DRAINS, IF USED,  
SHALL BE SO LOCATED TO PREVENT  
THEIR USE AS A DRAIN FOR THE  
FOOD ZONE

#### 4.1532 DRAINS

4.16 GASKETS: Exposed surfaces of gaskets shall be readily cleanable and shall not contain internal angles (angles less than 135°). All hollow sections of gaskets shall be closed and sealed.



#### 4.16 - INSULATED DOORS

4.161 RETAINING GROOVES: Retaining grooves or devices for readily removable gaskets shall be easily cleanable.

4.162 FIXED GASKETS: Gaskets, other than readily removable, shall be securely fastened and installed in such a manner as to minimize accumulations of condensation, spillage and foreign matter.

4.17 BREAKER STRIPS: Breaker strips shall be securely fastened around the entire perimeter and installed in such a manner as to minimize the accumulations of spillage, condensation and foreign matter. They shall have smooth, easily cleanable surfaces with all sharp or rough edges removed.

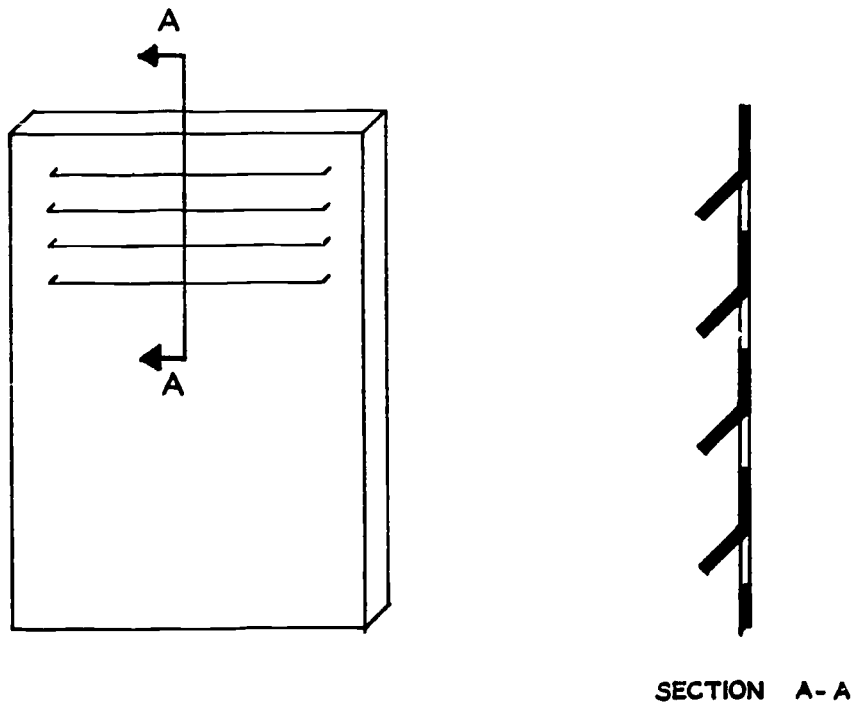
4.18 **SHELVING:** All shelving shall be constructed and installed so as not to harbor vermin and shall be readily cleanable.

4.181 **REMOVABLE SHELVES:** Where shelves are used as false bottoms, the flanged corners are to be closed or sufficiently open to permit cleaning. Such shelving shall be readily removable and of such size as to be easily handled by one person.

4.182 **DIVERTING SHELVES:** Shelves intended to prevent seepage shall have the back and ends turned up a minimum of 1 inch and corners and seams sealed.

4.183 **EVAPORATORS:** Evaporator drain pans, where used, shall have all sides turned up a minimum of 1/2 inch and shall be readily accessible for cleaning.

4.19 **LOUVERS AND OPENINGS:** Louvers shall be of drip-proof construction. All necessary ventilation louvers or openings into the equipment shall be effectively screened with 16 mesh screen or better, or closed against insects and rodents. Such screen shall be in a removable sash to facilitate cleaning and replacement. Compressor compartments, or enclosures, may be exempt from this requirement, provided the area is readily accessible and easily cleanable.



4.19 DRIP PROOF LOUVERS

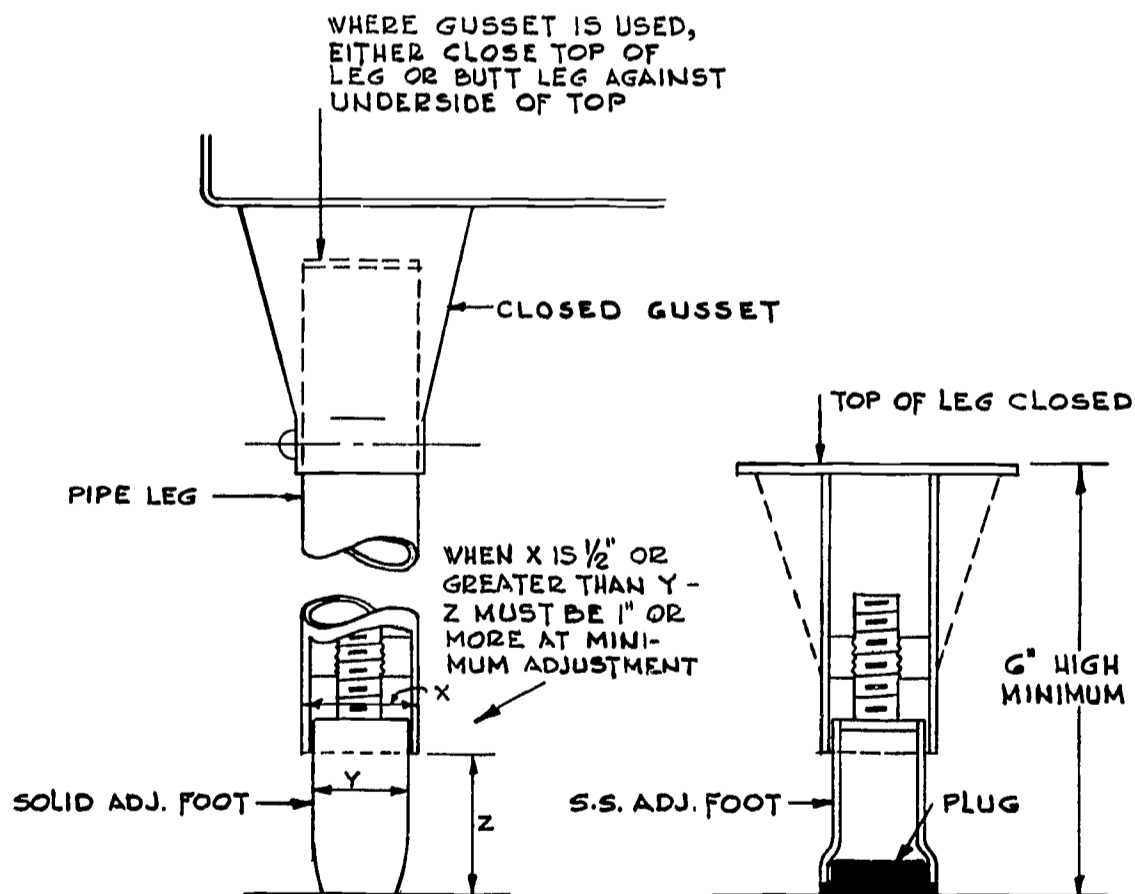


4.20 PROVISION FOR MOUNTING: All Food Service Refrigerators and Food Service Storage Freezers shall be designed and constructed with one or more of the following provisions for mounting:

4.201 MOUNTING: The unit shall be designed to be sealed to the floor, a raised base, counter or shelf or;

4.202 CASTERS, ROLLERS AND GLIDERS: The unit shall be mounted on legs or other suitable means provided to assure a minimum of six inches of unobstructed clearance between the floor and the lowest horizontal member or;

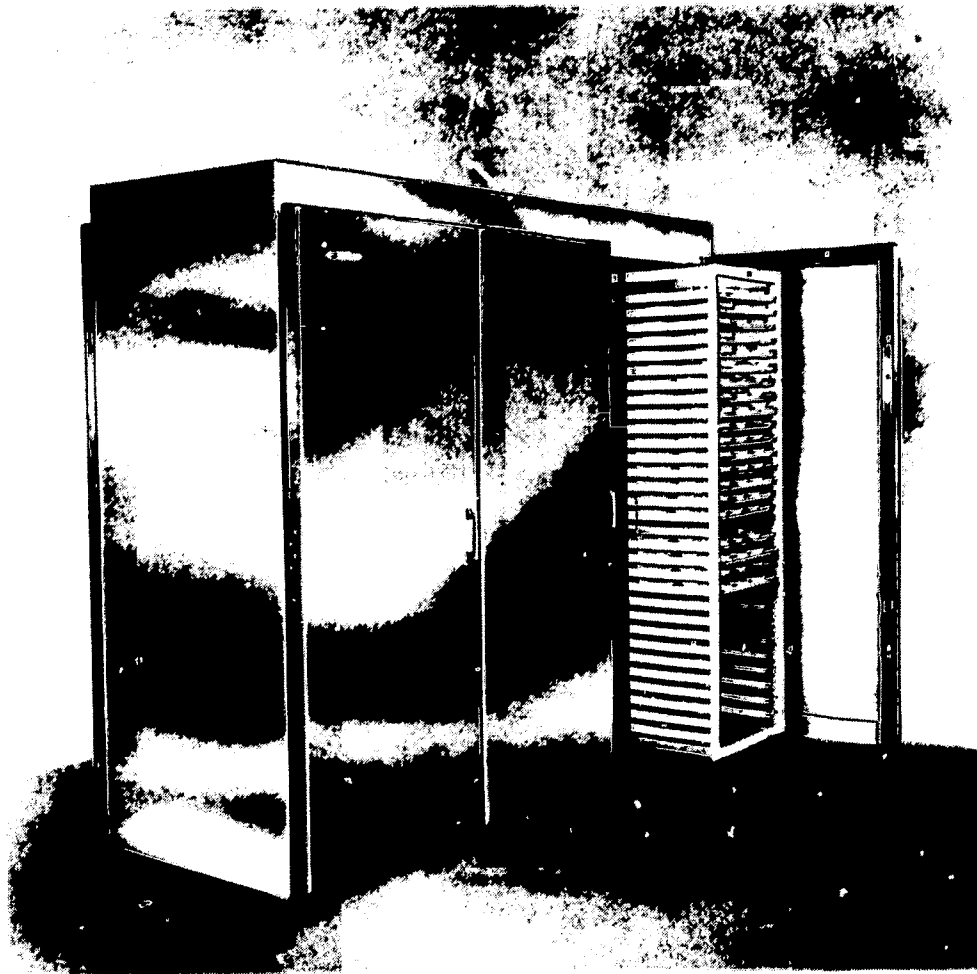
4.203 CLEAR SPACE BENEATH: The unit shall be mounted on casters, rollers, or gliders of such design and construction as to permit its being easily moved by one person and so installed as to be easily cleaned. Casters shall conform to NSF Basic Criteria C-2.



4.203 - LEGS & FEET

4.21 LEGS AND FEET—DESIGN AND CONSTRUCTION: Legs and feet shall be of a material of sufficient rigidity to provide support with a minimum of cross-bracing and so fastened to the body of the equipment and so shaped at floor contacts as to prevent the accumulation of dirt and the harborage of vermin. When the outside diameter of the leg is greater than the outside diameter of the foot, by  $\frac{1}{2}$  inch or more, in the same plane, the foot shall, at minimum adjustment, extend 1 inch below the leg. All openings to hollow sections between feet and legs shall be of drip-proof construction with no opening greater than  $\frac{1}{32}$  inch. All other openings to hollow sections shall be sealed. Legs and feet shall be of simple design, free from embellishments and exposed threads. Gussets, when used, shall be assembled to the equipment in such a manner as to insure easy cleanability and to eliminate insect harborage. The resultant assembly shall have no recessed areas or spaces.\*

\* The intent of this provision is to eliminate the uncleanable areas, generally encountered when open style gussets are used with cylindrical legs.



**Roll Through Refrigerator**

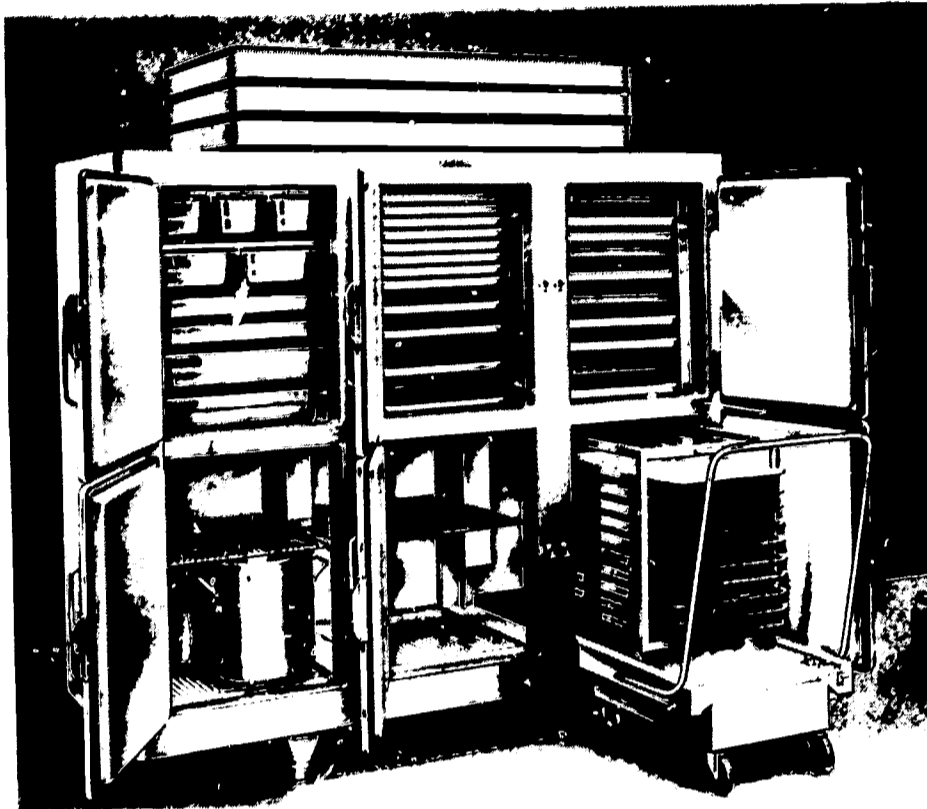
4.22 INSULATION: Adequate insulation to prevent the development of undue surface condensation under conditions as specified in Item 6.01 shall be provided. Insulation shall be of a material and so installed that voids do not occur between parts of the insulation and that it will not compact, settle or separate under normal operation and use. Insulation shall be closed and sealed and protected against condensation, spillage and seepage. Insulation shall be vapor-proofed to prevent undue migration of moisture vapor.

4.23 REFRIGERATION AND COOLING EQUIPMENT: Refrigeration and cooling equipment shall be designed and constructed in conformance with the applicable standards of American Society of Heating, Refrigerating and Air Conditioning Engineers.

4.231 COILS AND TUBING: Evaporator coils and refrigerant tubing shall be installed in such a manner that food contact surfaces are protected both from direct contact with them and from condensate and other fluids that may drop or splash thereon or therefrom. Refrigeration coils, if exposed to food or food spillage, shall be finless type and so located that they can be enclosed in a housing to protect against spillage of food or beverage. Adequate provision shall be made for the drainage of any accumulation of condensate.



**Glass door Display Reachin Refrigerator**



**Refrigerator with Mobile System**

4.232 EVAPORATOR SHELVES: Evaporator type shelving shall be permitted in food service storage freezers and the provisions of Item 4.052 shall not apply.

4.233 PLATE EVAPORATORS: Plate type evaporators in undercounter units, located within the interior so as not to be subject to direct food contact or routine splash or spillage, shall be considered non-food zone provided, however, that the material requirements of Item 3.01 shall apply.

4.234 AIR DUCTS: Air ducts for recirculating air located outside the food zone shall be totally enclosed and so designed, constructed and located as to be protected against splash, spillage and other contamination. Material used in such ducts shall comply with the splash zone requirements. Air ducts within the food zone shall comply with the requirements of the food zone.

4.24 CUTTING BOARDS: All cutting boards shall be easily removable for cleaning and shall have a smooth surface on all sides.

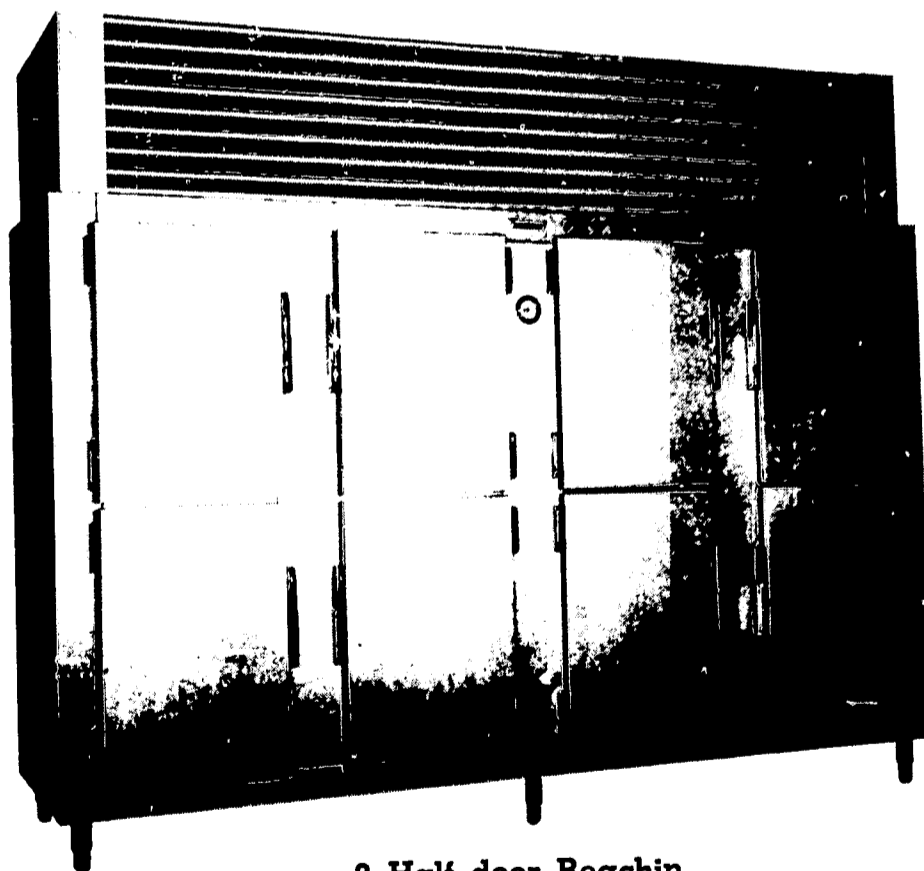
4.25 TEMPERATURES AND CONTROLS:

4.251 USE TEMPERATURES: Refrigerators and freezers shall be capable of maintaining appropriate food temperatures for the intended use. Provided, however, that the maximum operating temperatures shall be as follows:

Refrigerators	40° F.
Refrigerated (Short Term) Display Cases	45° F.
Freezers	0° F.

4.252 CONTROLS: Automatic controls shall be provided to insure the maintenance of the selected temperatures at all times, except when foods are being inserted or removed from the compartment.

4.253 TEMPERATURE INDICATING DEVICES (INCLUDING THERMOMETERS): Temperature sensing and indicating devices shall be provided for each temperature zone of the refrigerator and/or freezer. Such devices shall have an accuracy of  $\pm 2^\circ$  F. at the critical range, shall be of an easy-to-read type and so located as to be readily visible to persons using the equipment. The sensitizing element of the device shall be easily cleanable and so located as to reflect the representative temperature of stored foods in the appropriate temperature zone.



8 Half door Reachin

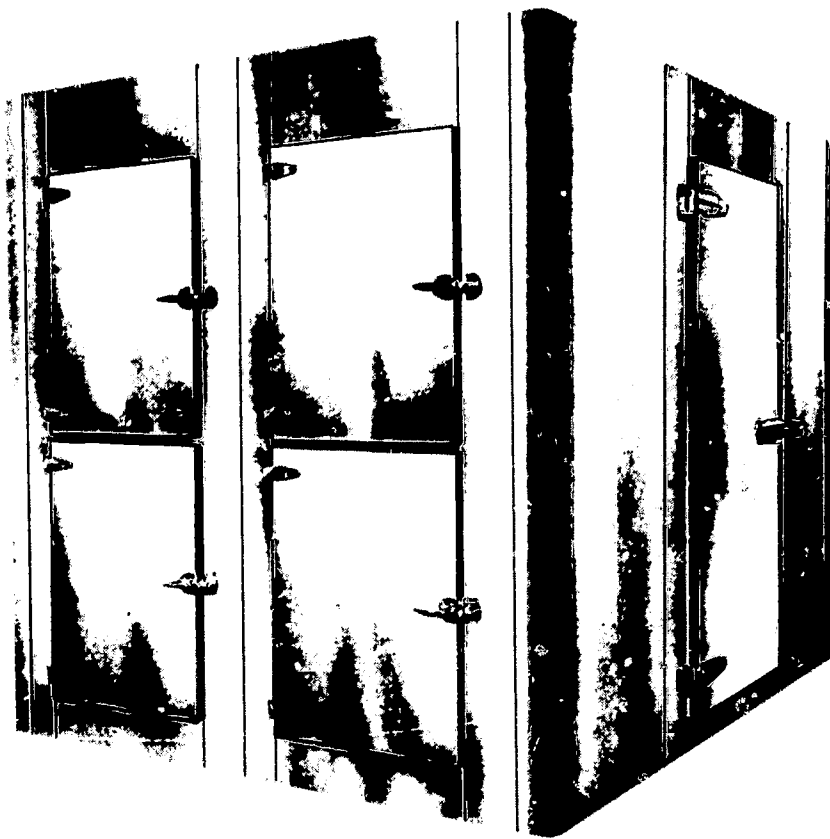
4.26 SAFETY REQUIREMENTS:

4.261 GAS EQUIPMENT: If gas burning devices are used, they shall be properly vented.

4.262 GUARDS: Safeguards shall be provided against the entrance into the food of glass, metal and similar contaminants from fixtures and devices within the equipment.

4.263 STANDARDS: Refrigeration and cooling equipment shall conform to the latest edition of the American Standards Association (ASA) Safety Code for Mechanical Refrigeration.

4.27 COMPLIANCE WITH PERFORMANCE STANDARDS: All equipment shall meet the safety and performance requirements which are covered in existing current applicable standards of the American Gas Association, the American Standards Association, the National Board of Fire Underwriters or Underwriters Laboratories, Inc. All requests for the examination of equipment for compliance with this Standard shall be accompanied by competent evidence of such compliance.



**Walk-in Refrigerator — Storage Freezer Combination**

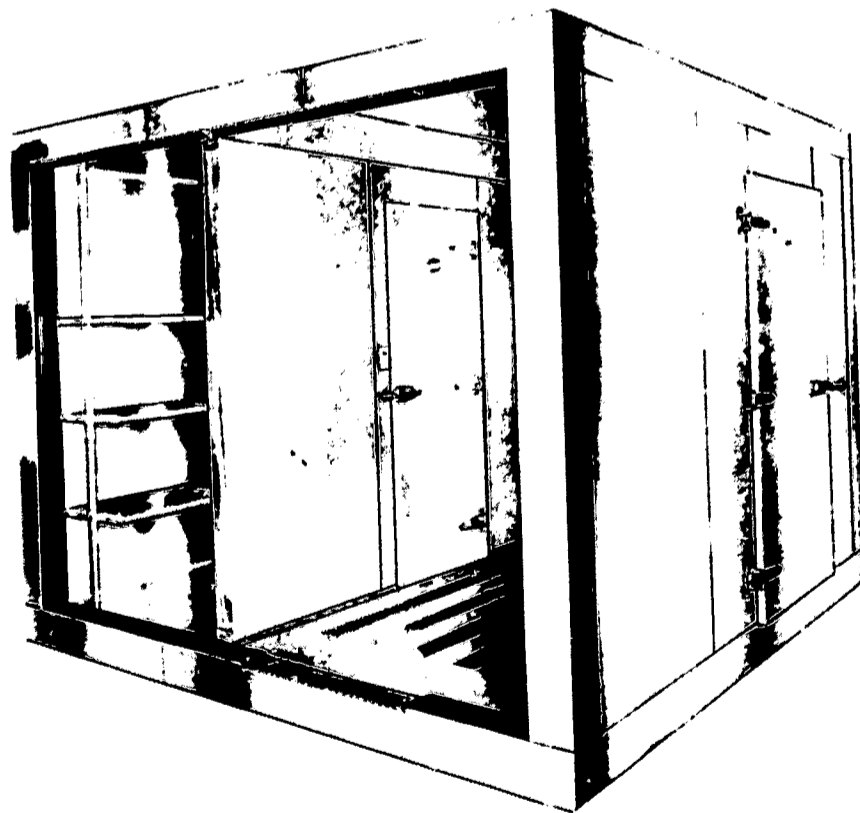
## 5. PREFABRICATED WALK-IN FOOD SERVICE REFRIGERATORS AND FOOD SERVICE STORAGE FREEZERS:

5.00 GENERAL: This equipment shall meet all the specifications for food service refrigerators and food service storage freezers except Items 4.20, 4.201, 4.202, and 4.203. In addition, such units shall comply with the following items:

5.01 INSIDE LINERS: The inside walls, ceilings and floors of walk-in food service refrigerators and food service storage freezers shall be classified as "Splash Zone" provided, however, the provisions of Items 4.00, 4.01 and 4.03 shall apply.

5.02 JOINTS AND SEAMS: Joints and seams in the inside liner shall be kept to a minimum. All necessary fabrication joints and seams resulting from assembly shall be designed to permit sealing and filling in an effective manner on erection.\* Shelf supports and other interior accessories and appurtenances shall be designed in conformance with the requirements for the food zone (Item 4.01 and 4.052).

\* The manufacturer's installation instructions shall outline an effective method for said sealing and filling.



Open End view — Prefabricated

5.03 DOORS: Doors shall be designed and/or equipped so as to prevent the sweeping of dirt or other contaminants from the outside floor into the interior during the closing of the door. Door sills shall be flush with the interior floor of the walk-in refrigerator or freezer. Doors shall be equipped with a mechanism to permit their opening from the inside.

5.04 TRACKS AND GUIDES: Tracks or guides of roll-in type units shall be so designed and constructed as to be easily cleanable or shall be readily removable.

5.05 PROVISION FOR INSTALLATION: Walk-in refrigerators and freezers shall be designed to be closed and sealed to the floor or shall be constructed integral with the floor. Coved bases shall be provided at the intersection of the floor and walls in the refrigerated interior; and side walls or base, and the surrounding floor.

5.06 AUXILIARY EQUIPMENT: All auxiliary equipment supplied with walk-in refrigerators or freezers shall conform to applicable requirements of this Standard or pertinent requirements of other adopted NSF Standards or Criteria.

## 6. RATINGS AND PERFORMANCE

6.00 GENERAL: Only such refrigeration units and components or equipment shall be used in the construction of commercial refrigeration and cooling equipment as will assure proper and efficient operation of such equipment for its intended use. Such units shall be durable and capable of providing continuing service with a minimum of maintenance.

6.01 RATINGS: Refrigerators and freezers shall be rated in conformance with the Standard for Methods of Rating and Testing of the American Society of Heating, Refrigerating and Air Conditioning Engineers provided, however, the ambient test temperature shall be 100° F. (dry bulb).

### MAXIMUM PERMISSABLE OPERATING TIME (NO LOAD CONDITIONS):

Storage Refrigerators	70%
Short-Term Display Refrigerators	100%
Storage Freezers	80%



### RECOMMENDED INSTALLATION & SERVICE

It is recommended that Food Service Refrigerator and Food Service Storage Freezer be installed in accordance with the National Sanitation Foundation **MANUAL ON SANITATION ASPECTS OF INSTALLATION OF FOOD SERVICE EQUIPMENT**. Refrigerators and freezers designed and constructed in accordance with this Standard will give satisfactory results when properly installed and connected to satisfactory services, as required by each specific unit, and operated in accordance with accepted sanitation standards. The method of installation and operation should be in conformance with the applicable state and local laws and regulations.

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SANITATION is a way of life. It is the quality of living that is expressed in the clean home, the clean farm, the clean business and industry, the clean neighborhood, the clean community. Being a way of life it must come from within the people; it is nourished by knowledge and grows as an obligation and an ideal in human relations.

THE NATIONAL SANITATION FOUNDATION