

background in order to show their configuration at various stages from purchase to application.

#### Observations on Connectors From Set I

A typical, tightly packaged connector is shown in Figure 1. Approximately 90% of such connectors received from the utilities had one or more bends of 1/2" radius or less.

A second packaged connector is shown in Figure 2. Approximately 58% of such connectors received from the utilities had one or more bends of 1/2" radius or less.

#### Observations on Connectors From Set II

A field-installed/removed connector is shown in Figure 3. The bends appear to be in one plane. A second field-installed/removed connector is shown in Figure 4. This connector indicates bends in more than one plane.

#### Observations on Connectors From Set III

Figure 5 shows a typical unpackaged connector received directly from the manufacturer. Figure 6 shows the four designs of connectors used in this study. Differences in size and shape of corrugations and coating color are evident.

#### 2.3 Pre-Conditioning of Set III Connectors

Based on an analysis of the bends observed in connector Sets I and II, a 1/2" radius bend was selected as being representative of the most severe bend that the connectors were subjected to during packaging and/or field installation. The unpackaged connectors received from the manufacturers (Set III) were subjected to bends of this radius before exposure to the ammonia vapor test.

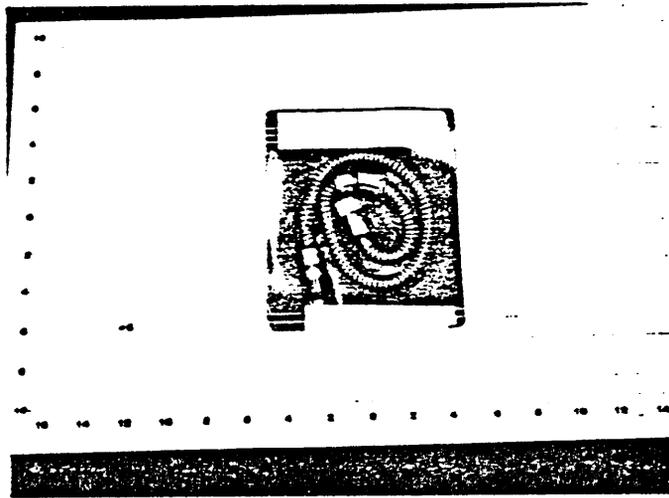


Figure 2 - Packaged Connector (Coiled)

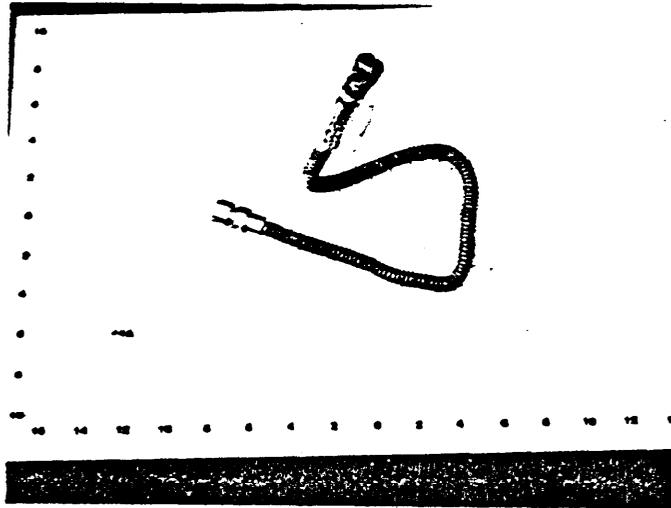


Figure 4 - Field-Installed/Removed Connector

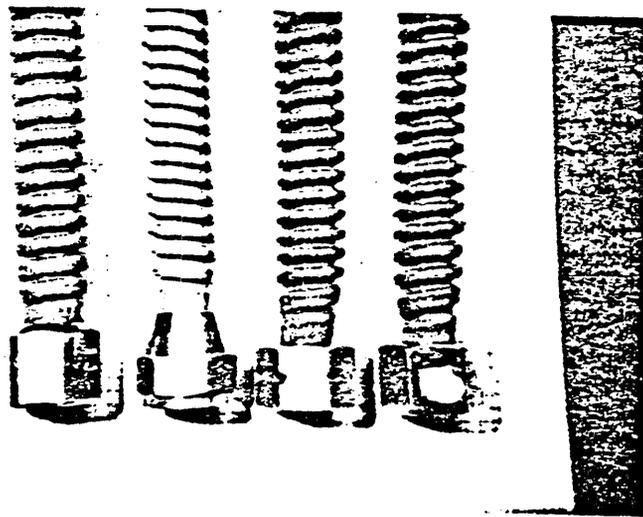


Figure 6 - Unpackaged Connectors

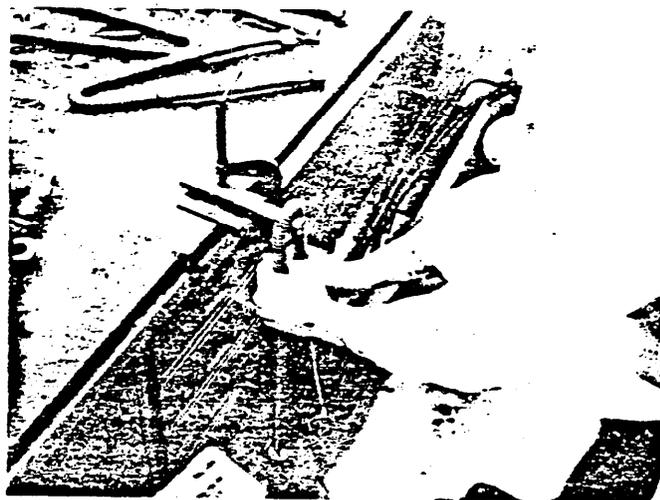
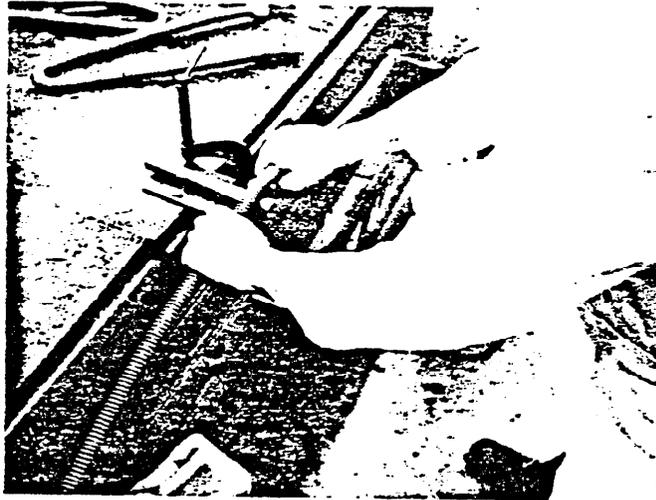


Figure 7 - Method of Bending Unpackaged Connectors  
Around a 1/2" Radius Mandrel

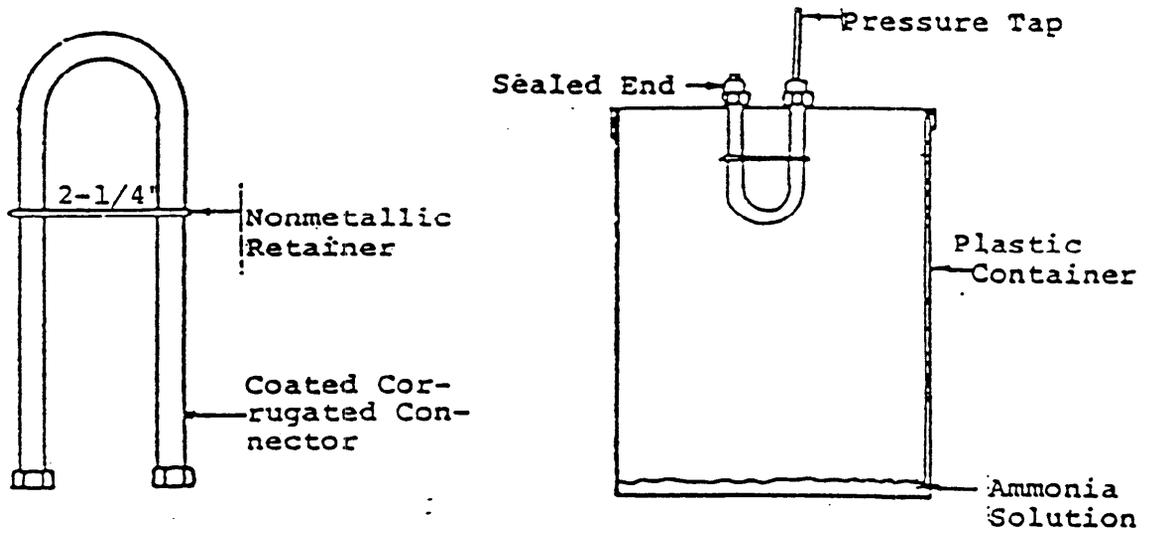


Figure 9 - Schematic of ANSI Z21.24\* Ammonia Vapor Test

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 \*NOTE: The configuration used in this study differs somewhat from that shown. (See Figure 11).

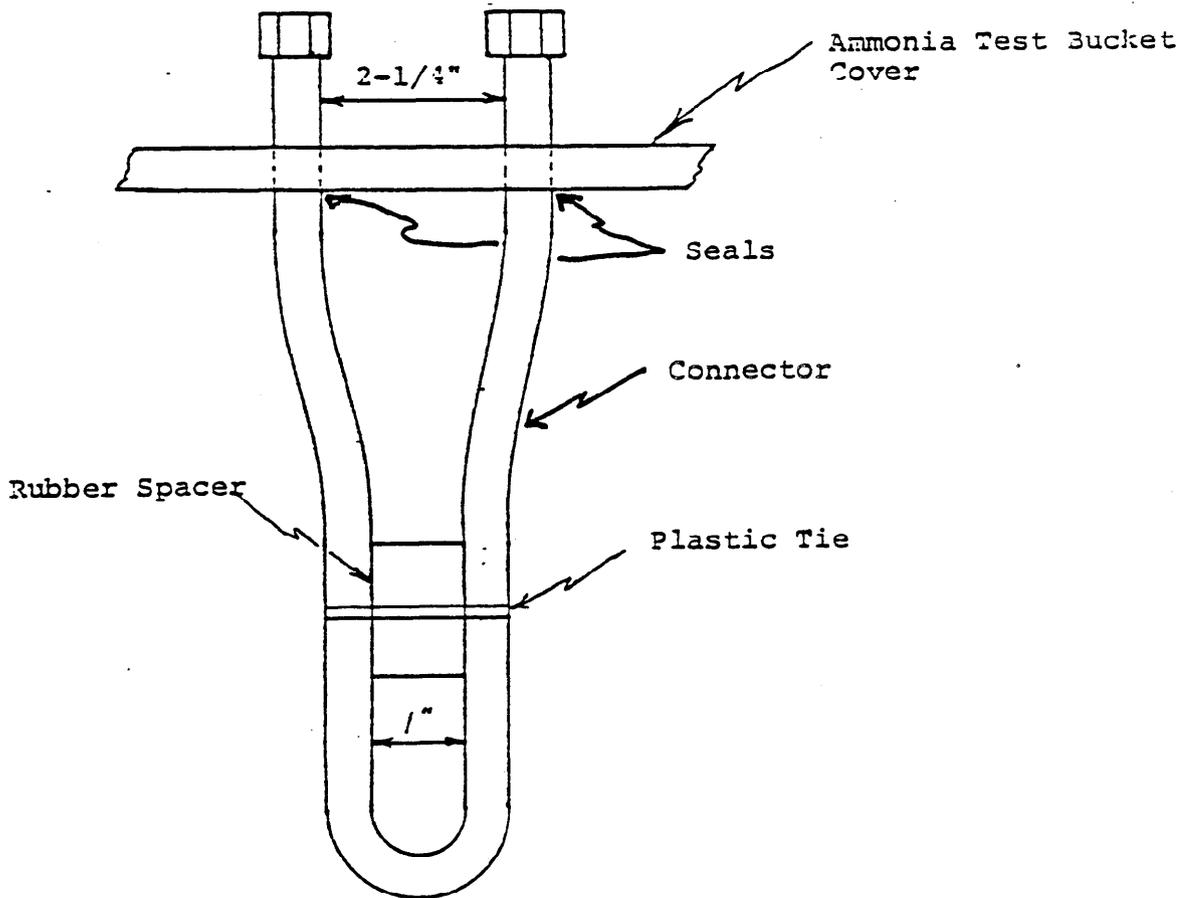


Figure 11 - Connector Mounted on Cover of Ammonia Test Bucket

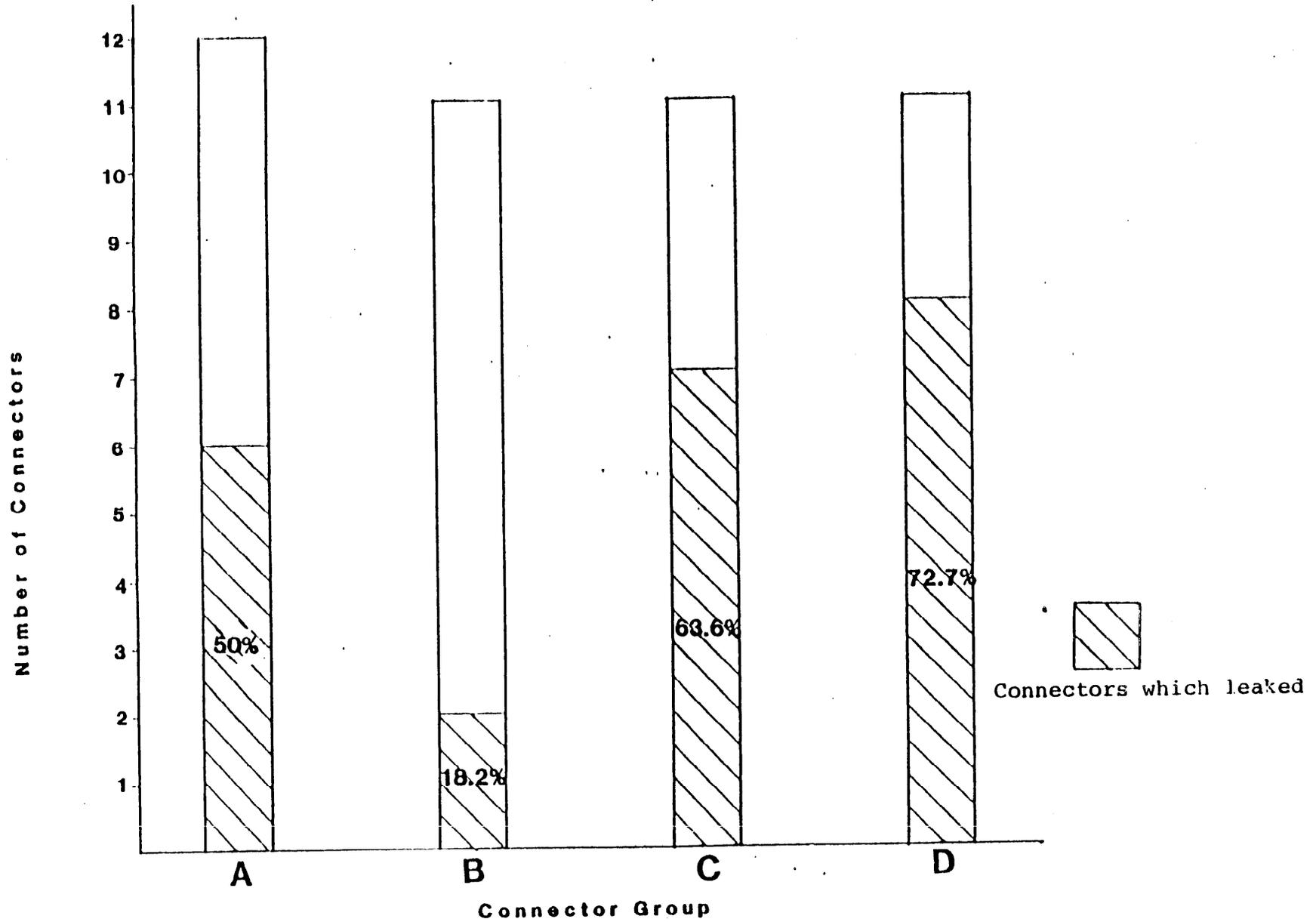


Figure 13 - Ammonia Test on Unpackaged Connectors

### 3.0 CONCLUSIONS

The following conclusions can be drawn from this study:

1. The mechanical stresses seen by a connector after it leaves the factory are potentially more severe than those created by the mechanical pre-conditioning steps specified in Z21.24. Approximately 60% of the packaged and field-installed/removed connectors (Sets I and II) received for evaluation had been bent to a radius equal to or smaller than the 1-1/8" radius specified in the ANSI test. Approximately 38% of connector Sets I and II had been bent to a radius of 1/2" or less. There were several bends in each connector and some had been subjected to reverse bends and bends in different planes.
2. A more representative pre-conditioning should include bending straight connectors 180° around a 1/2" radius mandrel, straightening and then bending 180° in the opposite direction around the same mandrel before conducting the ammonia test. Slightly more than one-half of the Set III connectors leaked at the end of the ammonia test.
3. The percent of connectors in Set III which leaked varied significantly from manufacturer to manufacturer. For example, 18% of the connectors in Group B and 73% of the connectors in Group D leaked. The factors influencing these differences were not identified.
4. Compliance with the test procedures used in this study is attainable with present connector designs and manufacturing processes. Approximately one-half of the connectors from Set III did not leak after being pre-conditioned and exposed to ammonia vapor as described above.

#### 4.0 RECOMMENDATIONS

As a result of this study, the following recommendations are made for future work:

1. The ANSI Z21.24 standard should be reviewed by the Z21 Connector Subcommittee to evaluate the need for more severe mechanical pre-conditioning of straight connectors before conducting the ammonia test. Bending straight connectors to a 1/2" radius using the technique developed in this work (bend, straighten, reverse bend) would create brass and coating stresses more representative of actual field conditions than the procedures now used in the Z21.24 standard.
2. In addition to the ANSI Z21.24 standard for indoor connectors, there is also a proposed ANSI standard for connectors used outdoors. Further studies should be undertaken to address conditions pertaining to outdoor use, such as temperature cycling and exposure to ultraviolet light, salt solutions, and animal urine.
3. Since this study has only considered the integrity of indoor connector coatings under mechanical stress, further studies should be undertaken to determine the effects of abrasion of the coating on connector performance for both indoor and outdoor connector applications.
4. Pending review of the Z21.24 connector standard, the manufacturers of coated brass connectors should again request those firms providing packaging services to use procedures which will not create sharp bends in coated connectors. Earlier efforts by connector manufacturers to encourage more care in packaging connectors were apparently unsuccessful.

LOG OF MEETING

DIRECTORATE FOR ENGINEERING SCIENCES

SUBJECT: American National Standard Sub-Committee on Standard for Connectors for Gas Appliances.

DATE OF MEETING: December 1, 1987      PLACE: Harley Hotel  
Cleveland, Ohio

LOG ENTRY SOURCE: Thomas E. Caton, ESMT *T.E.*

DATE OF ENTRY: December 14, 1987, revised February 24, 1988.

COMMISSION ATTENDEES:

Thomas E. Caton, ESMT *Thomas E. Caton*

NON-COMMISSION ATTENDEES:

Stanley L. Blachman, American Gas Association  
Kay Broughton, American Gas Association  
James Brown, U.S. Brass  
Richard Deringer, Columbia Gas Distribution Companies  
Sam Foti, Hose Master, Inc.  
John F. Grehoski, Commonwealth Gas Company  
Daryl L. Hosler, Southern California Gas Company  
Fred Hyman, Brass-Craft Manufacturing Co.  
Charles C. Lamar, Lamar Consultants, Inc.  
Marvin Leffler, Flexible Fabricators, Inc.  
Clarence B. Puchalski, The Peoples Gas Light and Coke Co.  
Allan Rodolitz, Flexible Fabricators, Inc.  
Jerome J. Segal, Dormont Manufacturing Co.  
Jeff D. Walker, General Appliance Manufacturing Inc.

SUMMARY OF MEETING:

- A.            The purpose of this meeting was to decide what proposed revisions to American National Standards for connectors should be accepted. The revisions included:
1.            Proposed revisions to American National Standard for Metal Connectors for Gas Appliances - deferred.
  2.            Proposed revisions to American National Standard for Flexible Connectors of other than all-metal construction - accepted.
  3.            Proposed revision to American National Standard for Movable Gas Appliances to include additional connector diameters - adopted.

4. Consideration of recommendations and comments regarding proposed outdoor connector Standard Z21.75 - deferred for remailing requests for comments. The Subcommittee was receptive to CPSC staff recommendations that indoor flexible connectors should conform to requirements as severe as those for the outdoor connectors. The above remailing will suggest that brass indoor gas connectors should conform to the stricter standards of outdoor connectors.
  5. The review of prospectus entitled, "Evaluation of Connectors for Outdoor Installation", to fund research methods for evaluating coating integrity -sent to ANSI Z21 main committee.
  6. Incorporation in the test methods of leakage tests which allow minimal leakage and reference it in the reconnection of fittings test of the Metal Connector Standard, Z21.24 - adopted.
  7. Motion to reconsider the inclusion of connectors for recreational vehicles in the proposed outdoor connector Standard - passed, a letter will be written to ANSI Z21.
  8. Listing of Stainless Steel (as a separate material) tubing in Connector Standards Z21.24 and Z21.69 -passed.
- B. Thomas Caton was appointed to a committee to supervise the "Evaluation of Connectors for Outdoor Use".
- C. Further information on this meeting can be obtained from Thomas Caton, room 738, 492-6494.
- D. On December 2, 1987, Thomas Caton toured the American Gas Association Laboratories. There he met with Spencer P. Grieco (216) 524-4990 ext. 319, who is the American Gas Association Laboratory contact with CPSC.

DISTRIBUTION

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M. Neily, ESMT

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PROSPECTUS

EVALUATION OF CONNECTORS FOR OUTDOOR INSTALLATION

SUBMITTED BY

AMERICAN GAS ASSOCIATION LABORATORIES

TO

GAS RESEARCH INSTITUTE

JULY, 1987

## EVALUATION OF CONNECTORS FOR OUTDOOR INSTALLATION

### Objective

The objective of this prospectus is to develop performance criteria and test procedures for outdoor corrugated metal connectors.

### Background

Corrugated metal connectors have been used indoors for many years to facilitate the connection of gas-fired equipment to gas supply piping. Depending on the type of equipment being connected, these connectors must conform to either ANSI Z21.24, "Metal Connectors for Gas Appliances", ANSI Z21.45, "Flexible Connectors of Other Than All-Metal Construction for Gas Appliances", or ANSI Z21.69, "Connectors for Movable Gas Appliances".

Corrugated connectors also have been used outdoors for the connection of equipment, such as roof top heating units, to gas supply piping and for connecting manufactured (mobile) homes to the gas supply. Connectors in outdoor applications are exposed to conditions which are not addressed in ANSI Standards Z21.24 and Z21.69. Consequently, a proposed new standard: "Gas Connectors for Connection of Fixed Appliances for Outdoor Installation and Manufactured (Mobile) Homes to the Gas Supply", was developed by the Accredited Standards Committee Z21.

Historically, most connectors have been constructed of brass which, if unprotected, can be susceptible to corrosive attack from various substances, such as household cleaning agents

containing ammonia. For this reason, all of the aforementioned standards include test procedures to evaluate a connector's resistance to corrosive attack by ammonia atmospheres. In order to address this corrosion problem, corrugated brass connectors have been provided with protective coatings such as epoxy.

Although these coatings appear to enhance connector performance, there have been reports that the coating has failed in some instances, exposing the brass to corrosive attack resulting in leakage of gas.

Concern was expressed that the ANSI standards do not adequately address the integrity of connector coatings, particularly with respect to the effects of mechanical stresses applied during packaging, unpackaging, installation and possible subsequent movement of the connected equipment.

Further concern was expressed that coatings on connectors and uncoated connectors used outdoors should be evaluated for the possible effects of sunlight, freezing/thawing, chemical attack from substances such as lawn fertilizers, animal urine, etc.

The Gas Appliance Technology Center (GATC) work at A.G.A.L., sponsored by the Gas Research Institute (GRI), has addressed several aspects of gas connectors. To date, the following work has been completed:

- Tests aimed at evaluating the integrity of coatings on indoor connectors packaged for retail sale, and as stressed during packaging, unpackaging, installation and removal using both the ANSI ammonia test and a new "Holiday" test developed by the Consumer Product Safety Committee based on electrical conductivity through the coating.

- Investigation of a possible correlation between the ammonia and "holiday" tests.

This prospectus is aimed at conducting the needed work for outdoor connectors, to address possible effects of weather, sun, etc, on the integrity of connector coatings or on uncoated connectors.

#### Benefit to Consumer

The program proposed for outdoor connectors will provide the consumer with safer gas appliance connectors. Improved connectors can enhance sales of outdoor gas appliances.

#### Work Statement

The proposed Standard covering "Gas Connectors For Connection of Fixed Appliances for Outdoor Installation and Manufactured (Mobile) Homes to the Gas Supply" will be reviewed.

Unstressed connectors of various materials and designs from several manufacturers of outdoor connectors will be obtained for study. The connectors will be examined visually and microscopically for integrity of the coating. The integrity of the coated connectors will be monitored using the "holiday" test. Both coated and uncoated connectors will be evaluated. The connectors will be subjected to the following test conditions:

- 1) Freezing and thawing in contact with water.
- 2) Flexing at temperature extremes of -40 F and 140 F.
- 3) Exposure to sunlight (ultraviolet light).

- 4) Exposure to animal urine.
- 5) Exposure to lawn/garden fertilizers.

*... PART OF THE SERIES OF METHODS*  
The work will be conducted in consultation with A.G.A.L.'s staff and an advisory group comprised of connector manufacturers, gas utility representatives, and others.

Recommendations will be developed for:

- 1) Test methods to evaluate coating integrity.
- 2) Test methods to evaluate a connectors ability to withstand outdoor installation conditions.

Time and Cost Estimate

It is estimated that this project will require 6 months at a funding level of \$60,000.

22 FEB 1985

TO: Victor Petralia, Director, Midwestern Regional Office  
THROUGH: Otto Hall, AED for Field Operations  
THROUGH: Harry I. Cohen, Director, OPM  
THROUGH: James F. Hoebel, Program Manager, Household  
Structural Products Program, OPM

FROM: Ronald L. Medford, Project Manager, Household Structural  
Products Program, Office of Program Management

SUBJECT: Flexible Connector Press Clippings

Attached are two news clippings sent to the Commission by the Illinois Press Association containing advice on flexible connectors for gas appliances. Both articles contain recommendations, which could possibly result in a hazard for anyone following through on them.

The first article advises consumers to ... "Check the heater for leaks and corrosion." This advice is contrary to the position of the Commission's technical staff working on flexible connectors. It is our position that checking the connector might flex it and, if it has become embrittled by stress corrosion, it could leak gas and cause a fire or explosion. We recommend that consumers request their gas companies to check their connectors.

The second article implies that only connectors manufactured prior to 1968 "may be dangerous." Investigations have shown that even connections made to the 1973 revised ANSI standard are failing in the same modes as some of the older connectors, but perhaps to a lesser degree. Connectors more than several years old should be checked periodically by trained service personnel, not consumers. Any gas odor should be reported immediately and if a strong gas odor is detected, the premises should be evacuated, the gas turned off at the outdoor valve and the gas company notified. We found the advice in the Northern Illinois Gas Company clipping to be reasonably good.

We would very much appreciate it if you would contact the newspapers involved and inform them of our safety concerns and try to get them to run a correction. You may also wish to coordinate this with the gas companies in those localities. Let us know how you make out and if you have any questions, please contact us.

Thanks!

Attachments

6(b) CLEARED: 6-28-88

No Mfrs Identified  
 Excepted  
 Mfrs Notified  
Comments Processed

Illinois Press Association  
(Press Services Inc.)  
929 South Second Street  
Springfield, IL 62704  
217/523 6496

OAK PARK  
Oak leaves 24  
14 701 W  
(Pioneer Chain)

JAN 9 1985

# Protect your home, life; check gas connectors

More than 32 million households in the U.S. use natural gas to cook their food and dry their clothes. Gas leaks, however, can cause fires or explosions. In our exclusive story about faulty flexible gas connectors, we show how manufacturing errors and inter-agency noncommunication can place a large number of people at risk. For example:

- For gas connectors, the manufacturing code had been revised many times to correct design errors. The major revisions were in 1969, 1968 and 1973, when design flaws were found that made the use of these connectors dangerous.

Although some recalls have been instituted over the years, many seem to have been ineffective. Authorities think it is still possible to buy a dangerous, faulty pre-1968 gas connector off the shelf. And that same type of connector, purchased years ago, could still be in your home.

- Until now (literally decades after some gas connectors first became suspect), no effort to record the incidence of failure on a state or nationwide basis had been in effect. This has been the case despite reports that these connectors were failing, causing fires and explosions.

- The data on fires caused by gas appliances has not been analyzed in detail by the state fire marshal or the National Fire Protection Assn. to determine if any have been caused by faulty flexible gas connectors. If this data would have been analyzed earlier, the extent of the problem would have been known and action could have been taken, saving lives and property.

- Where there have been serious local investigations of gas-related fires (Denver, Saginaw, Mich.,), faulty, pre-1968 gas connectors have been found to be the cause of the incidents at a higher rate than was expected. But our question is: Where were the other agencies in other parts of the country? And where were they here?

- Even with current efforts, it will be six months until the Consumer Product Safety Commission has a clear view of the extent of the problem. In six months, there may be thousands of fires in the U.S. How many of these will be caused by those faulty connectors?

In the meantime, you can protect yourself by doing the following:

- Check the connectors on your stove, clothes dryer and water heater for leaks and corrosion.
- If you think there is a leak, or if the connector is pre-1968, call the gas company or qualified service personnel.
- If you smell gas, open the windows, leave the house and call the gas company.
- One fire department recommends you change the connector every three times you move the stove or dryer. And try to move the stove and dryer as little as possible.
- Finally, we recommend you get in touch with your fire department and urge them to start a program (as outlined in the story) such as the one being instituted in Skokie.

Illinois Press Association  
120 South Superior Street  
Springfield, IL 62704  
217/223-8000

FOREST PARK  
Forest Lane  
7,163 W  
Forest View

JAN 29 1966

3

244-26-164

# Faulty gas connectors deadly

## Fire, explosion potential place lives and property at risk

According to 1965 U.S. Census figures, there are more than 20 million residential stoves and independent cooking units in the U.S. Of these, more than 2 million have gas stoves and gas control devices.

In the exclusive report, the safety of American Press have warned many thousands they are at danger of fire or explosion due to faulty flexible gas connectors.

Because of this potential danger, we urge everyone to read the following.

By JULIET HOUMA

When On Oct. 2, 1965, Jim Rodden, 22, finished working in the basement of her home and went upstairs to the

### EXCLUSIVE

bedroom to check some mail. She noticed on the corner of her gas stove and saw the blue flame was out.

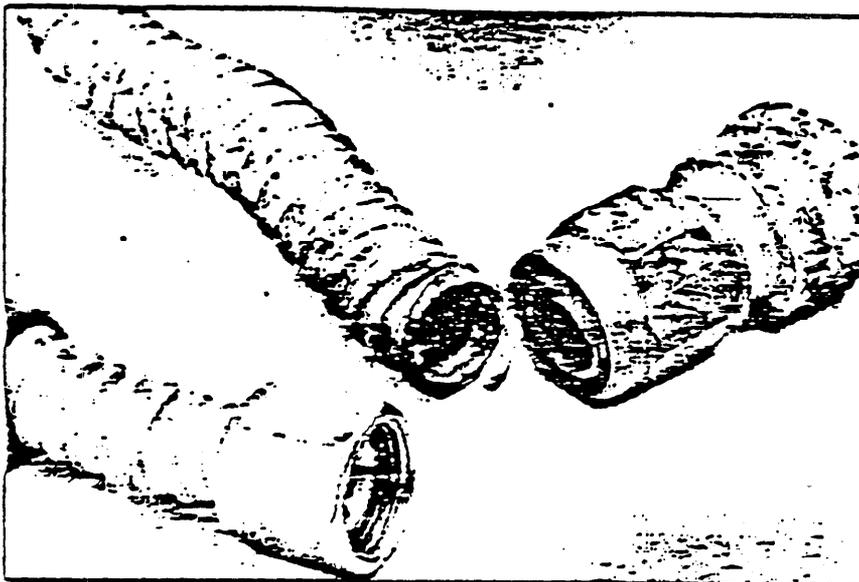
The stove's pilot light had gone out. She struck a match and waiting for the pilot light, seconds later, the "bedroom" home was filled with a red glow and a pile of bricks and broken stoves.

Jim Rodden had three days later of surgery and three more days suffered in the gas explosion.

When last October, a Rosemead home was completely damaged by a fire that started in the kitchen stove when no one was home. A neighbor called the fire department when she saw smoke coming from a window.

Every four years ago in Denver, Colo., fire officials began to notice a disturbing pattern: There were an increasing number of fires and explosions related to the flexible metal devices that connect gas appliances to the gas source. Property loss, injuries and deaths from the fires prompted Denver public safety officials to launch a public education program on the care of flexible gas connectors.

THESE INCIDENTS, and an alarming number of others, have one thing in com-



The flexible gas connector on the right, the kind many people have behind their gas ovens or control devices, developed a hole where the flexible tube was welded to the coupling (now broken apart). Leaks developed along the weld surfaces of some of the older connectors have caused fires or explosions. For comparison, at left, is a non-faulty connector. (Staff photo by Bill Powers)

mon: The fires were started by a leak in the flexible device connecting a gas appliance — a stove, a dryer, even a water heater — to the gas line. In most cases, the connectors involved were manufactured before 1958.

The U.S. Consumer Product Safety Commission (CPSC) warned that some of the "faulty" (under its new name) flexible gas connectors made before 1958 may be

dangerous. The design and common welding materials used for connectors prior to 1958 made certain gas connectors more likely to leak.

When the connectors are designed to be flexible, every time a stove or dryer is moved, stress on the weld joints makes it more likely to leak.

Once you attach a stove to a gas line, you may have it every now and then for

years. But you have no reason to change it," said Vic Pytko, regional director of the Consumer Product Safety Commission. "But every consumer product eventually fails. Some fail in a safe mode, such as a light bulb. Others fail in a critical mode. Gas connectors fall in a critical mode. Gas escapes."

He said he hopes, at the close of the gas

(Continued on page 10)

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Continued from page 3

24x-26x-164x

the Gas Assn. for testing and certification. The code was revised in 1983, changing the design of the connector between the copper or stainless flange and the coating on the end, said Forrest, manager of the gas association.

**IN THE OLDER MODELS**, the new and the coating were merely added to the gas pipe, and in the new design, one piece was a 1/8 inch gas pipe, the other piece, creating a stronger bond at the end. In the Amendment fire in October, the faulty gas connector, which made Amstar, was manufactured by a company that went out of business in 1981. It had the design, the one-to-one bond.

The design change did not correct all the weaknesses in the existing connector. In 1983, the code was revised again to make the connection as a component of the existing material. Manufacturers said, Phillips has been found to be a source of difficulty, according to the code.

**TO EDUCATE** the public, Northern Illinois Gas Assn. has distributed leaflets and working with fire departments to the consumer whenever they come into the gas line. The most recent one arrived in the month.

In a few areas across the country, some consumer effort has been made to notify the public about the problem. Some safety officials at Chicago, worked on the problem with gas companies. First in September, which is a city-wide program there.

Chicago Chief O'Connell is trying to get the ball rolling here.

But in most areas, there has been little effort to get the message out to consumers or fire departments.

In working to coordinate efforts, Northern Illinois Gas Assn. has distributed leaflets to fire departments and fire departments to the consumer whenever they come into the gas line. The most recent one arrived in the month.

In a few areas across the country, some consumer effort has been made to notify the public about the problem. Some safety officials at Chicago, worked on the problem with gas companies. First in September, which is a city-wide program there.

"The only way to get it done is by going through the normal process," Quinlan said.

**PETRALIA SAID** it is difficult to measure the number of fires that caused by faulty connectors because few have the time and talent to do so.

"It depends on who has taken the time to look," he said. "In Denver, the police have looked and, in most cases, every time they worked, turned up (gas connectors). In Chicago, they looked and they found a number of gas connector problems."

The Consumer Product Safety Commission probably has the most overall view of the gas connector situation. Petralia said the commission is in the process of a nationwide survey of fire departments and gas companies to find the extent of the problem, and what kind of tests exist. The survey is not expected to be completed for another six months.

The commission did a national survey of fire departments and gas companies in 1983. The survey was done in the form of a Chicago survey. "Chicago survey" was the name of the survey. The survey was done in the form of a Chicago survey.

Quinlan said that all the information was not coming in to the gas companies which were "dead" to him, and it was not coming in to the gas companies which were "dead" to him, and it was not coming in to the gas companies which were "dead" to him.

A connector that is made in Chicago and other nearby connectors has been revealed by the commission. Although it is difficult to find out gas connectors it is not that easy, Petralia said.

Even though changes were made in 1983 and 1984, many old models were not recalled. Phillips connectors may still be in use.

"Before we can recall, we have to have a number of defects or a pattern of recall," Petralia said. "So far we can't recall it is a manufacturer's or a company's problem."

The American Gas Assn. certifies Phillips gas connectors manufactured by 10 different companies, at least two of them foreign. Although the gas association is not a recognized gas appliance certification agency, it is a manufacturer of gas appliances. The industry certifies that they are designed to be completely safe and that they meet the safety standards of the gas companies of all ages in the current regulations.

But, the Consumer Product Safety Commission's studies and warnings are not enough to the public. Petralia said that Phillips and others need to do more. Phillips and others need to do more. Phillips and others need to do more.

Phillips and other officials are trying to get a program started. Phillips and other officials are trying to get a program started. Phillips and other officials are trying to get a program started.

## 24x-26x-164x Faulty gas connectors

connectors, that the residents who smell the gas before there is a fire and take the necessary steps. Open the windows, get out of the house and call the gas company.

But sometimes no one is home. Or the residents don't recognize the odor, and the leaking gas reaches the gas light or another source of ignition. Then there is a fire or explosion.

Everyone concerned with the problem stressed that this is not a panic situation, but people should be aware of the gas connectors in their homes and take proper care of them (see accompanying illustrations).

"What they do know, it is clear that a gas leak is not a good thing," said Petralia. "But you have to ask yourself, is the connector safe? The many gas connectors are not safe. There are 10 million in use in the country. 12 million have gas, and could cause the one, two or three connectors."

**ONE CHICAGO-AREA** fire department is taking steps to prevent such incidents. Chicago Fire Chief Tom Quinlan has been working closely during the last few months with the Northern Illinois Gas Assn. and the safety commission to develop a program to stop the growing number of connector-related fires.

The Chicago Fire Dept. has been in the process of a survey. Over the last five years we have had at least 20 incidents involving faulty gas connectors," Quinlan said. "We had no recall in 1983."

Chief Tom Quinlan of the Chicago Fire Dept. estimated that if these incidents each year were fires or explosions.

"For some reason, during the last 12 months, the number seems to have increased," he said.

Quinlan said, a consumer affairs specialist for the Consumer Product Safety Commission, advised that older gas connector designs seem to be increasing. "A lot of problems have been reported in the past 12 months and about 100,000 are still in use. It could be a problem for the future."

"If the cause where a fire occurs is in a neighborhood where all the houses were built around the same time, by the same contractor, they probably use the same connectors," Petralia said.

**THAT MAY BE** the case in Chicago. "There were really over a short period of time," Quinlan said. "It is the case, we feel we may have a problem."

Chief Quinlan has been fortunate, according to fire officials. No major investigations of gas connectors has occurred in the past.

Consumer Product Safety officials won't estimate the number of potentially faulty gas connectors in use today. Efforts to record incidences of them have not gone beyond the local level.

Consumer Product Safety officials say they certain gas connectors manufactured before 1983 are potentially dangerous. But cases are being reported.

They recommend people check gas connectors periodically for evidence of corrosion and leakage. But, they stress, do not move the stove or appliance if you suspect there is a leak, or that the connector is a Phillips model. This may create or increase a leak, or heat the connector. They advise people to call a qualified service agency or the gas company to check it.

**IN THE 1980S**, the number of gas connectors that had been developed in the past few years had increased. Since gas leaks, a considerable amount was done to reduce the number of gas connectors.

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## Gas company gives advice

The Northern Illinois Gas Company and the Consumer Product Safety Commission recommend the following tips for the care of flexible gas connectors:

- Some flexible connectors manufactured before 1968 may be unsafe, the Consumer Product Safety Commission has warned. If you are concerned, **DO NOT MOVE THE APPLIANCE**, you may cause a gas rupture. Instead, call a qualified service agent or NI-Gas to make the inspection.
- Regular inspection of connectors is recommended. If one shows evidence of damage or corrosion, have it replaced.
- A connector should be located where no one will step, sit or lean on it. Never install one through a wall, floor or ceiling. Use only one connector per appliance, and make sure it is no longer than six feet.
- Be very careful when moving an appliance for cleaning. Avoid bumping or bending the flexible connector.
- Check connectors periodically for corrosion. Detergent, cleaning solvent, ammonia and cooking grease can cause green spots to develop on brass connectors or grayish-white powder residue on aluminum connectors. If corrosion occurs, the connector should be replaced.
- Check around your appliance connectors occasionally for gas odor. If you smell gas, telephone the gas company immediately. Emergency numbers are listed in your local telephone directory.
- If the gas odor is very strong, open windows and doors to ventilate and get out of the house. Do not turn any electrical switches on or off. Do not light matches, smoke cigarettes or create any source of combustion. Telephone the gas company from a neighbor's house.

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