Minutes of Meeting

of

SUBCOMMITTEE ON STANDARDS FOR
CONNECTORS FOR GAS APPLIANCES

(Subcommittee of Accredited Standards Committee Z21)

Held at the
American Gas Association
1515 Wilson Boulevard
Arlington, Virginia 22209

January 29, 1985

The meeting was called to order by the Chairman at 9:10 A.M., Eastern Standard Time, Tuesday, January 29, 1985. During the course of the meeting, the following were in attendance:

Members Present or Represented:

Richard Deringer, Chairman
Richard A. Beals
Fred Hyman
Charles C. Lamar
Marvin Leffler
Don Maher (Represented by Randell M. Smith)
John Marcus
Kenneth M. Margossian
James N. Martin
Clarence B. Puchalski
Jerome J. Segal

Administrative Staff (Non-Voting):

Kay E. Broughton, Acting Secretary

Guests:

Vance G. Anderson, Consumers Power Company
S. L. Blachman, American Gas Association Laboratories
Thomas Z. Cooper, U. S. Consumer Product Safety Commission
B. W. Crawford, American Gas Association Laboratories
Ray Eisbrenner, American Gas Association
Howard I. Forman, Chairman, Accredited Standards Committee Z21
S. J. Foti, Hose Master
Sidney H. Greenfeld, U. S. Consumer Product Safety Commission
Jack Grehoski, Common Wealth Gas Company
James F. Hoebel, U. S. Consumer Product Safety Commission
Theodore C. Kuykendal, Flexible Fabricators, Inc.

J. P. Langmead, Gas Appliance Manufacturers Association
A. B. Mayernik, Dormont Manufacturing Company
Ronald L. Medford, U. S. Consumer Product Safety Commission
Paula Present, U. S. Consumer Product Safety Commission
Jack Stein, Dormont Manufacturing Company
Joseph R. Villoni, Corona Products
William Walton, U. S. Consumer Product Safety Commission

The minutes of the subcommittee's April 24, 1984 meeting were approved as corrected.

ITEM 1. Date Code Marking Specification in Connector Standards

The subcommittee reconsidered a comment from Mr. Donald R. Mackay, a member of the Z21 Committee, that the connector standards be revised to specify a date code marking which would include the month, as well as the year, of manufacture, as specified in other Z21 accessory standards. The subcommittee had previously considered this comment at its July 1983 meeting but did not revise the connector standards on the basis that it was not practical since the manufacture and assembly of the component parts of connectors normally are not a continuous process. The Z21 Committee returned the subject to the subcommittee following an additional comment from Mr. Mackay that it is the date of manufacture of the tubing which is significant and he could not see why the month of manufacture could not easily be added to the identification ring.

The subcommittee commented it had not received enough information on why Mr. Mackay believed the date of manufacture of the tubing was significant. Mr. Howard I. Forman, Chairman of the Z21 Committee, who was present at the meeting, was questioned whether in the future the Z21 Committee could give more detailed information when it returns a subject to one of its subcommittees for reconsideration. Mr. Forman agreed this was a logical request and agreed the Z21 Committee would consider it.

During reconsideration of the date code marking the subcommittee agreed a month date could be added to the nonremovable ring now bearing the year date; it also agreed it would not have any significance for the final assembled connector. The subcommittee explained that, in the manufacture of the connector, there are four basic steps: the manufacture of the tubing, annealing of the tubing, coating of the tubing, and flaring. Each of these steps is done in batches; however, the batch resulting from step one will not necessarily be the same batch in steps two, three or four since different batches are frequently intermixed at each step. The final assembly, adding on the end fittings, is done on the basis of need. Therefore, addition of a month date code marking indicating the date step one was completed could be misleading since (1) the steps in the manufacturing sequence may have been completed at different times and (2) for purposes of recall, the month date code would not be of help if the defect was the result of steps two, three or four.

For the above reasons, the subcommittee agreed adding the month date code would not be helpful in a recall and could actually be misleading. Therefore, it did not revise the connector standards as suggested by Mr. Mackay.

ITEM 2. Consideration of Requiring Union Fittings at Both Ends of Movable Appliance Connectors

The subcommittee reviewed October 31 and November 27, 1984 letters from Mr. J. J. Segal, Dormont Manufacturing Company, requesting that the movable connector standard (Z21.69) be revised to specify union fittings on both ends of the connector instead of one end only, as is presently specified.

The subcommittee was informed that Z21.69 was originally intended to cover an assembly of a connector and a quick-disconnect (q.d.) device. The standard had specified a union fitting at one end of the assembly for attachment to the appliance with the q.d. at the other end. When Z21.69 was revised to cover the connector only (without the q.d.), no revision was made to specify union fittings at both ends, as is presently specified in the metal connector (Z21.24) and other than all-metal connector (Z21.45) standards.

Following discussion, the subcommittee adopted for distribution for review and comment a proposed revision to Z21.69 to require union fittings at both ends of the connector, as shown in Appendix C to these minutes. The reason for the revision is stated in the "Rationale" following the proposal.

The subcommittee also recommended to the Z21 Committee an editorial revision to Z21.45 which will clarify that a q.d. is considered a union fitting, as shown in Appendix A to these minutes. The reason for this revision is stated in the "Remarks" following the proposal. This revision is being held in abeyance until more substantive revisions to Z21.45 are recommended to the Z21 Committee.

ITEM 3. Report on Appliance Connector Field Service History

ITEM 4. U. S. Consumer Product Safety Commission Status Report on Corrugated Connectors

and

ITEM 6. Analysis of Denver Fire Department Reports Involving Appliance Connectors

These three items were discussed together as they all dealt with reported field problems with connectors.

The appliance connector field history reported under Item 3 was a summarization of answers to questions on flexible connector usage and service history posed by Mr. S. L. Blachman, American Gas Association (A.G.A.) Laboratories, to members of A.G.A.'s Customer Service and Utilization Committee of which he is a member. Item 4 presented the subcommittee with excerpts from the U. S. Consumer Product Safety Commission's (CPSC) status report on Fiscal Year 1984 activities in the Gas Heating Project relative to corrugated connectors. The data base used by CPSC included 78 fire department reports from Denver, Colorado, for the year 1983 and 29 from Saginaw, Michigan. The executive summary of this report states:

"2. Flexible Gas Connectors - Gathered information which indicates connectors are continuing to stress-corrode in spite of the 1973 ANSI revisions to prevent this problem. More detailed information will be gathered during FY'85 and further improvements to the voluntary standard will be recommended"

[The 1973 revision to the metal connector standard (Z21.24) was to make the resistance to ammonia atmosphere test mandatory.]

Included in this status report were 36 in-depth investigations on accidents with gas appliances which used a corrugated connector to connect the appliance to the gas supply. In Item 6, Mr. Blachman analyzed 96 reports from the 1982 files of the Denver fire department on incidents involving flexible connectors.

Mr. Richard Deringer, subcommittee Chairman, reported on 1,050,000 service calls made by Columbia Gas Distribution Company over a 7-month period, of which 38 percent were odor complaints. 433 of the calls involved failures of connectors, 74 of which were coated. An analysis of the 433 failed connectors was distributed. Those CPSC staff members present requested that, if possible, Columbia Gas save the failed connectors for their inspection. Mr. Deringer indicated Columbia Gas could not comply since it does not make repairs but shuts off the gas until the connector, which is the property of the consumer, is replaced. Mr. Deringer further stated that Columbia Gas does not believe there is a serious problem with corrugated connectors; other utility subcommittee members concurred.

During discussion, the subcommittee reviewed possible causes of the connector failures, including age, coating quality, misapplication, misuse and stress corrosion cracking. Mr. Charles C. Lamar, a subcommittee member, suggested that straightening of a connector after conduct of the ammonia atmosphere test specified in the metal connector standard (Z21.24) and sequential testing would test for stress corrosion and the quality of the connector coating. He stated there was no test in Z21.24 to test for completeness and quality of the coating. Another subcommittee member indicated he believed the ammonia atmosphere test was already too severe and that sequential testing would destroy a connector. Further discussion focused on whether defective coatings could be the result of poor quality control rather than inherent defects in the coatings.

The subcommittee reviewed the CPSC in-depth investigations (IDI) included with Item 4 and pointed out the data collected was not sufficient to determine whether the connectors were the causes of the reported incidents. CPSC agreed the guidelines for collecting data for the IDI's would be improved to avoid some of the uncertainties in the present data. CPSC staff stated that, while the connector problem is not quantifiable and there is weakness in the data, there is sufficient data to justify consideration by the subcommittee of revisions to the Z21.24 standard to address connector coatings.

Since no agreement on the above questions could be reached at this meeting, the subcommittee appointed a working group consisting of the Technical Committee of the Connector Division of the Gas Appliance Manufacturers Association and members of CPSC staff to study connector coatings for both indoor and outdoor use and to determine the necessity of developing tests for connector coatings and, if such tests are necessary, to develop a proposed test(s).

ITEM 5. Packaging of Connectors For Retail Sale

At its April 24, 1984 meeting, the subcommittee was informed of corrugated connectors coiled when packaged for sale with a radius less than the mandrel specified for the ammonia atmosphere test in the metal connector standard (Z21.24). The manufacturer subcommittee members had stated that, to their knowledge, the connectors are shipped from the factory without being coiled and indicated they would contact their distributors and request them not to coil the connectors prior to sale. The Gas Appliance Manufacturers Association was also requested to suggest the same action to connector manufacturers that are not members of the subcommittee. Mr. Sidney H. Greenfeld, U. S. Consumer Product Safety Commission (CPSC), had stated CPSC would obtain samples from the marketplace for test and report the results at the subcommittee's next meeting.

The subcommittee reviewed a June 28, 1984 letter from Mr. O. C. Davis, former chairman of the subcommittee, to corrugated connector manufacturers, which transmitted a May 18, 1984 letter from Mr. Edgar Morgan, Executive Director, CPSC. In his letter Mr. Morgan stated that connectors complying with Z21.24, but coiled with a minimum bend radius of 7/8 inch (rather than the specified 2 1/4-inch mandrel diameter) may be stressed sufficiently prior to sale to make them vulnerable to stress corrosion in use. He informed Mr. Davis that CPSC intended to purchase some packaged connectors, as previously stated by Mr. Greenfeld, and evaluate them using the ammonia atmosphere test in Z21.24. He encouraged manufacturers to also test some packaged connectors and Mr. Davis emphasized this in his transmittal letter.

The subcommittee reviewed a tabulation of results obtained on 28 packaged connectors tested by CPSC. Twenty-four of these connectors were of the coated, single-wall brass construction and four were double-wall, uncoated connectors. Ten of the coated connectors failed the test. One of the double-wall connectors stress cracked through the brass outer surface, but did not leak, since the inner wall remained unperforated.

All the manufacturer members of the subcommittee agreed that connectors should not be tightly coiled since this might damage the coating in addition to causing stresses. A possible minimum coil diameter of 2 1/2 inches was suggested.

Following discussion, the subcommittee recommended to the Gas Appliance Manufacturers Association that it issue a bulletin cautioning against tight coiling of packaged connectors with the reasons therefore.

ITEM 7. GAIN Report on Connector Failures in Agricultural Spraying and Seaside Locations

and

ITEM 8. Further Consideration of Subcommittee Action on Proposed Mobile Home Connector Standard

Under Item 7, the subcommittee reviewed a June 21, 1984 letter from Mr. J. R. Hudson, Pacific Gas and Electric (PG&E), forwarding copies of two Gas Appliance Improvement Network (GAIN) reports on metal connector corrosion problems. In one report, the corrosion was attributed to agricultural sprays and in other to sea salt. Also reviewed were the failure analyses of two different connectors conducted by PG&E and dated July 1, 1983. In these analyses, the corrosion was attributed to agricultural sprays which reached the connector tubing at coating perforations.

In addition, the subcommittee examined two coated brass corrugated connectors from Mr. O. C. Davis, Southern California Gas Company. Mr. Davis stated in a June 6, 1984 letter that these connectors were installed on outdoor rooftop appliances in the lower San Joaquin Valley. The local atmosphere included gases from nearby refineries (which were sulfurous among other things), along with insecticide and fertilizer effluents from nearby agriculture, and of course, intense sunlight. From the extent of cracking at corrugations, ammonia was undoubtedly present. Chlorides could also have been present from the insecticides and ammonia from the fertilizers. Mr. Davis further stated that normal connector life expectancy under the above conditions is about one year, and therefore, the Southern California Gas Company recommends the use of stainless steel connectors. Mr. Davis suggested a notice on coated brass connectors that they are not for use outdoors.

All the above mentioned connectors were design certified under the metal connector standard (Z21.24).

Under Item 8, the subcommittee was informed the proposed mobile home connector standard, which it had recommended to the Z21 Committee at its April 24, 1984 meeting, was not submitted to the Z21 Committee following receipt of a December 13, 1984 letter from Mr. Charles C. Lamar, Lamar Consultants, Inc. This letter, which was presented to the subcommittee, requested the Z21 Committee to review the subcommittee's response, developed at its April 1984 meeting, to his comments on what he believed were deficiencies in the testing of mobile home connector coatings in the proposed standard.

The subcommittee, agreeing the proposed standard should be submitted to the Z21 Committee as soon as possible, did not consider Mr. Lamar's letter persuasive in light of its actions earlier in this meeting to address coatings of connectors for indoor and outdoor use, as discussed under Items 3, 4 and 6 of these minutes.

Following discussion, the subcommittee, agreeing a mobile home connector rather than a connector design certified under Z21.24 should be used outdoors, modified the title of the proposed mobile home connector standard to include connectors for fixed appliances installed outdoors, pointing out

that such a connector would be used under the same conditions (outdoors) as a connector for a mobile home. The subcommittee agreed that, once the proposed standard was approved by the American National Standards Institute, it would then revise the scope of Z21.24 to cover connectors for indoor use only.

The subcommittee requested staff to develop the necessary modifications to the proposed standard in line with this revised title and to forward them to a working group, comprised of Mr. Richard Deringer, subcommittee Chairman, Mr. Kenneth M. Margossian and Dr. John Marcus, for review prior to submitting them to the Z21 Committee for approval. These revisions are shown in Appendix B to these minutes. The "REMARKS" following 1.1 state the reasons for the revisions.

ITEM 9. Protection of Brass Metal Connectors When Used With Fuel Gases Containing More Than a Certain Amount of Hydrogen Sulfide

At its April 24, 1984 meeting, the subcommittee considered comments and a letter from Mr. Max D. Howard, Citizens Gas and Coke Utility, proposing a limitation on the use of brass metal connectors with gases containing more than a certain amount of sulfur. The subcommittee had questioned how the user or installer would know how many grains of hydrogen sulfide the gas contained so they could make a judgment on whether a brass connector or one with brass fittings could be used. It was the opinion of the subcommittee that it is up to the local gas supplier and the authority have jurisdiction to enforce the National Fuel Gas Code. The subcommittee therefore took no action on the recommendation.

The subcommittee reviewed an April 27, 1984 letter from Mr. John L. Gaia, Robertshaw Controls, in which he requested the subcommittee to again review Mr. Howard's comments.

The subcommittee was informed that Mr. Howard had been sent a copy of Mr. Gaia's letter and had been asked if he might have any additional information to aid the subcommittee in its deliberations. Since no additional information was received from Mr. Howard and since the subcommittee agreed it is not aware of any problems regarding connectors used with gas containing hydrogen sulfide, it took no action on Mr. Howard's comments.

ITEM 10. Clarification of Instruction Provision in Movable Appliance Connector Standard Regarding Capacity of Quick-Disconnect Device

The subcommittee reviewed a January 11, 1985 interoffice memorandum from Mr. G. J. Atoulikian, American Gas Association Laboratories, regarding an instruction provision (1.7.6) in the movable appliance connector standard (Z21.69). Mr. Atoulikian requested the subcommittee to clarify what information needs to be supplied with regard to the capacity of a quick-disconnect device which is used with a connector complying with Z21.69.

Following discussion, the subcommittee agreed this provision needed clarification as to what capacities should be given in the instruction provisions and adopted for distribution for review and comment proposed revisions to 1.7.6 in Z21.69, as shown in Appendix C to these minutes. The reasons for these revisions are stated in the "Rationale" following proposed 1.7.6.

There being no further business before the subcommittee, the Chairman thanked the members for their cooperation and adjourned the meeting at 5:20 P.M.

KAY E. BROUGHTON
Acting Secretary