TECH-SIL, INC.

TELEPHONE: 781-7900
AREA CODE: 713

P. O. BOX 42999
SUITE 562
HOUSTON, TEXAS 77042

NRC PUBLIC DOCUMENT ROOM

DOCKET NUMBER
PROPOSED RULE PR- Misc. Notice
Reg. Guide

September 18, 1979

Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Docketing and Service Branch

Subject: Draft Regulatory Guide and Value/Impact Statement, Dated July 1979 Division 1 Task RS 809-5 titled QUALIFICATION TEST FOR CABLE PENETRATION FIRE STOPS FOR USE IN NUCLEAR POWER PLANTS, Comments on.

Gentlemen:

The following comments are respectfully submitted for consideration. These comments cover items in the proposed guide and in the referenced document (IEEE-634) as well as subjects believed to be relevant but which are not covered by either. Should any clarification be required, please contact me.

1214 144

Acknowledged by card. 9/28

7910250208

C O M M E N T S

A. General - This guide should be made applicable to all fire stops placed in rated barriers, whether penetrants are mechanical, electrical, or non-existent. Any fire zone within a plant can be expected to have cables and raceways as well as piping systems and HVAC ducting penetrating the zone boundary. In addition, seismic gaps and construction openings may exist in these boundaries. All fire stops should provide the same level of protection and should be tested to the same standard. This level of coverage should be apparent in the title, Discussion and Regulatory Position, regardless of the limited scope of the referenced standard.

B. Comments on Item C2

Additional items should be included,

e. pipes with insulations of various types;
f. separability of cables, particularly in trays, at time of sealant application

Insulated pipes are of concern because of the insulation itself. This is particularly true of cold or anti-sweat insulation as its reaction at high temperature is questionable and its existence on the unexposed side should cause a significant temperature rise on the pipe itself, and on the insulation.

Separability of cables is particularly significant to penetration sealing because where cables can not be separated, the sealant may not get under cables in solid back trays or between cables in heavily packed bundles. This can result in through openings in the penetration fire stop via the spaces between cables. The addition of a pressure differential from the fire side to the cold side will ensure some heat passing via this route if it exists. When a fire stop is installed for test purposes it is very easy to separate cables and eliminate these openings. In actual field installations it is frequently not possible to separate cables due to routing and pulling methods used. In short, cables must not be separated when installing fire stops for testing unless actual plant conditions allow separation and installation procedures require separation.

C. Comments on Item C3

As written, this item would seem to imply that a fire stop which has been resealed would require that its entire original prototype be retested. Some types of materials have been repaired and tested in small fire stops with results showing positive evidence that the repaired portion of the fire stop was equal to and indistinguishable from the original. Repair procedures should be qualified by testing, but entire seal configurations should not automatically require retesting because of repair requirements.

D. Comments on Item C4

Required fire ratings are based on combustible loadings in the area. One hour or less ratings are rare in nuclear power plants and must be justified by very limited amounts of combustible material. Despite this, the requirement proposed would modify the standard fire. The extent of modification is not clear since the configuration is not clear.

When an extra two feet of cable is included, where does it go? Should the cable protrude straight out from the fire stop, or should it be bundled up at the stop? Should the cables stay in raceways if included in the design?

Where do the thermocouples go? Must the thermocouple placement meet the requirements of IEEE 634 and be within specified distance from the cables or are the thermocouples to be set farther away from the seal? In the latter case the fire stop face temperature could be lower than that obtained by the IEEE 634 requirements depending on the input from the cables. If indeed this procedure results in a more severe test, then the barrier which ultimately will be sealed should also be exposed to the more severe condition.

This situation should be dealt with through rules for establishing the rating requirement for the zone boundaries rather than modification of testing methods.

E. Comments on Item C5

A clarification is required on the terminology "...unsymetrical with respect to the use and application of fire stop materials...". The situations depicted in Fig. A6 and A7 of IEEE 634-1978 are unsymetrical and should require testing from both directions. However, the case of a fire stop totally enclosed in a barrier is not clear. As an example, take a 12 inch fire stop that is symetrical in a 24 inch thick barrier. This fire stop would normally be installed flush with one face of the barrier. Testing of this fire stop flush with the barrier face on the fire side should be sufficient to qualify the fire stop for any position within the barrier so long as the fire stop is totally enclosed by the barrier.

F. Comments on Item C6

Some clarification should be made on this item. An interface type is defined as "any physical contact between a specific pair of dissimilar materials". Since the "penetration" is under discussion, this would imply that thermocouples must be placed at several locations inside a cable, or for insulated pipes, at the pipe-insulation point, the insulation-jacket point, and the jacket-sealant point. In addition where the fire stop is constructed of multiple materials, these interfaces should get thermocouples. Since the unexposed side temperatures are in question, it would seem that temperature measurements should be required only on the surface of the fire stop where sealant and penetrants meet and one inch away from these locations on the free surface where required.

The requirements of three thermocouples for each interface type and the addition of measurements one inch away from each interface type are going to severely tax the capabilities of some fire testing facilities, particularly on large complicated fire stop designs. Hence temperature measurement requirements that do not directly impact acceptability of the tested design should be deleted.

G. Comments on IEEE 634-1978:

5.1.1 Applicability notes that the intent is not to test the fire resistive barrier. Then 5.2.3 states "Likewise, arrays of openings qualify similar arrays with the same or larger spacing". 5.2.3 then is concerned in part with that portion of the basic barrier which may exist between two or more fire stops. This is an important consideration, but testing in a concrete slab does not confirm spacing acceptability in plaster, gypsum board, or metal siding fire rated barriers. In fact the legitamacy of a fire stop must to some degree acknowledge the barrier which totally supports the fire stop. Any flexing or warpage of the basic barrier will jeopardize the fire stop in that barrier, particularly if the fire stop itself lacks flexability. Some engineering judgement can be applied. For example, a fire stop design, qualified in a six inch thick reinforced concrete barrier should not require requalification in a two foot thick reinforced concrete barrier. This qualification can not however, be extended to totally different types of barriers.

H. 5.3.12 Hose Stream Test

This section requires that a hose stream test be conducted immediately following the fire endurance test, and then goes on to define two different hose streams, for applications dependent upon the type of facility. For power-generating stations the stream must be provided by "..a 1½ inch hose discharging through a nozzle approved for used on fires in electrical equipment producing a long-range-narrow-angle (30-90° set at 30° included angle) high velocity spray only..".

"For other applicable industrial and commercial establishments..", the stream must be provided by "..a 2½ inch national standard playpipe equipped with a 1 1/8 inch tip, nozzle pressure of 30 p/in²...".

Having witnessed both of these hose stream tests, run consecutively on a single specimen, it was clear that the spray as required for power-generating stations, is no where near as severe as the stream applied to other applicable industrial and commercial establishments. No statement is provided as to why this situation exists, or why only the weak hose stream test is to be used for seals to be qualified for use in power-generating stations.

Hose stream tests verify a level of structural integrity. As this requirement now stands, nuclear power plant fire stops would be allowed a very low level of structural integrity, while a much higher level of structural integrity would be required for fire stops in non-power-generating facilities.

The wording "...a 1½ inch hose discharging through a nozzle approved, for use on fires in electrical equipment..." seems to imply that only electrical equipment exists in power-generating stations and further that only 1½ inch fire hoses are allowed in power-generating stations. Additionally one must also assume that the only possible justification for structural integrity in a fire stop is to survive a hose stream. This logic is not sufficient to support the difference in hose stream requirements.

Since the hose stream test using the 2½ inch national standard playpipe has been used and passed by several fire stop systems and since this test is required on non-power-generating facilities, it should be required on fire stop qualified for nuclear power plants.

I. Additional Discussion

One area that deserves clarification is the extent of qualification obtained by a test. Some areas have been defined such as the proximity of one module to another and the overall size of a module. However, there are other significant items of concern. The primary item relates to electrical cables. When a test is successfully completed with cables from a given manufacturer, similar fire stops with those specific cables are qualified. The question then arises, would similar fire stops containing cable from another manufacturer, but having the same generic jacket material be qualified? Would any other cables be acceptable for use in the design tested? It would seem clear that cables having a jacket material possessing lower ignition temperatures would not be acceptable in the otherwise qualified design.

There is good reason to allow and even encourage generic testing. Some rules however, should be established as to specific requirements for extended applicability of tests.

J. Another neglected area is that of very long but narrow fire stops, such as those in seismic gaps or around larger pipes. Significant difficulty will be experienced in testing a single fire stop equal in area to that of a seismic gap next to a containment.

It is apparent however, that a six inch wide seismic gap that is 200 feet long does not represent nearly the problem of a 10 foot square opening, although each contains 100 square feet of free area.

A suggested ruling might be:

Openings having a maximum width of 1/3 or less of the minimum dimension of a tested opening are exempt from the total area requirement imposed by the tested openings free area.

K. One last concern is with the potential impact of ambient conditions on the test results. Ambient condition controls or limits must be included in order to have comparable test results. The use of controls required by ASTM E-119 would be acceptable and would ensure proper comparability between fire stop and barrier tests.

Sincerely,

John D Bigbee

John D. Bigbee - P.E.