

Standards in Fireproofing

*iaWCC/GDCI's Procedure
for Inspection Enhances
Workmanship
Measure*



by Frank X. Neuwirth

In the last seven or eight years, an increasing awareness of fireproofing requirements by code and building officials and specifiers has brought to light a definitive need for proper inspection of applied materials.

Sprayed materials, unless laboratory evaluated, have been historically difficult to evaluate in terms of workmanship.

Prior to 1971, the ASTM (E119) fire test procedure guidelines used by Underwriters Laboratories (Underwriters Laboratories, Inc. Northbrook, IL and Underwriters Laboratories of Canada), allowed extensive structural movement of beams and deck systems during a fire before considering failure, providing concrete slabs above the beams stayed within certain temperature limits.

Beams treated with fire protection tested under those guidelines often attained a 4 hour fire endurance rating, before achieving structural collapse.

Today, using the revised ASTM E119 guidelines, a beam treated and tested in the same manner, would achieve only a 1 hour rating; if tested under certain conditions, a maximum 2 hour rating can be achieved.

Unfortunately, there are still a number of code standards which vary greatly in interpretation and use of known fire technologies. Different criteria are applied to results obtained from tests and engineering evaluations performed by UL laboratories, resulting in a myriad of codes and requirements by city and state agencies.

Often, fireproofing specifications

are improper or incomplete, resulting in misunderstandings and incorrect interpretations, a leading cause for the wide spread of dollars in bid submittals.

The criteria for columns has not been changed. Currently, a temperature limit of 1000°F average is imposed.

Although the above illustrations are basic, they nevertheless, point to the need of unified building codes, (certainly a topic not to be treated lightly) of which fireproofing performance standards are a small, but very significant part.

Largely because of these reasons, the iaWCC/GDCI Technical Committee No. 4 several years ago actively involved itself in preparing a document on field-inspection of fireproofing products as a suitable tool for standardization of methods.

It was the intent of this committee to provide building officials and testing agencies with a guide on *how to perform tests*, rather than provide methods or guidelines on judgments of code adherence. The latter subject is currently under intense study by this Committee and when completed a guideline will be published.

To date, thousands of copies of the "iaWCC/GDCI Inspection Procedure" have been distributed. It is the official procedure that has been approved by iaWCC/GDCI, and by the major manufacturers of sprayed fireproofing materials:

- W. R. Grace & Co., Construction Products Division*
- SprayCraft Corporation*
- American Energy Products (formerly SprayDon Corp.)*
- U.S. Mineral Products Co., CAFCO Division*

The procedure was also reviewed by the following organizations, whose constructive comments were incorporated:

- American Iron and Steel Institute*
- Carboline Corporation*
- Insurance Service Office*
- Southeast Lathing and Plaster-*

- ing Bureau, Inc.*
- Sprayed Mineral Fiber Manufacturers Association*
- Underwriters Laboratories, Inc.*
- Underwriters Laboratories of Canada*
- United States Gypsum Company*
- U.S. Department of Health, Education and Welfare*

The results of the combined efforts of these organizations, manufacturers, and contractors is the "Inspection Procedure for Field Applied" Sprayed Fireproofing Materials".

The procedure booklet is available as a handy pocket edition from iaWCC/GDCI (for details see page 18).

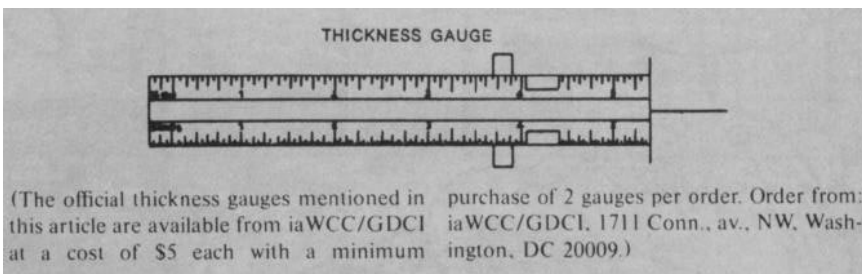
Procedure Guideline

Basically, the guideline establishes methods of determining the 2 most significant aspects of fireproofing:

- A. Determining Thickness*
- B. Establishing Applied Density*

A third, and optional criteria is an adhesion/cohesion test, which may be used to determine if fireproofing products meet minimum adhesion standards.

All three procedures are practical and simple tests which can be performed in the field, and/or samples be brought back to a laboratory for analysis.



Thickness Test:

This test is performed by using a thickness gauge, as it appears in the drawing. This gauge is approved by ASTM E605, and is used by Underwriters Laboratories. It is light, durable, and available from iaWCC/GDCI headquarters.

The required thickness of

materials to be tested should be known prior to commencing. Since there are many required different thicknesses on most projects, a chart of requirements should be available. The general contractor should provide this information.

Density Test

All fireproofing products vary in density, and there are stringent requirements for each UL classified products. Consideration must be given to the following, when density measurements performed:

- 1. Density requirements vary with each manufacturer.*
- 2. Some manufacturers produce several fire resistant products having different densities.*
- 3. A minimum density is always required by approval or classification agencies (UL, ICBO, etc).*
- 4. The required density may vary by UL design (if used).*
- 5. Most fire resistant products have chemically bound water, which is released during exposure to fire, and consequently cannot be exposed to high temperatures when being dried to achieve equilibrium, for density determinations. Therefore, the testing agency or individual charged to inspect, must know the specifics approved or classification used. It is in the fireproofing contrac-*

tors' best interest to make sure the testing agency is completely a ware of these requirements.

Bond Strength

Bond strength is measured by using two criteria: Adhesion and Cohesion. Adhesion is the

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adherence of a material to a substrate. Cohesion is a product's internal cohesive property.

When a fireproofing product is tested for bond strength, one or both of these criteria can be applied. Fireproofing products vary in density, performance and bond strength.

tests data on the adhesion and cohesion characteristics, provided the in-place density is in accordance with the design criteria and the substrate conditions as noted in Item 4.1 have been adhered to.)

4.4.1 The horizontally in place applied sprayed fire protection material shall support not less than a 2 lb. weight for a duration of not less than 2 minutes in accordance with the following test procedure, unless a greater requirement is established by the manufacturer.

It is not the purpose of fireproofing products to support adherence of other materials, but to stay in-place during a fire. Therefore, the inspection procedure established a reasonable minimum level (See 4.4.1 of the procedure) of adhesion.

If densities tested are within specifications, it is suggested that this test is optional, and at the discretion of local building officials.

Testing Agencies

There are numerous testing agencies in laboratories in this country, but few have been exposed to field testing of fireproofing products. Often, field testing personnel are new to sprayed fireproofing.

If you are a contractor involved in fireproofing, make sure you have a couple of procedure booklets handy. This will help assure that consistent test procedures are used and followed.

One of the most successful comments I've heard from a very active fireproofing contractor, is this:

"I make sure that the inspector knows the product, and understands its properties, application and specific requirements for this job.

"Should he find fireproofed areas which, for whatever reason, are not proper, he will point out the deficiency and allow correction, before I proceed to other floors (or areas) in the building."

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That's one way of minimizing costs.

In summary, job site inspection of fireproofing applications, is not a mystery, but can be done by qualified technicians, with laboratory experience.

Many fireproofing contractors today, check their own work, using the iaWCC/GDCI procedure before turning it over to an inspector.

Most of all, this procedure provides the necessary guidelines, which can be used by any independent inspection agency, to provide a uniform and practical method of evaluating workmanship at the job site.

(The author of this article, Frank X. Neuwirth, is Manager of the CAFCO Division, U.S. Mineral Products Company, and is also a member of iaWCC/GDCI Technical Committee No. 4 which is comprised of member contractors, technical advisors, and associate member manufacturers of spray-applied insulations and fireproofing products.)