



**UPDATED REQUIREMENTS FOR
FLOW MEASUREMENT EQUIPMENT
USED ON OVENS AND FURNACES**

**BASED ON NFPA 86 PUBLICATION
RELEASE 2011**

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Introduction

This document is intended as a specific overview of the latest safety requirements for flow measurement and control equipment as detailed within the National Fire Protection Association's Standards for Ovens and Furnaces publication (Document ID: 86C, Release: 2011).

What is the Standard? (Highlighted: New Text in 2011 publication)

14.5.1.7.4 *Means shall be provided for metering and controlling the flow rates of all fluids comprising the special atmosphere for a furnace.*

- A. *Devices with visible indication of flow shall be used to meter the flows of carrier gases, carrier gas component fluids, inert purge gases, enrichment gases, or air.*
- B. *Devices that meter the flow of inert purge gases shall meter and visibly indicate the flow rate by mechanical means.*
- C. *The installation of flow control equipment shall meet the following criteria*
 - 1. *It shall be installed either at the furnace, at the generator, or in a separate flow control unit.*
 - 2. *It shall be accessible and located in an illuminated area so that its operation can be monitored.*

Annex A "Explanatory Material"

14.5.1.7.4(B): *The indication of flow is intended to be provided by a device that will indicate flow any time a flow is occurring including during power outage. A mechanical device that indicates the flow rate without using any source of power except the physical flow of the inert purge gas meets this requirement. Where an inert purge gas flow is metered and displayed using electrical means, a reliable backup power supply, such as back-up batteries or an uninterruptible power supply, is needed to meet this requirement. Where back-up power sources are used, such as batteries and uninterruptible power supplies, the power source should be designed to supply power for the duration needed to purge-out the complete furnace system. In addition, appropriate maintenance procedures should be provided to inspect, test, and maintain the back-up power supply on a regular basis to reduce the possibility of its unavailability during a primary power interruption.*

What's New?

It should be noted that "Item (B)" has been newly added in the 2011 release, to further detail that purge flow measurement equipment shall contain a mechanical measurement device for visual confirmation of flow during power outages. Further, a new section has been added to the explanatory material section (Annex A) to further explain why this change has been added to the standard.

What Does this Standard Mean?

First, section “14.5.1.7.4” describes the requirement that all gasses that build the atmosphere within the heat treatment furnace must be metered and controlled. This could be as simple as a low tech floating ball flow meter and a manual gate valve or as advanced as an electronic flow controller. However, the guideline calls out specific requirements that these flow meters must have depending on the application for which they are used.

Section A

Section A details that whatever technology used to measure the gas flow, the device must provide a visual indication of that flow rate. This might seem obvious that a flow meter should indicate the flow rate it is metering, but with the advent and adoption of industrial grade electronic flow meters some devices only provide the flow rate as an electronic signal. These signals work great for transmitting the flow measurement to an operator interface screen or paperless chart recorder but what if this screen is mounted in a remote location or on the other side of the facility away from the operation of the furnace? Therefore, section A specifies that the display of this flow should be local to the flow meter. The type of display can be either mechanical or digital (except for certain applications detailed in Section B) but the section is trying to make sure that an operator standing in front of the flow meter can see how much flow of a particular gas is entering the furnace so that if any flow adjustments are required, the adjustment can be made and confirmed at the furnace.

Section B (New)

The newly added “Section B” provides some constraints to the measurement technology and indication of flow for inert purge gasses (Nitrogen) where the availability of power must be considered a variable. The guideline wishes to ensure that the purge flow can be confirmed and monitored visually during a power outage. It is for this reason that the guideline specifically requires a mechanical measurement device that does not require power to operate must be incorporated for purge gasses.

Annex A (Section B explanation)

This is a new addition to the publication and therefore explanation has been provided in the Annex A “Explanatory Material” section to describe why section B was added. However, the annex section goes further in that it identifies a process whereby electronic purge flow measurement might be made to meet this new guideline with the use of a well maintained and monitored battery backup system. For obvious reasons, this battery back must be able to provide enough power to the purge flow meter in order to maintain its operation for at least the amount of time to confirm that the furnace chamber has been completely purged of all combustible gasses.

Section C

Finally, Section C details that the flow meters (not just their displays) must be located near the equipment they are metering gasses for. Further, the location of the meters must be reasonably accessible and illuminated. This might again seem quite obvious but there have been many installations I have visited where the flow panel has been mounted on the opposite side of the department, pinched up against some other equipment, or in a location that is so dark it’s hard to see anything. Therefore, Section C, specifically is trying to limit the amount of distance to travel and effort required to ensure proper operation of the equipment. Since the section does not call out specific maximum distances, it is left to the discretion of those involved in operating and designing the process to define what is safe and reasonable.

Does Atmosphere Engineering Equipment Meet these Guidelines?

Yes. Atmosphere Engineering has been manufacturing and designing electronic flow meters, mechanical flow meters, and complete flow control systems since 2002. It should be understood that Atmosphere Engineering has always designed systems that meet or exceed NFPA86 guidelines. In addition, mechanical purge flow measurement has been designed into every panel we have ever designed (well before this new guideline was published). This requirement always made sense to us but we are glad to see that the newly added section will ensure the safety of operators and professionals in the thermal processing industry.

If you have any questions regarding this technical paper or would like additional information regarding how Atmosphere Engineering can help make your flow control process safer, contact our team of engineers.