MEMORANDUM

TO: NFPA Technical Committee on Multiple Burner Boilers

FROM: Jeanne Moreau-Correia

DATE: August 5, 2009

SUBJECT: NFPA 85 ROP Letter Ballot

The ROP letter ballot for NFPA 85 is attached. The ballot is for formally voting on whether or not you concur with the committee’s actions on the proposals. Reasons must accompany all negative and abstention ballots.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for action.

Please complete and return your ballot as soon as possible but no later than Thursday, August 20, 2009. As noted on the ballot form, please submit the ballot to Jeanne Moreau-Correia, e-mail to jmoreaucorreia@nfpa.org or fax to 617-984-7110.

The return of ballots is required by the Regulations Governing Committee Projects.

Attachment: Proposals
Submitter: John Van Name, URS - Washington Division

Recommendation: Revise text as follows:

(6) Where the common component does not contain a possible ignition source, a bypass shall not be required, as long as the requirements contained in 6.5.3.2 Open-Flow Air Path and 6.4.2.3.4.3 (C) are met.

Substantiation: When two or more boiler outlets are tied together, it is possible to pressurize this connection point either by design or excursion. Positive pressure at the connection point eliminates an open air path and also permits products of combustion from a running unit to enter a starting unit or a unit experiencing an emergency shutdown with loss of fans. A pressurized connection point also creates a safety issue for maintenance and inspection entries into a shutdown unit requiring emergency maintenance. A means of natural draft must always be provided for the emergency condition to slowly purge the remaining products of combustion. Water seals block a natural draft flow path. ID fans with positive discharge pressures keep the connection point pressurized above atmospheric pressure at all times.

Committee Meeting Action: Reject

Committee Statement: The proposal is not appropriate for inclusion in Chapter 4 as it is specific to one type of equipment covered by the Code. It would also not be appropriate for Chapter Four to refer to requirements in an equipment chapter. The proposal is referred to the MBB TC for inclusion in Chapter 6.

MBB TC Statement: The TC feels that the bypass should not be mandated because the proposed purge procedures (6.4.2.3.4.3(C)) as described in Proposal 85-68 (Log #60) address the issues raised by the submitter.

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Submitter: Technical Committee on Multiple Burner Boilers

Recommendation: Add new text to read as follows:

4.6.3.1.3 The burner management system interlock and alarm functions shall be initiated by one or more of the following:

(1) A switch or transmitter independent of control functions and signals

(2) One or both of two continuously variable process signals exceeding a preset value

(3) The median of three continuously variable process signals exceeding a preset value

4.6.3.1.3.1 When multiple continuously variable process signals are provided to initiate interlock or alarm functions, those signals shall be monitored in comparison to each other by divergence or other fault diagnostic alarms.

4.6.3.1.3.2 When multiple continuously variable process signals are provided to initiate interlock or alarm functions the provided signals shall be generated by individual sensing devices connected to separate process taps.

Substantiation: This is a refinement of language that currently exists in section 8.7.4.1.6 of the Code but which should also be applicable to all boiler and combustion systems. Continuously variable process signals are preferred by many over discrete process switches because they can be monitored to assure that they are continuing to respond to changes in the process. Modern continuously variable devices also are less prone to drift than process switches and thus provide a better indicator of the process parameter they are monitoring. It is the intent of the TC to allow a single transmitter to be used if independent of control functions. Editorially, the terminology was changed to singular to clarify the intent of the provision that a single switch or transmitter is adequate.

Committee Meeting Action: Accept
**Report on Proposals – November 2010**

### 85-36  Log #92c  BCS-MBB

**Recommendation:** New text to read as follows:

(12)* The hardware master fuel trip relay shall be of the type that stays tripped until the unit purge system interlock permits it to be reset. Whenever the master fuel trip relay(s) is operated, it shall directly remove all fuel inputs from the furnace in a redundant path with the soft master fuel trip which will trip all outputs to fuel related devices. The master fuel trip relay contacts shall not only trip the fuel headers but all individual fuel related equipment and shall de-energize all spark igniters and all ignition devices within the unit and flue gas path.

A.4.6.3.2.4 (12) The main hardware master fuel trip relay shall be a fail-safe relay with mechanically linked contacts to prevent the reclosing of the normally closed contact if a normally open contact is welded.

**Substantiation:** The master fuel trip relay is not addressed properly in the Chapter 4, common to all boilers and HRSGs. This proposal intends to make the existing requirements for MBB common to all boilers and HRSGs.

The proposal for the Annex A intends to utilize safe relays for the master fuel trip application. These relays meet IEC 947-5-1-I. There are several manufacturers in the market and some relays are tamper resistant.

**Committee Meeting Action:** Reject

**Committee Statement:** The Fundamentals TC feels that this requirement, which comes from the MBB chapter, is more appropriately to be considered by the TCs which are responsible for the other boiler sections, i.e. SBB, HRSG, and FBB. The language came from 6.4.2.3.1(A) blocks 3-12. It is not appropriate to pull one requirement from the table into chapter 4 without the input from the other TCs. The TC feels that the equipment chapters contain requirements that address some of the submitter's concerns, and that the proposal should be forwarded to the other TCs for use in clarifying the applicable coverage.

**MBB TC Statement:** The mandatory text of the proposal is already covered in Chapter 6. The MBB TC rejects the proposed annex material because Chapter 6 does not require mechanically linked relays. The MBB TC has no objection to the action taken by the HRS TC on Proposal 85-35 (Log #92b).

### 85-58  Log #CP7  BCS-MBB

**Recommendation:** Revise text to read as follows:

6.3.2 Forced draft (FD) and induced draft (ID) fans shall include all fans whose purpose is to supply air for combustion or remove products of combustion, including associated booster fans, and excluding fans in the pulverized coal fuel system.

6.8.5.1.5.6 (C)(3) Although light-off of all burners associated with a pulverizer is recommended, it is sometimes necessary to operate or light off with fewer than the total number of burners served by the pulverizer. In this event, positive means shall be provided to prevent fuel leakage into idle pulverized coal fuel piping and through idle burners into the furnace.

6.8.5.2.3.3 A pulverized fuel coal system shall be shut down in the following sequence:

**Substantiation:** The TC replaced "pulverized fuel" with "pulverized coal" throughout chapter 6 to be consistent with chapter 1, which limits Chapter 6 to pulverized coal systems.

**Committee Meeting Action:** Accept

Printed on 8/5/2009
6.4.2.2.14 The mandatory master fuel trip–sensing elements and circuits shall be independent of all other control elements and circuits.

Exception No. 1: Individual burner flame detectors also shall be permitted to be used for initiating master fuel trip systems.

Exception No. 2: Airflow measurement and auctioneered furnace draft signals from the boiler control system shall be permitted to be used for a master fuel trip, provided all the following conditions are met:

1) These interlocks are hardwired into the burner management system in a manner compliant with this Code.
2) Tripping set points are protected from unauthorized changes.
3) Any single component failure of these sensing elements and circuits does not prevent a mandatory master fuel trip.

Substantiation: 1) The existing language is unclear. It can be interpreted to mean that no logic used to initiate a master fuel trip can originate in or be processed in compliant PLC based Burner Management System.
2) Hardwired is not defined.

Committee Meeting Action: Reject
Committee Statement: The TC rejects the proposal because the term "hardwired" has been defined in action taken by the Fundamentals TC on 85-12 (Log #26).

Exception No. 2: Airflow measurement, and auctioneered furnace draft and drum water level signals from the boiler control system shall be permitted to be used for a master fuel trip, provided all of the following conditions are met:

Substantiation: NFPA 85 is a consensus code based on industry accepted good engineering practice and is viewed as a source document for the design of burner management systems. Insurance industry and NERC data show that boiler damage from low drum water level is a leading cause of non-routine plant forced outages. As such, a master fuel trip based on low water level in the drum for drum type boilers is a commonly recognized good engineering practice that is further supported by its inclusion in a major majority of multiple burner boiler BMS installations. The use of a control signal for the low drum water level trip is a proven means for establishing a reliable low water protection system in multiple burner boilers and should be recognized in this code.

It has been stated in the past that low water protection is not a combustion related hazard and therefore does not fit within the scope of Chapter 6 in NFPA 85, which is to prevent fires and explosions in multiple-burner boilers. That being said, and whether or not scenarios could be postulated where a low water condition leads to tube ruptures where the escaping steam/water smothers burner flame leading to delayed ignition and explosion, NFPA 85 is the primary resource in North America for identifying BMS requirements and not including a low drum level trip in Figure 6.4.2.3.1 has created confusion with users of the Code. Also, NFPA 85 requirements for implosion protection is in fact a not a combustion related hazard but a mechanical loss prevention. Adding low drum water level trip as a mechanical loss prevention is the current/past industry solution to prevent low water losses.

Committee Meeting Action: Accept
Add new block 11 to Figure 6.4.2.3.1 and renumber subsequent block numbers.

Substantiation: NFPA 85 is a consensus code based on industry accepted good engineering practices. Insurance industry and NERC data show that boiler damage from low drum water is a leading cause of non-routine plant forced outages. As such, a master fuel trip based on low water level in the drum for drum type boilers is a commonly recognized good engineering practice as supported by a major majority of existing multiple-burner BMS installations that incorporate this interlock. Economic realities preclude the dedication of a control room operator to monitoring and responding to drum level swings during normal unit operation and the addition of drum water level (low) trip as required interlock should no longer be an optional interlock in the BMS based on owner and designer evaluation.

It has been stated in the past that low water protection is not a combustion related hazard and therefore does not fit within the scope of Chapter 6 in NFPA 85, which is to prevent fires and explosions in multiple-burner boilers. That being said, and whether or not scenarios could be postulated where a low water condition leads to tube ruptures where the escaping steam/water smothers burner flame leading to delayed ignition and explosion, NFPA 85 is primary resource in North America for identifying BMS requirements and not including a low drum level trip in Figure 6.4.2.3.1 has created confusion with users of the Code. Also NFPA requirements for implosion protection is in fact not a combustion related hazard but a mechanical loss prevention. Adding low drum water level trip as a mechanical loss prevention is the past and current industry solution for low water losses.

Committee Meeting Action: Accept in Principle

Insert proposed diagram as new block 10 and renumber subsequent blocks.

A.6.4.2.3.1 In block 8 of Table 6.4.2.3.1(a), the partial loss of flame described is potentially more hazardous at lower load levels. The decision regarding specific requirements or implementation of this trip should be a design decision based on furnace configuration, total number of burners, number of burners affected as a percentage of burners in service, arrangement of burners affected, interlock system, and load level. This trip is interlocked through flame supervisory equipment.

In block 9 Table 6.4.2.3.1(a), the tables referenced describe the allowable differences in operating procedures based on the classification of igniter being used. The following descriptions of conditions are typical for both Table 6.4.2.3.1(b) and Table 6.4.2.3.1(c).

(1) Condition 1: An event in which, after a successful boiler purge, an attempt(s) to place the first igniter in service fails.

(2) Condition 2: An event in which an igniter(s) has been proven in service and subsequently all igniters are shut down without the attempt ever having been made to place a burner or pulverizer in service.

(3) Condition 3: An event in which gas and/or oil fuel burners were started or attempted to start and all burner valves were subsequently closed while igniters remain proven in service.

(4) Condition 4: An event in which a pulverizer system(s) was started up or attempted to start up and subsequently all pulverizer systems were shut down while igniters remain proven in service.

(5) Condition 5: An event in which any fuel has been placed in service and all fuel subsequently shut off.

In the event that any main fuel is shut down while any other main fuel remains proven in service, the all-fuel-off master fuel trip requirements do not apply.

In block 10 Table 6.4.2.3.1(a), low drum water level has been included as a master fuel trip. Although low drum water level is not a combustion related hazard, NFPA 85 is the primary resource for identifying BMS requirements and not including a low drum level trip in Figure 6.4.2.3.1 has created confusion with users of the Code. A master fuel trip based on low drum water level for drum type boilers is a commonly recognized good engineering practice.

Committee Statement: The TC accepted the proposed diagram reordered as block 10, and chose to include parts of the substantiation in the annex.
Add new block 11 to Figure 6.4.2.3.1 and renumber subsequent block numbers.

Add new block 11 to Table 6.4.2.3.1(a) and renumber subsequent block numbers.

Block 11 For drum type boilers, a low drum water level shall activate the master fuel trip relay.
85-62  Log #49  BCS-MBB  
(6.4.2.3.1(a), Block 6)  
Final Action: Reject  

Submitter: Dale E. Dressel, Solutia Incorporated  
Recommendation: Change the wording associated with Block 6 in this table from:  
High furnace pressure, such as that resulting from a tube rupture or damper failure, shall activate the master fuel trip relay.  
to:  
High furnace pressure, such as that resulting from a tube rupture, damper failure, overfiring, burner instability or flue gas path pluggage, shall activate the master fuel trip relay.  
Substantiation: The examples given for high furnace pressure (tube rupture and damper failure) are not directly related to combustion systems hazards although they can impact combustion conditions. The additional examples added are more directly related to the combustion systems hazards that it is the intent of the code to address.  
Committee Meeting Action: Reject  
Committee Statement: The intent of the examples is not to provide an exhaustive list of the potential causes of high furnace pressure.

85-63  Log #58  BCS-MBB  
(Table 6.4.2.3.1(B) and (C))  
Final Action: Accept in Principle  

Submitter: Henry K. Wong, URS Washington Division  
Recommendation: Revise Tables 6.4.2.3.1(b) and (c) as follows:  
***Insert Tables 6.4.2.3.1(b) and 6.4.2.3.1(c) Here***  
Substantiation: Table 6.4.2.3.1(B) & Table 6.4.2.3.1(C) provide a tabulated summary of various igniter/burner scenarios during start up and the required interlock actions depending on the igniter Class used. Table 6.4.2.3.1(B) covers actions with Class 1 igniters. Table 6.4.2.3.1(C) covers Class 2 & Class 3 igniters. However due to the great differences in capability of a Class 2 vs. a Class 3 igniter, the table as is, is confusing and conflicts with other parts of the code. The proposed revisions specifically separate Class 2 and Class 3 igniter situations.  
Committee Meeting Action: Accept in Principle  
Accept proposed changes to table 6.4.2.3.1(b).  
Modify table 6.4.2.3.1(c) as follows:  
***Insert Table 6.4.2.3.1(c) Here***  
Committee Statement: Allowing Class 2 proven ON igniters to remain ON after the last main burner is taken out of service in a normal shutdown still provides for both supervised and stable furnace conditions. This is consistent with what is allowed for Class 2 igniters in coal-fired burners.

85-64  Log #CP5  BCS-MBB  
(Table 6.4.2.3.1(A) Blocks 3-12)  
Final Action: Accept  

Submitter: Technical Committee on Multiple Burner Boilers,  
Recommendation: Revise text to read as follows:  
The master fuel trip relay contacts shall also trip primary air fans or exhausters, coal feeders, pulverizers, and coal burner line shutoff valves, or take equivalent functional action to stop coal delivery to burners.  
Substantiation: The addition of the word “pulverizer” makes the table consistent with paragraph 6.8.5.2.5.4.  
Committee Meeting Action: Accept
# Table 6.4.2.3.1(b) Fuel Inputs Shutoff When Class 1 Igniters Are Used

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) First Class 1 igniter(s) fails to light after successful unit purge. [See 6.6.5.2.1.3(B)(9), 6.7.5.2.3.2(J), and 6.8.5.2.1.3(B)(7).]</td>
<td>(1) Igniter valve(s) shall be closed immediately. Master fuel trip not required, but a 1-minute delay shall be required before retrial of that or any other igniter.</td>
</tr>
<tr>
<td>(2) Any igniter(s) proven on, all other fuel sources off, all igniter valves subsequently closed.</td>
<td>(2) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>(3) Any Class 1 igniter(s) proven on, any burner valve leaves closed limit, all burner valves subsequently closed, no other main fuel in service, igniter(s) remain proven.</td>
<td>(3) Associated main fuel gas trip valve and/or fuel oil trip valve shall be closed (fuel gas trip and/or fuel oil trip), proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(4) Any Class 1 igniter(s) proven on, any pulverizer startup initiated, all pulverizers subsequently stopped, no other main fuel in service, igniter(s) remain proven.</td>
<td>(4) Proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(5) All igniter and burner valves closed and all feeders or pulverizers stopped.</td>
<td>(5) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>Condition</td>
<td>Action Required</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>(1) First Class 2 or Class 3 igniter(s) fails to light after successful unit purge. [See 6.6.5.2.1.3(B)(9), 6.7.5.2.3.2(J), and 6.8.5.2.1.3(B)(7).]</td>
<td>(1) Igniter valve(s) shall be closed immediately. Master fuel trip not required, but a 1-minute delay shall be required before retrial of that or any other igniter.</td>
</tr>
<tr>
<td>(2) Any igniter(s) proven on, all other fuel sources off, all igniter valves subsequently closed.</td>
<td>(2) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>(3a) Any Class 2 igniter(s) proven on, any burner valve leaves closed limit, all burner valves subsequently closed, no other main fuel in service, igniter(s) remain proven.</td>
<td>(3a) Associated main fuel gas trip valve and/or fuel oil trip valve shall be closed (fuel gas trip and/or fuel oil trip), proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(3b) Any Class 3 igniter(s) proven on, any burner valve leaves closed limit, all burner valves subsequently closed, no other main fuel in service, igniter(s) remain proven.</td>
<td>(3b) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>(4) Any Class 2 igniter(s) proven on, any pulverizer startup initiated, all pulverizers subsequently stopped, no other main fuel in service, igniter(s) remain proven.</td>
<td>(4) (a) If first pulverizer fails to ignite as described in 6.8.5.2.1.3(B)(12), master fuel trip shall be actuated. (b) If last pulverizer in service is tripped, master fuel trip shall be actuated. (c) If last pulverizer in service is taken out of service in a normal shutdown sequence by an operator, proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(5) All igniter and burner valves closed and all feeders or pulverizers stopped.</td>
<td>(5) Master fuel trip shall be actuated.</td>
</tr>
</tbody>
</table>
### Table 6.4.2.3.1(c) Fuel Inputs Shutoff When Class 2 or Class 3 Igniters Are Used

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) First Class 2 or 3 igniter(s) fails to light after successful unit purge. (See 6.6.5.2.1.3(B)(9), 6.7.5.2.3.2(J), and 6.8.5.2.1.3(B)(7).)</td>
<td>(1) Igniter valve(s) shall be closed immediately. Master fuel trip not required, but a 1-minute delay shall be required before retrial of that or any other igniter.</td>
</tr>
<tr>
<td>(2) Any igniters proven on, all other fuel sources off, all igniter valves subsequently closed.</td>
<td>(2) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>(3) Any igniter(s) proven on, any burner valve leaves closed limit, all burner valves subsequently closed, no other main fuel in service, igniter(s) remain proven. (3a.1) Class 2 igniter(s) proven ON, first main burner trial for ignition fails;</td>
<td>(3a.1) Master fuel trip shall be actuated.</td>
</tr>
<tr>
<td>(3a.2) Class 2 igniter(s) proven ON, last main burner is taken out of service in a normal shutdown;</td>
<td>(3a.2) Associated main fuel gas trip valve and/or fuel oil trip valve shall be closed (fuel gas trip and/or fuel oil trip), proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(3a.3) Class 2 igniter(s) proven ON, last main burner is taken out of service in an abnormal shutdown;</td>
<td>(3a.3) Master Fuel Trip shall be actuated.</td>
</tr>
<tr>
<td>(3b.1) Class 3 igniters proven ON, first main burner trial for ignition fails;</td>
<td>(3b.1) Master Fuel Trip shall be actuated.</td>
</tr>
<tr>
<td>(3b.2) Class 3 igniter(s) proven ON, last main burner is taken out of service in a normal shutdown;</td>
<td>(3b.2) Master Fuel Trip shall be actuated.</td>
</tr>
<tr>
<td>(3b.3) Class 3 igniter(s) proven ON, last main burner is taken out of service in an abnormal shutdown</td>
<td>(3b.3) Master Fuel Trip shall be actuated.</td>
</tr>
<tr>
<td>(4) Any Class 2 igniter(s) proven on, any pulverizer startup initiated, all pulverizers subsequently stopped, no other main fuel in service, igniter(s) remain proven.</td>
<td>(4a) If first pulverizer fails to ignite as described in 6.8.5.2.1.3(B)(12), master fuel trip shall be actuated. (b) If last pulverizer in service is tripped, master fuel trip shall be actuated. (c) If last pulverizer in service is taken out of service in a normal shutdown sequence by an operator, proven igniters shall be permitted to remain in service.</td>
</tr>
<tr>
<td>(5) All igniter and burner valves closed and all feeders or pulverizers stopped.</td>
<td>(5) Master fuel trip shall be actuated.</td>
</tr>
</tbody>
</table>
85-65 Log #CP1 BCS-MBB
(Figure 6.4.2.3.4)

Submitter: Technical Committee on Multiple Burner Boilers,
Recommendation: Delete Figure 6.4.2.3.4

6.4.2.3.4 Purge Requirements. See Figure 6.4.2.3.4.
Table 6.4.2.3.1(a) "Blocks 3 through 12" These blocks represent conditions that initiate the tripping of all main and
ignition fuel supplies through a master fuel trip relay contact(s). The master fuel trip relay(s) shall be of the type that
stays tripped until the unit purge system interlock permits it to be reset, as shown in Figure 6.4.2.3.4.
Substantiation: Delete as originally recommended in the F06 ROP, 85-75 (Log #96).
Also delete references to the figure found in other areas of the code.

Committee Meeting Action: Accept

85-66 Log #57 BCS-MBB
(Figure 6.4.2.3.4)

Submitter: Michael A. Walz, Burns & McDonnell
Recommendation: Delete Figure 6.4.2.3.4.
Substantiation: The figure was intended to be deleted when Proposal 85-75 (Log #96) was Accepted in Principle.
Unfortunately, it was not deleted in the final document.
The figure implies a sequential logic process that is not required. Many of the steps can actually be performed in
parallel. The text of 6.4.2.3.4 is adequate to convey the requirements of the section and are not enhanced by the
inclusion of this figure.
Committee Meeting Action: Accept in Principle
Committee Statement: The TC agrees to delete the figure as originally intended in the F06 ROP. The TC further
deleted references to the figure in other sections of the code in their action on Proposal 85-11 (Log #CP1).

85-67 Log #78 BCS-MBB
(Figure 6.4.2.3.4)

Submitter: G. F. Gilman, SIS-Tech
Recommendation: Revise text to read as follows:
5 minute time delay of five volume changes which ever is greater.
5 minutes and at least five volume changes of the boiler enclosure.
Substantiation: This meets the modified requirement of NFPA 85 2007.
This is not original material; its reference/source is as follows:
NFPA 85, 6.4.2.3.4.7
Committee Meeting Action: Reject
Committee Statement: The TC rejects the proposal because the figure has been deleted from the Code by TC action
on 85-11 (Log #CP1).
85-68 Log #60 BCS-MBB
(6.4.2.3.4.3(C) and A.6.4.2.3.4.3(C))
Final Action: Accept in Principle

Submitter: Michael A. Walz, Burns & McDonnell

Recommendation: Revise text as follows:

(C)* On an emergency shutdown where no fans remain in service, boiler enclosure purge conditions shall be established and a boiler enclosure purge completed. Purge rate airflow shall be established in accordance with the following procedure:

(1) Except for damper actions necessary to prevent positive or negative furnace pressure transients beyond design limits, no damper actions shall be permitted that would reduce flue gas or air flow through the boiler enclosure until after a normal boiler enclosure purge has been completed. All dampers in the air and flue gas passages of the unit shall be opened slowly to the fully open position to create as much natural draft as possible to ventilate the unit.

(2) Damper positioning shall be allowed as required to achieve flow distribution through areas of the boiler enclosure where combustible gases may be present.

(3) Open isolation and control dampers, except on fans isolated for maintenance. The opening of these dampers shall be timed or controlled to maintain positive or negative furnace pressure transients within design limits. Where multiple boilers feed into a common piece of equipment or stack and there is the potential for reverse flow into an idle unit it shall be allowed to keep the most downstream damper closed. Opening of fan dampers shall be timed or controlled to ensure that positive or negative furnace pressure transients beyond design limits do not occur during fan coastdown.

(4) The conditions in (1) through (3) shall be maintained for an all fan trip hold period of at least 15 minutes prior to allowing any ID or FD fan to be re-started. This condition shall be maintained for at least 15 minutes.

(5) At the end of this period, the fan(s) shall be started in accordance with Section 6.5.

(6) The airflow shall be increased gradually to the purge rate, and a boiler enclosure purge shall be completed.

A.6.4.2.3.4.3(C) many units are being equipped with downstream equipment that restricts flow. In this arrangement, stack effect, and any associated draft, is reduced or completely eliminated. However, a hold period prior to re-starting the fans allows the boiler setting to cool, in-leakage will promote further cooling, and, in the case of little or no draft, and suspended particles are allowed to settle. It is important to remember that as the fans coast down, furnace pressure must be controlled to prevent positive or negative excursion beyond design limits. This may require damper movement or blade positioning on axial flow fans. In the case of multiple boilers connected to common downstream equipment, dampers should be closed to isolate the boiler from backflow originating in other boilers remaining in operation. These dampers can be re-opened as the ID Fans are restarted and establish a positive flow out of the boiler.

Substantiation: The 2005 MBB/Purge Task Group consisting of Allan Zadiraka, Joe Vavreck, and Mike Walz, with guidance and additional input from Skip Yates and Henry Wong, generated this proposal. The committee has received many questions regarding purge requirements following an all fan trip, particularly in cases where downstream equipment restricts or eliminates stack effect. It was felt that additional clarity would be provided by revising and expanding this section along with additional annex material.

Committee Meeting Action: Accept in Principle

Revise text to read as follows:

(C)* On an emergency shutdown where no fans remain in service, boiler enclosure purge conditions shall be established and a boiler enclosure purge completed. Purge rate airflow shall be established in accordance with the following procedure:

(1) Except for damper actions necessary to prevent positive or negative furnace pressure transients beyond design limits, no damper actions shall be permitted that would reduce flue gas or air flow through the boiler enclosure until after a normal boiler enclosure purge has been completed. All dampers in the air and flue gas passages of the unit shall be opened slowly to the fully open position to create as much natural draft as possible to ventilate the unit.

(2) Damper positioning shall be allowed as required to achieve flow distribution through areas of the boiler enclosure where combustible gases may be present.

(3) Open isolation and control dampers, except on fans isolated for maintenance. The opening of these dampers shall be timed or controlled to maintain positive or negative furnace pressure transients within design limits. Where multiple boilers feed into a common piece of equipment or stack and there is the potential for reverse flow into an idle unit it shall be allowed to keep the most downstream damper closed. Opening of fan dampers shall be timed or controlled to ensure that positive or negative furnace pressure transients beyond design limits do not occur during fan coastdown.

(4) The conditions in (1) through (3) shall be maintained for an all fan trip hold period of at least 15 minutes prior to allowing any ID or FD fan to be re-started. This condition shall be maintained for at least 15 minutes.
(5) At the end of this period, the fan(s) shall be started in accordance with Section 6.5.
(6) The airflow shall be increased gradually to the purge rate, and a boiler enclosure purge shall be completed.

A.6.4.2.3.4.3 (C) Many units are being equipped with downstream equipment that restricts flow. In this arrangement, stack effect, and any associated draft, is reduced or completely eliminated. However, a hold period prior to re-starting the fans allows the boiler setting to cool, in-leakage will promote further cooling, and, in the case of little or no draft, and suspended particles are allowed to settle. It is important to remember that as the fans coast down, furnace pressure must be controlled to prevent positive or negative excursions beyond design limits. This may require damper movement or blade positioning on axial flow fans. In the case of multiple boilers connected to common downstream equipment, dampers should be closed to isolate the boiler from backflow originating in other boilers remaining in operation. These dampers can be re-opened as the ID Fans are restarted and establish a positive flow out of the boiler.

Committee Statement: The TC made minor wording modifications to correct typos and make the second statement in 6.4.2.3.4.3(C)(3) positive. TC Members report that the concepts incorporated in the proposal have been used successfully in the field. The TC Members feel that the proposal addresses the issues of lack of draft due to back-end environmental control equipment and multiple units with common tie points. This also addresses issues where environmental permits prohibit bypasses around environmental control equipment.

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**Technical Committee on Multiple Burner Boilers, Revise text to read as follows:**

6.4.2.3.4.4 Purge Rate Air Flow.

(A)* The designer shall establish a minimum purge rate airflow. This purge rate airflow shall be in accordance with 6.4.2.3.4.4(B) and 6.4.2.3.4.4(D(C)).

Substantiation: The TC makes this proposal as a correction to an oversight that occurred during the renumbering in the last cycle.

Committee Meeting Action: Accept

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**Technical Committee on Multiple Burner Boilers, Revise text as follows:**

Purge should be that amount of air flow rate over a specific period of time to assure that the combustion volume is evacuated at least 5 times. More air volume changes result in significant quenching of hot boiler internals without increasing safety. The use of purge air volume flow rates in excess of 75 percent of the design full load firing rate combustion air flow is superior to using lower (and recommended) 40 percent of design full load firing rate combustion air flow.

Substantiation: Purge should be that amount of air flow rate over a specific period of time to assure that the combustion volume is evacuated at least 5 times. More air volume changes result in significant quenching of hot boiler internals without increasing safety. The use of purge air volume flow rates in excess of 75 percent of the design full load firing rate combustion air flow is superior to using lower (and recommended) 40 percent of design full load firing rate combustion air flow.

Committee Meeting Action: Reject

Committee Statement: The TC rejects the proposed changes to the wording of 6.4.2.3.4(E) because the purpose of the existing open register continuous purge light-off procedure is to assure that airflow is not reduced prior to light-off.
85-71  Log #31  BCS-MBB  
(6.4.2.3.4.7(A))  
Final Action: Reject

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation:  Revise text as follows:
(A)* Completion of the boiler enclosure purge shall require a minimum of 5 minutes and at least five volume changes of the boiler enclosure while all of the purge permissives are maintained.
Substantiation: Purge should be that amount of air flow rate over a specific period of time to assure that the combustion volume is evacuated at least 5 times. More air volume changes result in significant quenching of hot boiler internals without increasing safety. The use of purge air volume flow rates in excess of 75 percent of the design full load firing rate combustion air flow is superior to using lower (and recommended) 40 percent of design full load firing rate combustion air flow.
Committee Meeting Action: Reject
Committee Statement: The TC rejects the proposal because the combination of requiring a minimum of 5 minutes AND at least 5 volume changes, whichever is longer, has been successfully demonstrated to reduce incidents during light-off.

85-72  Log #41  BCS-MBB  
(6.4.3.2.19)  
Final Action: Accept in Principle

Submitter: Tom Russell, Honeywell
Recommendation: Revise text as follows:
This condition shall be sensed and alarmed when total airflow falls below the minimum purge rate.
Substantiation: The issue of purging needs to be clarified. Does the purge rate need to be fixed or can it be variable, the code is ambiguous on this topic. The code permits a boiler to be purged at various airflow rates, but it implies that whatever airflow rate is used for purging now becomes the minimum value to which airflow can be controlled. These changes permit purging at rates above the minimum and then permits airflow to be reduced to the minimum.
Committee Meeting Action: Accept in Principle
Committee Statement: The TC recognizes that purge may be accomplished at a rate greater than this designer-established minimum purge airflow rate, but the alarm is associated with the designer-specified minimum.
85-73     Log #21  BCS-MBB
(6.5.1.3.2.1) Final Action: Accept

Submitter: Dale P. Evely, Southern Company Services, Inc.
Recommendation: Revise text to read as follows:

6.5.1.3.2.1* Positive Transient Design Pressure.
(a) If the test block capability of the forced draft fan at ambient temperature is equal to or more positive than +8.7 kPa (+35 in. of water), the positive transient design pressure shall be at least, but shall not be required to exceed, +8.7 kPa (+35 in. of water).
(b) If the test block capability of the forced draft fan at ambient temperature is less positive than +8.7 kPa (+35 in. of water), the positive transient design pressure shall be at least, but shall not be required to exceed, the test block capability of the forced draft fan.

Exception: If the test block capability of the forced draft fan at ambient temperature is less positive than +8.7 kPa (+35 in. of water), the positive transient design pressure shall be at least, but shall not be required to exceed, the test block capability of the forced draft fan.

Substantiation: The existing code text should be reworded to eliminate the exception in keeping with NFPA Manual of Style section 2.3.5. This proposal will accomplish that without changing the intent of the existing Code text.

This is not original material; its reference/source is as follows:
Mr. Mike Polagye of FM Global and I collaborated on the development of this proposal.
Committee Meeting Action: Accept

85-74     Log #22  BCS-MBB
(6.5.1.3.2.2) Final Action: Accept

Submitter: Dale P. Evely, Southern Company Services, Inc.
Recommendation: Revise text to read as follows:

6.5.1.3.2.2* Negative Transient Design Pressure.
(a) If the test block capability of the induced draft fan at ambient temperature is equal to or more negative than -8.7 kPa (-35 in. of water), the negative transient design pressure shall be at least as negative as, but shall not be required to be more negative than, -8.7 kPa (-35 in. of water).
(b) If the test block capability of the induced draft fan at ambient temperature is less negative than -8.7 kPa (-35 in. of water), for example -6.72 kPa (-27 in. of water), the negative transient design pressure shall be at least as negative as, but shall not be required to be more negative than, the test block capability of the induced draft fan.

Exception: If the test block capability of the induced draft fan at ambient temperature is less negative than -8.7 kPa (-35 in. of water), for example, -6.72 kPa (-27 in. of water), the negative transient design pressure shall be at least as negative as, but shall not be required to be more negative than, the test block capability of the induced draft fan.

Substantiation: The existing code text should be reworded to eliminate the exception in keeping with NFPA Manual of Style section 2.3.5. This proposal will accomplish that without changing the intent of the existing Code text.

This is not original material; its reference/source is as follows:
Mr. Mike Polagye of FM Global and I collaborated on the development of this proposal.
Committee Meeting Action: Accept
Changes to Clause 6.5.2.2.2 and Figure 6.5.2.2.1.

The existing design shown on the figure causes a problem that if directional blocking is set downstream of the MFT feedforward and the override controller in the control loop, and is set to operate close to the normal measurement point, the directional blocking action will block the corrective action of the MFT feedforward and the override controller if the unit experiences a significant negative and positive pressure swing on a trip. This has evidenced itself on several units particularly those with oil and gas fired boilers.

The idea is to provide directional blocking action on the operator action and the normal controller only while allowing the two emergency controls to operate without being overridden or interrupted.

The override controller can be unidirectional (negative pressure only) or bi directional operating whenever the measurement gets outside a set "deadband".

The industry has applied the "OR" in the directional blocking or override controller as an "AND" as most control systems now feature both.

The controls manufacturers have not been willing to deviate from the Figure 6.5.2.2.1 design even though they acknowledge the existence of the problem.

Substantiation: CURRENT

Furnace pressure system requirements.
FIGURE 6.5.2.2.1 Systems Requirements.

CURRENT

PROPOSED
Furnace pressure system requirements.

6.5.2.2.1 The furnace pressure control subsystem (A), as shown in Figure 6.5.2.2.1, shall position the draft furnace pressure regulating equipment so as to maintain furnace pressure at the desired set point.

6.5.2.2.2 The furnace pressure control system, as shown in Figure 6.5.2.2.1, shall include the following features and functions:

1. Three furnace pressure transmitters (B) in an auctioneered median-select system, each on a separate pressure-sensing tap and suitably monitored (C) to minimize the possibility of operating with a faulty furnace pressure measurement.

2. A feed-forward signal (D), representative of boiler airflow demand, which can be permitted to be a fuel flow signal, a boiler-master signal, or other index of demand, but not a measured airflow signal.

3. On large furnace pressure errors, either an override action, or directional blocking, or both (E), on large furnace draft errors introduced after the auto/manual transfer station (F).

4. A feed-forward action (G) initiated by a master fuel trip to minimize the furnace pressure excursions, introduced after the auto/manual transfer station (F).

5. Axial fans, where used, operated in their stable range to prevent a stall condition to prevent uncontrolled changes in airflow or flue gas flow.

6.5.2.3 Component Requirements. The furnace pressure control element(s) ([H] in Figure 6.5.2.2.1) (draft fan inlet damper drive, blade pitch control, speed control) shall meet the following criteria:

1. The operating speed shall not exceed the control system's sensing and positioning capabilities.

2. The operating speed of the draft furnace pressure control equipment shall not be less than that of the airflow control equipment.

Committee Statement: The TC does not agree with relocating the fan directional blocking ahead of the MFT for the following reasons: If the MFT feedforward is located downstream of the directional blocking, the MFT feedforward will reduce the ID fan demand. If the MFT is the result of high furnace pressure, this may be incorrect action as the pressure excursion may have been caused by a reduction in ID fan demand. If the MFT feedforward is located upstream of the directional blocking, the feedforward will have no effect on ID fan demand. From a high furnace pressure trip condition, implosion prevention is not a primary concern. As pressure in the furnace is reduced as a result of the MFT, directional blocking will be released as soon as the pressure falls below the point where directional blocking was activated.

The TC agrees that either directional blocking and/or fan override actions may be acceptable control schemes depending on the design. The TC has changed the word "draft" to "furnace pressure" throughout the section as appropriate for consistency with current industry terminology.
On installations with multiple ID fans or FD fans, the following shall apply:

(1) Unless an alternate open-flow path is provided, all fan control devices and shutoff dampers shall be opened in preparation for starting the first ID fan.

(2) Within the limitations of the fan manufacturer’s recommendations, all flow control devices and shutoff dampers on idle ID fans shall remain open until the first ID fan is in operation, and all flow control devices and shutoff dampers on idle FD fans shall remain open until the first FD fans are in operation while maintaining furnace pressure conditions and indication of an open-flow path.

It is not the intent of this paragraph to require air to recirculate backwards through idle ID fans until the first FD fan is started and in operation. The proposed change provides clarification.

Revise text to read as follows:

(1) Unless an alternate open-flow path is provided, all fan control devices and shutoff dampers shall be opened in preparation for starting the first ID fan except as permitted by 6.4.2.3.4.3(C)(3).

(2) Within the limitations of the fan manufacturer’s recommendations, all flow control devices and shutoff dampers on idle ID fans shall remain open until the first ID fan is in operation, and all flow control devices and shutoff dampers on idle FD fans shall remain open until the first FD fans are in operation while maintaining furnace pressure conditions and indication of an open-flow path.

Committee Meeting Action: Accept in Principle

Revise text to read as follows:

85-77 Log #32 BCS-MBB

Submitter: Robert Benz, Benz Air Engineering Co.

Recommendation: Revise text as follows:

(F) The total furnace air throughput shall not be reduced below that needed for complete combustion and to maintain burner stability.

Substantiation: For multiple burner boilers, increasing the minimum air flow to that required to purge the furnace would require burners to be initially started at a high rate of fuel input. Requiring a high rate of air flow through a boiler significantly reduces efficiency. Setting an arbitrary minimum air flow through can be dangerous without an analysis to the stability of the combustion air flow supply system.

Committee Meeting Action: Reject

Committee Statement: The TC rejected the proposal because historical operating experience has proven that operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions.
85-78    Log #39 BCS-MBB
(6.6.5.1.5.6(F), 6.7.5.1.5.6(F), and 6.8.5.1.5.6(E))
Final Action: Accept in Principle

Submitter: Tom Russell, Honeywell
Recommendation: Revise text as follows:
The total furnace air throughput shall not be reduced below the minimum purge air flow rate.
Substantiation: The issue of purging needs to be clarified. Does the purge rate need to be fixed or can it be variable, the code is ambiguous on this topic. The code permits a boiler to be purged at various airflow rates, but it implies that whatever airflow rate is used for purging now becomes the minimum value to which airflow can be controlled. These changes permit purging at rates above the minimum and then permit airflow to be reduced to the minimum.
Committee Meeting Action: Accept in Principle
Revise text to read as follows:
6.6.5.1.5.6(F) The total furnace air throughput shall not be reduced below the minimum purge air flow rate established by the designer in accordance with 6.4.2.3.4.4(A).
6.7.5.1.5.6(F) The total furnace air throughput shall not be reduced below the minimum purge air flow rate established by the designer in accordance with 6.4.2.3.4.4(A).
6.8.5.1.5.6(E) The total furnace air throughput shall not be reduced below the minimum purge air flow rate established by the designer in accordance with 6.4.2.3.4.4(A).
Committee Statement: The TC recognizes that purge may be accomplished at a rate greater than this designer-established minimum purge airflow rate. The unit must still light-off at the rate at which the purge is accomplished. Subsequent to light-off, boiler load must be increased (increase of fuel and airflow) before airflow can be reduced below the actual purge rate used, down to the designer-established minimum.

85-79    Log #33 BCS-MBB
(6.6.5.1.5.7)
Final Action: Reject

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation: Revise text as follows:
6.6.5.1.5.7* The open register light-off and purge procedure shall be used to maintain airflow at or above the purge rate during all operations of the boiler.
6.6.5.1.5.7* The open register light-off and purge procedure shall be used to airflow at or above that needed for complete combustion and burner stability during all operations of the boiler.
Substantiation: For multiple burner boilers, increasing the minimum air flow to that required to purge the furnace would require burners to be initially started at a high rate of fuel input. Requiring a high rate of air flow through a boiler significantly reduces efficiency. Setting an arbitrary minimum air flow through can be dangerous without an analysis to the stability of the combustion air flow supply system.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because historical operating experience has proven that operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions. The rate of fuel flow on the burners is permitted to be less than that required to match the purge rate airflow when the unit is being started or at low loads.
85-80  Log #40  BCS-MBB
(6.6.5.1.5.7, 6.7.5.1.5.7, and 6.8.5.1.5.7)

Submitter: Tom Russell, Honeywell
Recommendation: Revise text as follows:
The open-register light-off and purge procedure shall be used to maintain airflow at or above the minimum permitted purge rate during all operations of the boiler.

Substantiation: The issue of purging needs to be clarified. Does the purge rate need to be fixed or can it be variable, the code is ambiguous on this topic. The code permits a boiler to be purged at various airflow rates, but it implies that whatever airflow rate is used for purging now becomes the minimum value to which airflow can be controlled. These changes permit purging at rates above the minimum and then permits airflow to be reduced to the minimum.

Committee Meeting Action: Accept in Principle
Revise text to read as follows:
6.6.5.1.5.7 The open-register light-off and purge procedure shall be used to maintain airflow at or above the designer-established minimum purge rate during all operations of the boiler.
6.7.5.1.5.7 The open-register light-off and purge procedure shall be used to maintain airflow at or above the designer-established minimum purge rate during all operations of the boiler.
6.8.5.1.5.7 The open-register light-off and purge procedure shall be used to maintain airflow at or above the designer-established minimum purge rate during all operations of the boiler.

Committee Statement: The TC recognizes that purge may be accomplished at a rate greater than the designer-established minimum purge airflow rate. The unit must still light-off at the rate at which the purge is accomplished. Subsequent to light-off, boiler load must be increased (increase of fuel and airflow) before airflow can be reduced below the actual purge rate used, down to the designer-established minimum.

85-81  Log #34  BCS-MBB
(6.6.5.1.5.7(A)(2))

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation: Revise text as follows:
(2) Creation of a fuel-rich condition at individual burners during their light-off
(2) Creation of a post stoichiometric air fuel ratio at individual burners during their light-off

Substantiation: The light off of a burner at an air fuel ratio that is greater than 1, minimizes the risk of a fuel rich environment within the furnace.

Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because a fuel-rich environment at the burner is required to achieve reliable ignition. Section 6.6.5.1.5.7(A)(3) requires an air-rich environment in the furnace.
85-82  Log #35  BCS-MBB
(6.6.5.1.5.7(A)(3))
Final Action: Reject

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation: Revise text as follows:
(3) Creation of an air-rich furnace atmosphere during lightoff and warm-up by maintaining total furnace airflow at
    the same rate as that needed for the unit purge.
(3) Creation of an air-rich furnace atmosphere during lightoff and warm-up by maintaining total furnace airflow in
    excess that needed for complete combustion.
Substantiation: Maintaining purge rates through a boiler warm up would result in an excessively high firing rate in one
    or more of the firing burners. The resulting warm up would most likely result in a warm up rate that exceeds the boiler
    recommended warm up rate.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because historical operating experience has proven that
    operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions. The rate of
    fuel flow on the burners is permitted to be less than that required to match the purge rate airflow when the unit is being
    started or at low loads.

85-83  Log #44  BCS-MBB
(6.6.5.1.5.7(A)(3), 6.7.5.1.5.7(A)(3), and 6.6.5.1.5.7(A)(3))
Final Action: Reject

Submitter: Tom Russell, Honeywell
Recommendation: Revise text as follows:
Creation of an air-rich furnace atmosphere during lightoff and warm-up by maintaining total furnace airflow at or above
    minimum purge airflow rate, the same rate as that needed for the unit purge.
Substantiation: The issue of purging needs to be clarified. Does the purge rate need to be fixed or can it be variable,
    the code is ambiguous on this topic. The code permits a boiler to be purged at various airflow rates, but it implies that
    whatever airflow rate is used for purging now becomes the minimum value to which airflow can be controlled. These
    changes permit purging at rates above the minimum and then permit airflow to be reduced to the minimum.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because it conflicts with the requirements of 6.4.2.3.4.4. Air flow
    must remain at the actual purge airflow rate through light-off and initial loading.

85-84  Log #36  BCS-MBB
(6.6.5.1.5.7(B)(4))
Final Action: Reject

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation: Revise text as follows:
(4) Prior to being placed into service, purge components (e.g., precipitators, fired reheaters) containing sources of
    ignition energy for either (1) a period of not less than 5 minutes or (2) five volume changes of that component,
    whichever is longer.
Substantiation: A purge of a volume requires 5 volume changes. Requiring more than 5 air volume changes results in
    a reduction of efficiency, fan horsepower, with no increase in safety.
Committee Meeting Action: Reject
Committee Statement: The TC rejects the proposal because the combination of requiring a minimum of 5 minutes
    AND at least 5 volume changes, whichever is longer, has been successfully demonstrated to reduce incidents during
    component start-up.
Except where Class 1 igniters are in service, the master fuel trip shall be initiated when the flame detection system(s) indicates that ignition has not been obtained within 5 seconds of the time the fuel actually begins to enter the furnace.

The TC added the word "associated" to make it clear that the exception applies only for burners that have associated Class 1 igniters. The word "main" has been added for clarity.

Total airflow shall not be reduced below the minimum purge rate established by the designer in accordance with 6.4.2.3.4.4.

The TC recognizes that purge may be accomplished at a rate greater than the designer-established minimum purge airflow rate. The unit must still light-off at the rate at which the purge is accomplished. Subsequent to light-off, boiler load must be increased (increase of fuel and airflow) before airflow can be reduced below the actual purge rate used, down to the designer-established minimum.
Requiring a high rate of air flow through a boiler significantly reduces efficiency. Setting an arbitrary minimum air flow through can be dangerous without an analysis to the stability of the combustion air flow supply system. The air flow requirements are that required for complete combustion.

The TC rejected the proposal because historical operating experience has proven that operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions. The 5 percent margin is established to prevent nuisance trips due to measurement tolerances.

Add an Exception to read:

6.7.5.2.1.1(8) All safety shutoff valves are closed and all sparked de-energized.

Exception: If the design of the fuel oil system requires the safety shutoff be open for fuel oil recirculation, the safety shutoff valves may be open if all burner valves are proven closed.

The added exception will permit the continued recirculation of the fuel oil for system warm up during the start up procedure. If not, it appears that the recirculation system would be required to be shut down. In the common system design, this presents a conflict with 6.7.5.2.1.1(10). General Comment: The fuel oil system requirements for a fuel oil warm up recirculation system design seems to conflict with each other and are confusing. In addition, they do not address the mechanically atomized delta P style of burner fuel oil supply system design where there is a continuous return flow. This return flow can be regulated, feed into a pump, etc., but generally goes to some sort of a header where an elevated pressure is present. The requirements in some of the paragraphs cannot be met with the requirements of this type of system.

The TC recognizes that some designs require the main safety shutoff valve to remain open for the purpose of fuel oil circulation. However, the TC has reworded sections 8 and 10 instead of imposing an exception on subparagraph 8, in accordance with the NFPA Manual of Style. In subparagraph 8, the TC specified exactly which valves are required to be closed. Subparagraph 10 now includes language to clarify that the main safety shutoff valve may be used, if required, for circulation.
6.7.5.2.1.3(6) The main fuel control valve shall be closed and the main safety shutoff valve(s) shall be open, but only after the requirements of 6.7.5.12.9 for leak test requirements and 6.4.2.3.4 for permissive conditions in the unit purge system have been satisfied.

Substantiation: In the design of most fuel oil systems if you close either of the valves, you will not get any warm up oil flow. This is unless a special circulation valve has been provided. There are many stations where this circulation valve is not provided as it is viewed and a path around the trip valve. The code should not rule out the simpler and safer design.

General Comment: The fuel oil system requirements for a fuel oil warm up recirculation system design seems to conflict with each other and are confusing. In addition, they do not address the mechanically atomized delta P style of burner fuel oil supply system design where there is a continuous return flow. This return flow can be regulated, feed into a pump, etc., but generally goes to some sort of a header where an elevated pressure is present. The requirements in some of the paragraphs cannot be met with the requirements of this type of system.

Committee Meeting Action: Reject
Committee Statement: The TC believes that this issue is addressed by 6.7.5.2.1.3(B)(7-b) in the 2007 edition.

NOTE: This Proposal appeared as Comment 85-64 (Log #64) which was held from the F2006 ROC on Proposal 85-8.
Submitter: Charles A. Moore, Hull, MA

Recommendation: Revise text to read:
6.7.5.2.1.3(7) It shall be determined that the main fuel control valve is closed (unless opening is required for the fuel warm up system) and the following procedures performed:

Substantiation: This permits the main fuel oil valve to be open for recirculation.

General Comment: The fuel oil system requirements for a fuel oil warm up recirculation system design seems to conflict with each other and are confusing. In addition, they do not address the mechanically atomized delta P style of burner fuel oil supply system design where there is a continuous return flow. This return flow can be regulated, feed into a pump, etc., but generally goes to some sort of a header where an elevated pressure is present. The requirements in some of the paragraphs cannot be met with the requirements of this type of system.

Committee Meeting Action: Reject
Committee Statement: This is part of the start-up sequence in preparation for firing, not for header warm-up. Header warm-up should have been accomplished in accordance with 6.7.5.2.1.3(5), prior to step 7.
Submitter: Thomas D. Russell, Honeywell, Inc.
Recommendation: Revise text as follows:
   Except where Class 1 igniters are in service, a master fuel trip shall be initiated when the flame detection system(s) indicates that ignition has not been obtained within 5 seconds of the time the fuel actually begins to enter the furnace.
Substantiation: Aligns 6.6.5.2.1.3(B)(11)(b) with 6.8.5.2.1.3(B)(12)(c) coal firing, and table 6.4.2.3.1(b) thus minimizing confusion.
Committee Meeting Action: Accept in Principle
Revise text to read as follows:
   6.7.5.2.1.3(B)(12)(b) Except where associated Class 1 igniters are in service, a master fuel trip shall be initiated when the flame detection system(s) indicates that ignition has not been obtained within 5 seconds of the time the main fuel actually begins to enter the furnace.
Committee Statement: The TC added the word "associated" to make it clear that the exception applies only for burners that have associated Class 1 igniters. The word "main" has been added for clarity.

Submitter: Robert Benz, Benz Air Engineering Co.
Recommendation: Revise text as follows:
   (e) Total furnace airflow shall not be reduced below purge rate airflow and shall be at least that which is necessary for complete combustion in the furnace.
Substantiation: For multiple burner boilers, increasing the minimum air flow to that required to purge the furnace would require burners to be initially started at a high rate of fuel input. Requiring a high rate of air flow through a boiler significantly reduces efficiency. Setting an arbitrary minimum air flow through can be dangerous without an analysis to the stability of the combustion air flow supply system.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because historical operating experience has proven that operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions. The rate of fuel flow on the burners is permitted to be less than that required to match the purge rate airflow when the unit is being started or at low loads.

Submitter: W. Scott Matz, Invensys Process Systems
Recommendation: Revise text to read as follows:
   The main fuel control valve shall be closed permitted to be open or closed and the main safety shutoff valve (s) shall be open, only after the requirements of 6.7.5.1.3 for leak test requirements and 6.4.2.3.4 for permissive conditions in the unit purge system have been satisfied.
Substantiation: The original text did not address oil header designs that do not have special circulation valves.
Committee Meeting Action: Reject
Committee Statement: The TC feels that this is already addressed in 6.7.5.2.1.3(B) (7-b) in the 2007 edition.
6.7.5.2.3.7  As the fuel is reduced, the remaining burners shall be shut down sequentially as described in 6.7.5.2.3.5 and 6.7.5.2.3.6 except that the last burner shall not be scavenged unless an associated Class 1 or 2 igniter is in use. Substantiation: Class 2 igniters provide an adequate source of ignition for oil being purged into the furnace during a normal shutdown, and therefore the TC is expanding the use of Class 2 igniters for scavenging the last burner. Committee Meeting Action: Accept

85-95  Log #29 BCS-MBB  
(6.7.5.2.5.2(B)(2))  
Final Action: Reject

Submitter: Robert Benz, Benz Air Engineering Co.  
Recommendation: Revise text as follows:  
(2) Total airflow decreases below the minimum airflow as required in 6.4.2.3.4.4(A) by 5 percent design full load airflow.  
(2) Total airflow decreases below the minimum airflow as determined by trial and empirical analysis to maintain complete combustion and burner stability.  
Substantiation: Requiring a high rate of air flow through a boiler significantly reduces efficiency. Setting an arbitrary minimum air flow through can be dangerous without an analysis to the stability of the combustion air flow supply system.  
The air flow requirements are that required for complete combustion.  
Committee Meeting Action: Reject  
Committee Statement: The TC rejected the proposal because historical operating experience has proven that operation below the minimum airflow established in accordance with 6.4.2.3.4.4 has resulted in explosions. The 5 percent margin is established to prevent nuisance trips due to measurement tolerances.

85-96  Log #CP8 BCS-MBB  
(6.8.5.2.1.3(B)(12)(a))  
Final Action: Accept

Submitter: Technical Committee on Multiple Burner Boilers,  
Recommendation: Revise text to read as follows:  
6.8.5.2.1.3 (B)(12)(a) Required ignition shall be obtained within 10 seconds following the specific time delay described in 6.8.5.2.1.3(B)(117).  
Substantiation: TC corrected the reference.  
Committee Meeting Action: Accept
85-97  Log #45  BCS-MBB
Final Action: Reject

(6.8.5.2.1.3(B)(10))

Submitter: Tom Russell, Honeywell
Recommendation: Revise text as follows:
The furnace airflow shall be readjusted after conditions stabilize, as necessary. Airflow shall not be reduced below the minimum purge rate.
Substantiation: The issue of purging needs to be clarified. Does the purge rate need to be fixed or can it be variable, the code is ambiguous on this topic. The code permits a boiler to be purged at various airflow rates, but it implies that whatever airflow rate is used for purging now becomes the minimum value to which airflow can be controlled. These changes permit purging at rates above the minimum and then permits airflow to be reduced to the minimum.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because it conflicts with the requirements of 6.4.2.3.4.4.

85-98  Log #47  BCS-MBB
Final Action: Accept in Principle

(6.8.5.2.1.3(B)(12)(c))

Submitter: Thomas D. Russell, Honeywell, Inc.
Recommendation: Revise text as follows:
Except where Class 1 igniters are in service, a master fuel trip shall be initiated on failure to ignite or on loss of ignition for on placing the first pulverizer into service.
Substantiation: Do not want to imply that any time the first pulverizer is removed from service a MFT is required.
Committee Meeting Action: Accept in Principle
Committee Statement: The TC added the word "associated" to make it clear that the exception applies only for burners that have associated Class 1 igniters.

85-99  Log #61  BCS-MBB
Final Action: Reject

(6.8.5.2.5.4(A))

Submitter: Allan J. Zadiraka, The Babcock & Wilcox Company
Recommendation: Revise text as follows:
The igniter safety shutoff valve, individual igniter safety shutoff valves, primary air fans or exhausters, recirculating fans, coal feeders, and pulverizers coal burner line shutoff valves or equivalent functional action to stop coal delivery to burners shall be tripped, and the igniter sparks shall be de-energized.
Substantiation: Block 12 of Table 6.4.2.3.1(a) does not include pulverizer in list of equipment to be stopped on MFT to halt coal flow to unit. Pulverizer motor is typically stopped because of wear/vibration with no coal. Pulverizer motor is run on some mill designs to remove coal remaining in tripped pulverizer group through pyrites hopper after an MFT as referenced in Chapter 9.
Committee Meeting Action: Reject
Committee Statement: The TC rejected the proposal because it is desired to trip the pulverizer on a master fuel trip. The TC agrees that it may be necessary to run the pulverizer motor to clear the mill prior to restart.
Submitter: Technical Committee on Multiple Burner Boilers,
Recommendation: Revise text to read as follows:
(A) Igniter sparks shall be de-energized, the igniter safety shut-off valve, individual igniter safety shut-off valves, primary air fans or exhausters, recirculating fans, coal feeders, and pulverizers shall be tripped, coal burner line shut-off valves shall be closed or equivalent functional action shall be taken to stop coal delivery to burners and the igniter sparks shall be de-energized.
Substantiation: The TC made editorial changes to make the paragraph consistent with Table 6.4.2.3.1(a) Blocks 3-12.
Committee Meeting Action: Accept

Submitter: Gordon G. Gaetke, The Dow Chemical Company
Recommendation: Add "**" to 6.4.2.3.4.6 (2). Following text proposed for Appendix.
Analyzers may contain heated elements which exceed the auto-ignition temperature of many fuels. Zirconium oxide analyzers, commonly used for oxygen analysis, contain an element heated to 1300°F (704°C). This high temperature element presents a potential ignition source to unburned fuel which could be present at startup. Some analyzers are designed to protect the sampled space from the ignition source by providing flashback protection (such as flame arresters in sample gas path) and skin temperatures rated at T2 (572°F / 300°C) or lower temperature rating. Analyzers without that protection will need to be proven off until a purge is successfully completed.
Substantiation: In 2005 a flammable hydrocarbon mixture formed in a chemical company’s process furnace that was ignited severely damaging the furnace. A power failure placed the furnace off-line and inadvertently permitted the introduction of hydrocarbon material. The investigation determined an in situ zirconium oxide oxygen probe was the source of ignition. These oxygen probes are very common with fired equipment such as boilers. Providing specific reference to such potential sources of ignition energy via the 6.4.2.3.4.6 (2) text will enhance industry knowledge and prevention of this hazard.
Committee Meeting Action: Accept
The objective of the leak test is to ensure that the individual burner safety shutoff valves are not leaking gas fuel oil into the furnace. The test can be performed by closing the main fuel header vent oil recirculating valve and the individual burner safety shutoff valves, then closing the main safety shutoff valve, thus pressurizing the header. If a charging circulating valve is used, the test is performed by closing the main safety shutoff valve and using the charging circulating valve to pressurize the header, then closing the charging circulating valve. The pressure must be held within predetermined limits for a predetermined amount of time for the test to be successful.

The TC made minor editorial changes to the proposal.

Recommendation: The test procedure in A.6.7.5.1.3 is copied from the fuel gas articles in A.6.6.5.1.3 and needs to be revised for fuel oil.

Committee Meeting Action: Accept in Principle

Revise text to read as follows:
The objective of the leak test is to ensure that the individual burner safety shutoff valves are not leaking gas fuel oil into the furnace. One method to perform this test can be performed by closing the main fuel header vent oil recirculating valve (if provided) and the individual burner safety shutoff valves, then closing the main safety shutoff valve, thus pressurizing the header. If a charging circulating valve is used, the test is performed by closing the main safety shutoff valve and using the charging circulating valve to pressurize the header, then closing the charging circulating valve. The pressure must be held within predetermined limits for a predetermined amount of time for the test to be successful.

Committee Statement: The TC made minor editorial changes to the proposal.

Submittant: Kris A. Gamble, Black & Veatch Corporation

In the first sentence, change "gas" to "oil".
In the second sentence, revise text as follows: "The test can be performed by closing the main fuel header vent oil recirculation valve (if provided) and...

Substantiation: The appendix material is related to performing an oil header leak test. The references to gas and vent valves are not correct.

Committee Meeting Action: Accept in Principle

Committee Statement: The action taken on 85-122 (Log #59) meets the intent of the submitter.
NOTE: This Proposal appeared as Comment 85-78 (Log #67) which was held from the F2006 ROC on Proposal 85-8.
Submitter: Charles A. Moore, Hull, MA
Recommendation: Revise Figure A.6.7.5.1.4(c) and A.6.7.5.1.4(d) as follows:

INSERT revised Figure A.6.7.5.1.4(c) HERE
FIGURE A.6.7.5.1.4(c) Typical mechanical atomizing main oil burner system.

INSERT revised Figure A.6.7.5.1.4(d) HERE
FIGURE A.6.7.5.1.4(d) Typical steam or air atomizing main oil burner system.

Substantiation: Safety shutoff valves should be shown in the return line to positively prevent fuel flow to the burner header. In many designs this line connects to the fuel oil system that is or could be at a positive pressure.
Committee Meeting Action: Accept in Principle in Part
Add new text to read as follows:
6.7.3.1.13* A.6.7.3.1.13 One method for meeting this requirement is to provide an automatic shutoff valve in the oil return line to prevent the backflow of oil into the oil header.
Committee Statement: The TC agrees that a means for preventing the backflow of oil should be highlighted in the annex material. However, the TC feels that 6.7.3.1.13 contains this requirement, and is therefore a more appropriate location for annex material. The TC rejected the modification of the A.6.7.5.1.4 diagrams to illustrate the valve location because it could imply that the valve is necessary in every application.

Submitter: W. Scott Matz, Invensys Process Systems
Recommendation: Revise text to read as follows:

***Insert Artwork Here***
Figure A.6.7.5.1.5.4(c) Typical Mechanical Atomizing Main Oil Burner System.

Substantiation: A safety shutoff valve should be shown in the return line to prevent the oil burner header from being back pressured from the fuel oil system. If a recirculating valve is used it should be a safety shutoff valve.
Committee Meeting Action: Reject
Committee Statement: The TC does not feel that there should be a bypass around the shutoff valve used to prevent backflow into the oil header. In addition, the TC believes that the recirculating valve does not need to be a shutoff valve as shown in the proposed diagram. The TC action on Proposal 85-124 (Log #7) on a similar proposal addresses the submitter’s concern about preventing backflow of oil into the oil header.
FIGURE A6.7.5.1.4(c) Typical mechanical atomizing main oil burner system.
FIGURE A.6.7.5.1.A(d) Typical steam or air atomizing main oil burner system.
A1 RETURN SAFETY SHUTOFF VALVE

FIGURE A.6.7.5.1.5.4(c) Typical Mechanical Atomizing Main Oil Burner System.