



TENNESSEE VALLEY AUTHORITY  
Division of Nuclear Engineering

CIVIL ENGINEERING BRANCH

INSTRUCTION CEB-C1.102

TITLE: OPERABILITY CRITERIA FOR MISCELLANEOUS STEEL

	REVISION RO	R1	R2	R3	R4	R5
ISSUE DATE	March 3, 1988	3/31/88				
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Revision No.	DESCRIPTION OF REVISION	Date Approved
1	Revised allowable stress limits for bolting material to reflect US-NRC comments in a meeting on March 17, 1988 in Rockville, Maryland.	3/31/88

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### 1.0 PURPOSE

The purpose of this instruction is to provide engineering requirements for implementing Browns Ferry operability criteria as applicable to miscellaneous steel used to support piping and HVAC.

### 2.0 SCOPE

These criteria shall apply to those miscellaneous steel structural members that do not qualify according to Design Criteria BFN-50-C-7100, Attachment G (Reference 5.1). Modifications will be prioritized into two groups: those that require implementation for operability prior to restart, and those that require implementation post-restart. Operability modifications are those modifications that do not comply with the criteria in this document and that must be made before restart. Design criteria modifications are those modifications that comply with the requirements of this document but do not meet design criteria.

### 3.0 MISCELLANEOUS STEEL EVALUATION CRITERIA

#### 3.1 LOAD COMBINATIONS

For operability evaluation, the miscellaneous steel modifications that do not meet design criteria shall be evaluated only for Loading Condition 8, shown below, in accordance with BFN-50-C-7100, Attachment G.

Abnormal Accident + DBE (Seismic) =

$DL + LL + T_a + R_a + P_a + 1.0(Y_j + Y_r + Y_m) + E'$

#### 3.2 ALLOWABLE LIMITS

The following limits shall be used to establish priorities for modifications to miscellaneous steel:

##### 3.2.1 Structural Steel Members

Stresses in structural steel members shall not exceed the lesser of  $1.2F_y$  and  $0.7F_u$  for tensile and flexural stresses and 90 percent of the critical buckling stress in compression flange as defined in AISC specification (Reference 5.2) for compressive loads. Shear stresses shall not exceed 60 percent of allowable stress for tensile and flexural stresses.

### 3.2.2 Bolting

The allowable stress for bolting shall be the minimum specified yield stress of the bolt material. When the yield stress of the bolt material is not specified, the allowable stress shall be 70 percent of the minimum specified ultimate strength.

### 3.2.3 Concrete Expansion Anchors

The minimum factors of safety for concrete expansion anchors (wedge and shell types) shall be 2.0 (Reference 5.3).

## 4.0 DOCUMENTATION

Engineering evaluations performed to determine the priority of modifications shall be documented in calculations performed in accordance with the applicable Quality Assurance requirements.

## 5.0 REFERENCES

- 5.1 Design Criteria for Miscellaneous Steel Components for Class I and II Structures, BFN-50-C-7100, Attachment G
- 5.2 Specification for the Design, Fabrication, and Erection of Structural Steel Buildings, AISC 7th and 8th Editions
- 5.3 IE Bulletin 79-02, Revision 1, Supplement 1 dated August 20, 1979, Pipe Support Base Plate Designs Using Concrete Anchor Bolts