



Westinghouse Electric Company  
Nuclear Services  
P.O. Box 355  
Pittsburgh, Pennsylvania 15230-0355  
USA

U.S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555-0001

Direct tel: (412) 374-4643  
Direct fax: (412) 374-4011  
e-mail: greshaja@westinghouse.com

Our ref: LTR-NRC-07-36

July 25, 2007

Subject: NSAL-07-2, "Revised Seismic Level for Type A200 Size 1 and Size 2 Motor Starters and Contactors" (Non-proprietary)

Westinghouse has identified a potential safety issue which involves unacceptable performance of Type 200 Size 1 and Size 2 motor starters and contactors in a normally de-energized state, under safe shutdown earthquake (SSE) conditions. Type 200 Size 1 and Size 2 motor starters and contactors were provided by Westinghouse as safety-related (Class 1E) equipment for use in Westinghouse Type W, Five Star, 2100 and other manufacturers' motor control centers for balance of plant (BOP) applications.

Westinghouse does not have sufficient plant specific information to evaluate the consequences of this issue and has transferred the information to utility users for their evaluation. The attached NSAL was recently provided to all potentially affected plants as a transfer of information pursuant to 10 CFR 21.21(b).

This letter is being provided to the NRC for information only. Westinghouse requests that NSAL-07-2 be identified on the NRC website as a transfer of information rather than a 10 CFR Part 21 report.

Correspondence with respect to NSAL-07-2 should be addressed to J. A. Gresham, Manager, Regulatory Compliance and Plant Licensing, Westinghouse Electric Company LLC, P. O. Box 355, Pittsburgh, Pennsylvania 15230-0355.

Very truly yours,

A handwritten signature in cursive script that reads "JA Gresham".

James A. Gresham, Manager  
Regulatory Compliance and Plant Licensing

Attachment:

NSAL-07-2, "Revised Seismic Level for Type A200 Size 1 and Size 2 Motor Starters and Contactors" (Non-proprietary)

JE20

AMSS

# Nuclear Safety



## Advisory Letter

This is a notification of a recently identified potential safety issue pertaining to basic components supplied by Westinghouse. This information is being provided so that you can conduct a review of this issue to determine if any action is required.  
P.O. Box 355, Pittsburgh, PA 15230

Subject: <b>Revised Seismic Level for Type A200 Size 1 and Size 2 Motor Starters and Contactors</b>	Number: NSAL-07-2
Basic Component: Type A200 Size 1 and Size 2 motor starters and contactors used in BOP applications	Date: 07/12/2007

Affected Plants: Westinghouse NSSS Plants, CE NSSS Plants and GE NSSS Plants

Substantial Safety Hazard or Failure to Comply Pursuant to 10 CFR 21.21(a)	Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input checked="" type="checkbox"/>
Transfer of Information Pursuant to 10 CFR 21.21(b)	Yes <input checked="" type="checkbox"/>
Advisory Information Pursuant to 10 CFR 21.21(d)(2)	Yes <input type="checkbox"/>

References: See page 4

### SUMMARY

In accordance with Westinghouse procedures, seismic confirmation testing of the Type A200 Size 1 and Size 2 motor starters was performed using a Size 2 motor starter at a Westinghouse facility. The motor starter includes a contactor and an overload relay (see Figure 1). During this testing, the motor starter performed acceptably at the operating basis earthquake (OBE) level. The starter failed to perform acceptably at the safe shutdown earthquake (SSE) level when in the normally de-energized state. This issue does not apply to the Type A200 Size 1 and Size 2 motor starters when in the normally energized state.

The result of this seismic test applies to Type A200 Size 1 and Size 2 motor starters and contactors. Type A200 Size 1 and Size 2 motor starters and contactors were provided by Westinghouse as safety-related (Class 1E) equipment for balance of plant (BOP) applications. These components were provided for use in Westinghouse Type W, Five Star and 2100 or other manufacturer's motor control centers.

Westinghouse does not have sufficient information to evaluate this issue for potentially affected plants. Therefore this information is being transferred pursuant to 10 CFR 21.21(b).

Additional information, if required, may be obtained from Ron W. Riling; telephone (724) 722-5284

Originator:(s)

R. M. Span  
Regulatory Compliance and Plant Licensing

R. W. Riling  
Electro-Mechanical Part Engineering

Approved:

J. A. Gresham, Manager  
Regulatory Compliance and Plant Licensing

R. H. Jabs  
Electro-Mechanical Part Engineering

## ISSUE DESCRIPTION

This issue applies to Type A200 Size 1 and Size 2 motor starters and contactors that were provided by Westinghouse as part of a complete motor control center (MCC) for BOP applications that are used for safety-related applications. The motor starters and contactors were also provided as replacement parts. Seismic confirmation testing of the Type A200 Size 3 and Size 4 motor starters and contactors demonstrate that they are not affected by this issue. A typical MCC includes motor starters, contactors, mechanical interlocks, molded case circuit breakers, relays and wiring. This assembly is commonly referred to as a "MCC bucket". Individual starters were provided with an equipment qualification data sheet (Reference 1) that shows the SSE seismic levels. The affected components were shipped between 1992 and May 2007.

The cause of the reduced seismic capability is based upon a historical review of earlier test results. The review concluded that the early test results were based, in part, upon test data extrapolation which was not as accurate as the current test equipment results. In addition, minor variations in manufacturing tolerances may have contributed to the reduced seismic capability.

Table 1 (attached) provides a means to identify the affected safety-related components. For example, for the catalog number A200M2CAC Y each of the positions 1 through 10 can be identified as follows:

1. A = Magnetic Low Voltage
2. 2 = 1 Speed
3. 0 = Non-reversing
4. 0 = Starter
5. M = Open Vertical Starter
6. 2 = NEMA Size 0-9
7. C = 3 Pole or 3 x 3 Reversing or Horizontal Multi-speed
8. A = 120 Volt/60 Hz, 110 Volt/50 Hz AC Coil
9. C = Separate Control
10. Y = Safety-related

## TECHNICAL EVALUATION

Typically the Type A200 Size 1 and Size 2 motor starters are provided with one J20 auxiliary contact that has two normally open contacts and one J11 auxiliary contact that has one normally open and one normally closed contact (see Figures 2 and 3). The customer can add up to two additional auxiliary contacts. Figure 1 and 2 shows the location of the J20 and J11 auxiliary contacts. During normal plant operation with the starter in the de-energized state, the J20 auxiliary contacts are normally open and the J11 auxiliary contact has one contact open and one contact closed.

During the seismic test, the J11 normally closed contact experienced contact chatter near the SSE seismic levels when the starter was in the de-energized state. Westinghouse uses the industry accepted threshold of 2 milliseconds contact chatter during seismic testing. There was one J20 auxiliary contact and one J11 auxiliary contact in the motor starter during this test. Excessive contact chatter on the J20 contact, if wired into a latching start circuit, may cause the contactor to change from the de-energized state to the energized state during a SSE event. This change of state during a seismic event would not meet the Westinghouse SSE level requirement.

The Type A200 Size 1 and Size 2 motor starters and contactors will perform with no J20 contact bounce or J11 contact bounce during normal plant operation. During a seismic event, the starters and contactors

will perform with no J20 contact bounce or J11 contact bounce during an OBE (i.e., 2/3 SSE). During a SSE, the motor starter and contactor will perform at the fragility levels indicated in the table below.

Below is a summary of the new SSE seismic qualification levels with the motor starter and contactor in the de-energized state:

- The de-energized motor starter and contactor will not change state (energize) at 78% of SSE with one J20 auxiliary contact and one J11 auxiliary contact installed.
- The de-energized motor starter and contactor will not change state (energize) at 95% of SSE with one J20 auxiliary contact and three other auxiliary contacts installed.
- The de-energized motor starter and contactor will not change state (energize) at 95% of SSE with one J20 auxiliary contact and one J11 auxiliary contact installed however the normally closed J11 contact will experience 16 to 32 milliseconds contact chatter.
- The de-energized motor starter and contactor will not change state (energize) at 100% of SSE with one J20 auxiliary contact and three other auxiliary contacts installed however the normally closed J11 contact will experience 16 to 32 milliseconds contact chatter.

The table provides a complete summary of the motor starter coil state, the number of normally closed auxiliary contacts and % of SSE levels established as the new SSE seismic qualification level for a normally de-energized Type A200 Size 1 and Size 2 motor starter and contactor.

Motor Starter Coil State	Seismic Level With One J20 Auxiliary Contact And One J11 Auxiliary Contact <sup>(1)</sup>	Seismic Level With One J20 And Three Auxiliary Contacts <sup>(1)</sup>
De-energized <sup>(2)</sup>	Nominally 78% of SSE with < 2 msec J20 and J11 contact chatter	Nominally 95% of SSE with < 2 msec J20 and J11 contact chatter
De-energized <sup>(2)</sup>	Nominally 95% of SSE with 16 to 32 msec J11 contact chatter without unauthorized change of motor starter state	100% of SSE with 16 to 32 msec J11 contact chatter without unauthorized change of motor starter state
Energized	100% of SSE with J20 and J11 contact chatter < 2 msec	100% of SSE with J20 and J11 contact chatter < 2 msec
Transitioning from de-energized to energized state	100% of SSE with J20 and J11 contact chatter < 2 msec	100% of SSE with J20 and J11 contact chatter < 2 msec

(1) Reference EQDS 1176 SSE seismic curves

(2) The motor starter did not change state during the SSE seismic test

Contact chatter of 2 milliseconds is an industry accepted threshold. IEEE-649-1980 (Reference 2) states a maximum contact chatter of 2 milliseconds unless otherwise specified by the user. IEEE-649-1991 (Reference 3) indicates that the permissible time for contact chatter is dependent upon the circuit in which it is used and needs to be analyzed to determine acceptability. The 16 to 32 millisecond contact chatter in the above table is derived from the recent seismic testing. Each customer will need to evaluate the 16 to 32 millisecond contact chatter based upon IEEE-649 or some other acceptable criteria.

## SAFETY SIGNIFICANCE

When a Type A200 Size 1 and Size 2 motor starter and contactor is purchased from Westinghouse, the purchasing agent (typically a utility or architect engineer (AE)) does not specify what function the motor

starter or MCC bucket is to perform. While these components were purchased as electrical Class 1E equipment, typically Westinghouse is not aware of the specific safety (or non-safety) application to be performed by these components. Therefore, each customer will need to follow the Recommended Actions below to determine if the reduced SSE level for the Type A200 Size 1 and Size 2 motor starters and contactors is acceptable.

## **NRC AWARENESS**

The NRC is receiving a copy of this NSAL.

## **RECOMMENDED ACTIONS**

Westinghouse recommends the following steps to identify and correct a seismic issue related to the SSE qualification level of the Type A200 Size 1 and Size 2 motor starter and contactor.

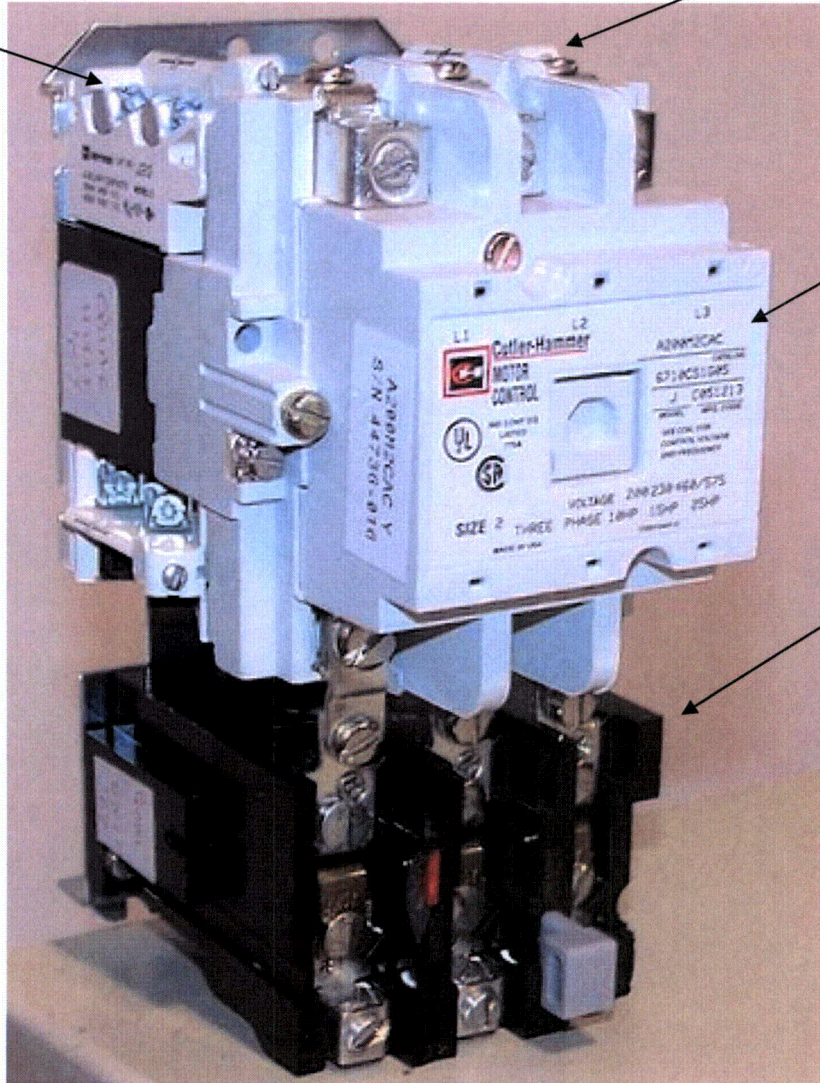
1. Identify and locate each Type A200 Size 1 and Size 2 motor starter and contactor that is used in a safety-related BOP application.
2. Determine if the contactor is normally de-energized. If the contactor is energized in a normal safety application, then no further investigation is required.
3. Determine the site specific location SSE level that has a Type A200 Size 1 or Size 2 motor starter or contactor used in a safety-related BOP application.
4. Compare the site specific location SSE level to the new SSE qualification level in the above Technical Evaluation section. For any motor starter or contactor not meeting the new qualification level, the effects of spurious starting of equipment (and contact chatter from the auxiliary contacts) in conjunction with a seismic event should be evaluated for significant adverse effects on the plant. If any adverse impacts are identified, then an operability determination of the impacted equipment should be performed; otherwise the deficiency should be treated as a qualification issue in the site corrective action program.

## **REFERENCES**

1. EQDS-1176, Westinghouse Equipment Qualification Data Sheet, dated 4/13/92 (Westinghouse Proprietary)
2. IEEE-649-1980, "IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations"
3. IEEE-649-1991, "IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations"

J20 Auxiliary Contact

J11 Auxiliary Contact



Contactor

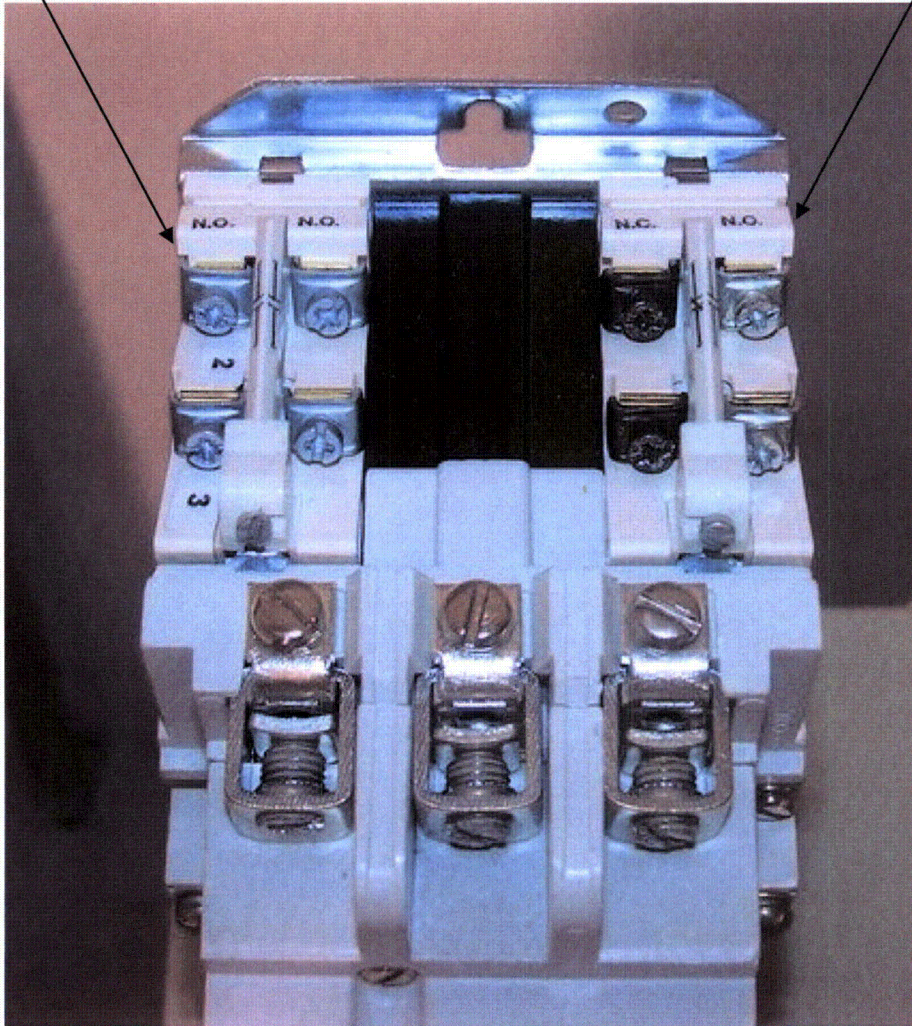
Overload Relay

Motor Starter

Figure 1

**J20 Auxiliary Contact – two normally open contacts**

**J11 Auxiliary Contact – one normally open and one normally closed contact**

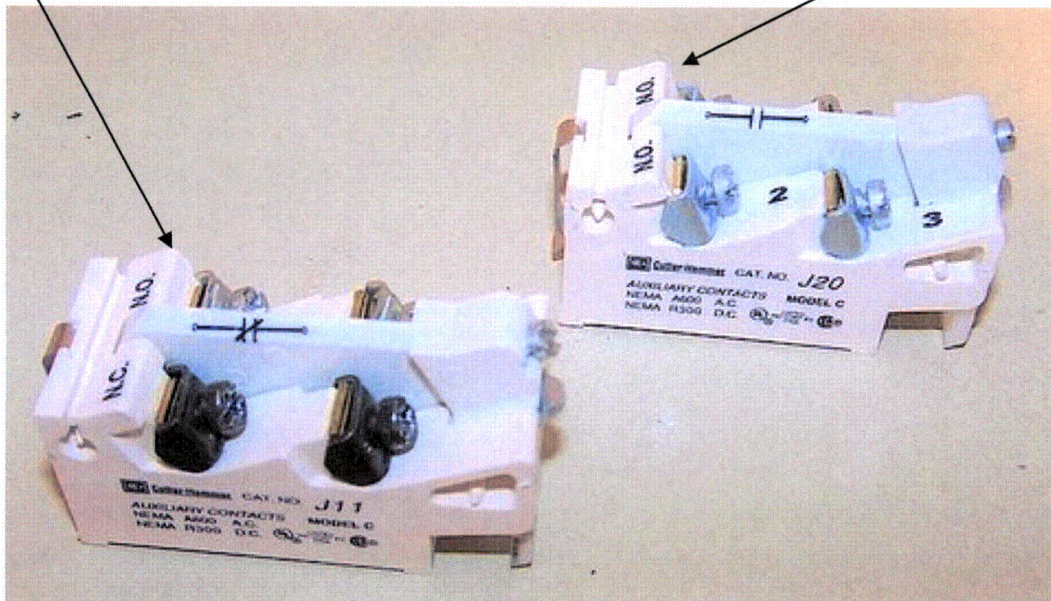


**J20 and J11 Auxiliary Contact Locations**

**Figure 2**

J11 Auxiliary Contact

J20 Auxiliary Contact



J11 and J20 Auxiliary Contact Assemblies

Figure 3



A 1	CATEGORY 2	FUNCTION 3	TYPE 4	ENCLOS/ OPEN 5	SIZE 6	POLES 7	COIL 8	MODIFI 9	10
--------	---------------	---------------	-----------	----------------------	-----------	------------	-----------	-------------	----

A = MAGNETIC  
LOW VOLTAGE  
V = VACUUM  
LOW VOLTAGE

1 = HOR. REVERSER  
6 = 2 SPD 2 WNDG 3X3  
8 = VERT. REVERSER  
7 = 2 SPD 1 WNDG 5X3  
0 = NON. REVERSING  
8 = 2 SPD 1 WNDG 3X8

2 = 1 SPEED  
9 = 2 SPEED

K = OPEN CONTR.  
S = NEMA 1 ENCL.  
J = NEMA 12 ENCL.  
W = NEMA 4 ENCL.  
U = NEMA 7D ENCL.  
M = OPEN VERT. STR.  
C = NEMA 7C ENCL.

1 = CONTACTOR, ALL HAVE N.O.  
HOLDING INTERLOCK  
EXCEPT VACUUM  
CONTACTOR.  
2 = LIGHTING NO  
HOLDING INTERLOCK  
0 = STARTER

(NEMA SIZE 0-9)  
A = 00  
D = 1P - 1½  
B = 1¼  
C = 2¼  
E = 3¼  
F = 4¼  
G = 5¼

MODIFICATIONS  
START HERE

A = 120/60, 110/60 AC  
B = 108/60 AC  
C = 240-480/60 AC\*  
D = 440/60 AC  
E = 660/60, 600/60 AC  
F = 12/60 AC  
G = 220/60 AC  
H = 380/60 AC  
I = 24/60 AC  
J = 110-120 ANY RECT TO DC  
K = 220-240 ANY RECT TO DC  
L = 24 DC\*\*  
M = 48 DC\*\*  
N = 110/60 AC  
O = NO COIL  
P = 48/60 AC  
Q = COIL SPECIFIED ELSEWHERE  
R = 120 & 240/60 AC\*  
S = 125 DC\*\*  
T = 250 DC\*\*  
U = 440-480 ANY RECT TO DC  
V = 110/60 AC  
W = 220/60 - 240/60 AC  
X = 480/60 AC, 440/60 AC  
Y = 418/60 AC  
Z = 277/60 AC

\*DIFFERENT UPPER BASE FOR  
DUAL VOLTAGE PLUS TWO WIRES.  
\*\*DC IS DIFFERENT LOWER BASE  
STRUCTURE SIZE 0 TO 4

(9) MODIFICATIONS:	
C	= SEPARATE CONTROL
D	= AMB. COMP. TYPE A O.L. WITH AUTO RESET
D3	= MOR. SUBSTITUTION
D4	= OMIT OVERLOAD RELAY
D7	= FAST TRIP SINGLE POLE O.L. AMB. COMP. (MUST HAVE AMP RATING)
E	= 1 N.O. EXTRA CONTACT ON O.L.
J1 THRU J4	= 1 TO 4 AUX. (1NO-1NC UNWIRED)
J7	= 1 AUX. (2NC)
J8	= 1 AUX. (2NO)
J9	= 1 AUX. (1NO)
J0	= 1 AUX. (1NC)
M	= MECHANICAL LATCH OR PERMANENT MAGNET LATCH (CONTACTORS ONLY)
M1	= COIL CLEARING CONTACTS FOR LATCHED UNITS JIC, DELAYED BREAK AND 1 NO.
X	= OMIT CONTROL WIRING
Z1	= NO LINE AND LOAD TERMINALS (TAPPED TANG)
Z2	= NO LINE TERMINALS
Z3	= NO LOAD TERMINALS
Z4	= REAR CONNECTED
Z6	= CU TERMS ONLY ON LIGHTING CONTR.
P	= BULK PACKAGED
Z	= CU/AL TERMINALS (LIGHTING CONTR. ONLY)
SEE ADDITIONAL ENCLOSED MODIFICATIONS CATALOG 28-000	

IF SINGLE SPEED, REVERSING OR 2 SPEED  
B = 2 POLE OR 2 X 2 REV.  
C = 3 POLE OR 3 X 3 REV.  
OR HORIZ. MULTI-SPEED  
D = 4 POLE OR 4 X 4 REV.  
E = 6 POLE OR 6 X 3 REV.  
F = 6 POLE, 6 X 3 VERTICAL MULTI-SPEED

Catalog Number System

Table 1