

210.61

SUBMITTED TO EBASCO
FOR CONTRACT NO. 435035
SF&W S.O. NO. 3301-3308
SUPPLEMENT NO. 1
ATTACHMENT NO. —

[illegible]

Shearon Harris Nuclear Power Plant
Draft SER Open Item No. 354
NRC Question 210.62

Piping Specification (CAR-SH-M-30, Rev. 16), Minimum Wall Thickness

There are several places where minimal wall thickness is specified; e.g.,

II, 2.15 "weld end preparation . . . does not encroach on the minimum wall of fittings . . ."

II, 11. "The wall thickness after machining or grinding shall not be less than the minimum wall thickness specified by the Pipe Code and/or Piping Line List."

Appendix A of the Specification, "Pipe Codes," does not identify any "minimum wall thickness" (or even a nominal wall thickness) and the Piping Line Lists (at least those furnished for Service Water, Unit 1) do not specify minimum wall thickness. However, our major concern is with:

II, 5.03 "In no case shall trimming of the inside diameter result in wall thickness less than the minimum required for the service conditions outlined in the Piping Line List of this specification."

As indicated by Question PI-2, we have not found any indication of what corrosion/erosion allowance is used in evaluating the adequacy of piping. However, assuming that $A = 0.0625$ " for the line identified as "3SW8-87 SA" (8 inch nominal size, Sch. 80, nominal thickness of 0.500 inch, SA106 Grade B material), the "minimum required wall thickness for the service conditions" is either:

$t = 130 \times 8.625 / (2(15000 + 52)) + 0.0625 = 0.100$ inch
for "service condition" = "maximum operating," or

$t = 150 \times 8.625 / (2(15000 + 60)) + 0.0625 = 0.105$ inch
for "service condition" = "design".

Where is the cited minimum wall of II, 5.03 of the Specification used and, where used, what i-factor for girth butt welds is used?

RESPONSE:

As stated in response to Question No. 210.60, corrosion/erosion allowance was considered in determining the pipe wall thickness.

In reference to Appendix A of the M-30 Specification, Pipe Codes, note that the purpose of this section is to provide the pipe manufacturer with the acceptable material specification for pipes, fittings, bolts, nuts, etc. The information in this Appendix has to be used in conjunction with the Ebasco Line List. The Appendix A and the Line List are two complimentary documents and both documents have to be utilized in the pipe fabrication. The wall

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thickness/schedule is provided in the Line List and there is no reason for indicating the wall thicknesses in the Appendix A, as well. Under column "Pipe Code and Material" in the Line List, each line number is "assigned a pipe code symbol (such as CS-1, SS-3, etc.), which directs the fabricator to a specific material requirements per Appendix A of M-30 spec.

The term "Minimum Wall" as referred to in several places in the M-30 Specification reflects the minimum wall thickness required. This minimum wall is based on the equations shown in ASME-III, NB/NC/ND-3641.1 and it includes the mill and corrosion/erosion tolerances. The wall thickness/schedule shown in the Line List is a nominal wall thickness (except for a few heavy wall main steam and feedwater extruded pipes). Pipe fabricator is required to furnish pipes with the wall thickness per the Line List. The "minimum wall" is being used by the pipe manufacturer in the instances such as weld and preparation. In this case, the acceptable machine I.D. is shown in the Piping Line List (See the Attachment). The other instance where a reference to the minimum wall is made involved the shop "misfabrications." These cases usually involve a violation of the nominal thickness shown in the Line List, and require Ebasco verification on case-by-case basis. Ebasco would ensure that the violation is within the "design tolerance" (difference between the nominal wall thickness shown in the Line List and the minimum required wall per the code including corrosion/erosion allowance).

In summary, the nominal thickness/schedule shown in the Line List is a "binding" requirement for fabricating a spool piece. All pipes delivered by the vendor have to comply with the Line List.

Regarding the comment on i-factor for girth butt welds, the intent of the question is not clear; i-factors for girth butt welds are specified in ASME-III, Figure NC/ND-3673.2(b)-1.

A question has been raised during the meeting with NRC on August 16, 1982, in Bethesda, MD, regarding the "assurance" for minimum wall requirement at the girth butt weld area.

The NRC concern was reviewed with the pipe fabricator, Southwest Fabricating and Welding. The comment is addressed by Southwest in the enclosed letter, dated August 17, 1983 (Item 1 and 2).



210.62

SOUTHWEST FABRICATING

& WELDING CO., INC.

August 17, 1983

S-EB-748

Ebasco Services, Inc.
2 World Trade Center, 81st Floor
New York, NY 10048

Attention: Mr. Pete Fiala

Reference: Shearon Harris Nuclear Power Plant
P.O. NY-435035
S.O. 3301-3304 and 4121-4124

Gentlemen:

In response to your telephone request we offer the following:

1. **QUESTION:** How do you assure that minimum wall thickness is maintained at counterbored ends.

ANSWER: Where counter bores are a requirement, the counter bore diameter, wall thickness and tolerances are specified on Southwest's detail sheets. Prior to fit up for welding the pipe ends are counter bored to the specified dimension and thickness is checked with a micrometer to verify that the thickness satisfies the specified requirement. Since this check is only to verify that the thickness is adequate, actual thicknesses are not recorded.

2. **QUESTION:** What tolerance applies at a counter bore when Ebasco specifies a minimum wall?

ANSWER: When Ebasco specifies a minimum wall, the minimum thickness also applies to counter bored ends.

3. **QUESTION:** What specification bolting was furnished by Southwest:

ANSWER: Southwest furnished the grade of material specified by Ebasco. The most frequently specified is SA-193 B7 studs with SA-193 2H nuts for pressure boundary joints. A-307 is the grade commonly specified for machine bolts for nonpressure boundary applications.



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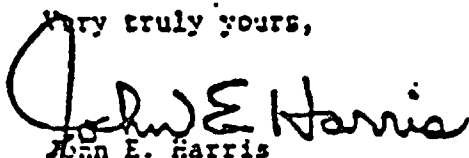
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4. QUESTION: Did Southwest specify corrosion allowance to the manufacturers of weldolet type fittings?

ANSWER: I do not believe corrosion allowances were a part of the data furnished to Southwest. If a corrosion allowance was specified, Southwest would impose the same requirement on manufacturers of special fittings. The wall thicknesses specified by Ebasco are included in the requirements imposed on our suppliers.

I trust this will satisfactorily answer your questions. Call if I can be of further help.

Very truly yours,


John E. Harris
Project Manager

JEH:cp

cc: B. J. Goodwin
E. R. McAnally
N. H. Mberke
R. P. Barnes
S. M. Goodwin

Shearon Harris Nuclear Power Plant
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Piping Stress Analysis Data, References to Specification

The Stress Analysis Data package (16 pages) appears to be a summary of the status of the design of the piping covered by Calculation No. 8050-1. We have been unable to find any references to "Design Specification" CAR-SH-M-30. Why has the Design Specification seemingly been ignored in this package?

RESPONSE:

Stress isometric 1A-216-SW-1 lists under the reference documents "Design Spec CAR-SH-M-71" which is the design specification for Class 2, 3 and B31.1 piping. That specification in turn lists Specification CAR-SH-M-30 in Paragraph 2 "Applicable Codes, Standards and Documents."



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Piping Stress Analysis Data, ND-3640 Requirements

We have not found any indication that the requirements of ND-3640 of Section III have been considered. How is assurance obtained that the requirements of this important part of Section III have been met? (A reply is expected that addresses assurance of adequate pressure design for all Section III piping; not just the piping covered by Calculation No. 8050-1.)

RESPONSE:

As stated in reply to Question No. 210.59, Safety Class 2 and 3 piping has to be designed in accordance with the requirements of ASME-III, Subsection NC and ND, respectively. It means that the specified wall thicknesses, branch connection designs, pipe bends etc., follow the requirements of the code.

Assurance of adequate pressure design is provided by means of instructions to the engineer responsible for design and specifications provided the pipe fabricator. Instructions to the engineer include specific design criteria for use in the preparation of calculations. In the case of pipe wall thickness determination, Ebasco Design Criteria MNE-65 for pipe line sizing applies, and a standardized worksheet (MNE-WS-16) is employed to document this calculation. The design criteria is derived from code requirements and the worksheet provides a systematic approach in the determination of pipe wall thickness consistent with the requirements of the code.

SUPPLEMENTARY QUESTION IDENTIFIED DURING AUGUST 16, 1983 MEETING WITH THE NRC
MEB IN BETHESDA, MD. (Identified by E. Rodabaugh)

1. How are field fabricator revisions controlled?

Field revisions and changes are governed by Company procedures and site specifications; specifically, Procedure No. 3.2, Design Change Control, and Site Specification No. 0.30, Field Fabrication and Erection of Power Piping. (Copies Attached)

2. What corrosion allowance is used by suppliers of fittings (weldolets, etc.)?

The corrosion allowance used by fitting suppliers is identical to that used in the determination of wall thicknesses specified in the Ebasco piping Line List. The specified thicknesses are included in the requirements imposed by the pipe fabricator on his suppliers. The determination of wall thickness and consideration for corrosion/erosion allowances are discussed in response to question MEB-210.60.

NRC Question 210.64 (cont'd)

3. How does the pipe fabricator design branch connections?

The pipe fabricator provides branch connections in accordance with the Ebasco piping specification. Where stub-in nozzles are permitted, the fabricator does check reinforcement requirements in accordance with formulae provided in the applicable code using pressure and temperature furnished in the Ebasco piping Line List.

SYSTEM

LINE DESIGNATION NO.

P - DESIGN PRESSURE, PSIG

T - DESIGN TEMPERATURE, F

PIPE SPECIFICATION & GRADE

SE - ALLOWABLE STRESS, PSI **

D - OUTSIDE DIAMETER OF PIPE, IN.

C - ALLOWANCE FOR MINIMUM STRUCTURAL STABILITY *

y - COEFFICIENT ***

 t_m - MINIMUM PIPE WALL THICKNESS, IN. (See NOTE 2) t_n - NOMINAL WALL THICKNESS, IN. (See NOTE 3) t_s - FIRST STANDARD SCHEDULE THICKNESS EQUAL TO OR GREATER THAN t_n SCHEDULE (CORRESPONDING TO t_s)

SCHEDULE SELECTED

ID - INSIDE DIAMETER OF PIPE, IN. (See NOTE 1)

C - ALLOWANCE FOR MINIMUM STRUCTURAL STABILITY *

y - COEFFICIENT ***

 t_m - MINIMUM PIPE WALL THICKNESS, IN. (See NOTE 2) t_n - NOMINAL WALL THICKNESS, IN. (See NOTE 3) t_s - FIRST STANDARD SCHEDULE THICKNESS EQUAL TO OR GREATER THAN t_n SCHEDULE (CORRESPONDING TO t_s)

SCHEDULE SELECTED

Use either of the following equations to determine t_m :

BASED ON OUTSIDE DIAMETER

$$t_m = \frac{P \times D}{2 (SE + Py)} + C$$

BASED ON INSIDE DIAMETER (See NOTE 1)

$$t_m = \frac{P \times ID + 2 SEC + 2yPC}{2 (SE + Py - P)} + B$$

- * - C = Allowance for minimum structural stability
 = 0.065" for 1/2 to 3-1/2 inch nominal pipe size
 = 0.000 for 4 inch nominal pipe size and larger

- ** - SE = Maximum allowable stress in material due to internal pressure and joint efficiency, at the design temperature, psi.

B = .038" for pipe ordered to specified machined I.D. with tapered backing ring and extruded pipe specified by I.D. with tapered backing ring.

= .000" for the above pipe with flat backing ring or other types of pipe with any Design Guide M-4 backing ring.

- *** - y = A coefficient having values as follows: (See NOTE 4)

TEMP. F	900 AND BELOW	950	1000	1050	1100	1150 AND ABOVE
Ferritic Steels	0.4	0.5	0.7	0.7	0.7	0.7
Austenitic Steels	0.4	0.4	0.4	0.4	0.5	0.7

NOTE 1 - Use maximum possible inside diameter with all its tolerances on wall thickness and outside diameters, except for pipe ordered to specified machined I.D. and extruded pipe specified by I.D. where note 8, paragraph 4, of Design Guide MNE-65 governs.

NOTE 2 - The pipe wall thickness required for a given pressure-temperature condition increases as pipe size increases.

NOTE 3 - For seamless pipe use $\frac{t_m}{0.875}$; for any size of plate pipe, add 0.010 inches to the calculated t_m to obtain t_n .

NOTE 4 - The value of "y" may be interpolated between 50 F values shown above. For nonferrous materials and cast iron use y = 0.4.

GENERAL NOTES: See Design Guide MNE-65 Pipe Line Sizing - for specific information.

CLIENT

LOCATION

PROJECT

BY

(JOB ENGINEER)

DATE

CHECKED

DATE

APPROVED

(SUPERVISOR)

DATE

STANDARDIZED WORK SHEET
PIPE WALL THICKNESS AND
SCHEDULE DETERMINATIONEBASCO SERVICES INCORPORATED
MECHANICAL-NUCLEAR ENGINEERING

WORK SHEET

MNE-WS-16