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W. K. Kratzer

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**THIRD SET OF LOADING AND OPERATING CONDITIONS
FOR NIN-1 AND NIE-1 ELEMENTS
IN THE KER LOOPS UNDER PT-IP-377-A**

by

W. K. Kratzer

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RICHLAND, WASHINGTON**

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THIRD SET OF LOADING AND OPERATING CONDITIONS
FOR NIN-1 AND NIE-1 ELEMENTS
IN THE KER LOOPS UNDER PT-IP-377-A

Production Test IP-377-A⁽¹⁾ authorized the irradiation of NIN-1 and NIE-1⁽²⁾ elements in the KER loops and specified certain limitations on the operating conditions for these elements. The test required that specific operating conditions and trip settings for particular loadings would be approved by the Manager of the Process and Reactor Development Subsection and the Process Technology Subsection prior to charging. The purpose of this document is to provide specific charge orders and limiting operating conditions for a group of fuel loadings not covered by previous documents.^(3,4)

Tables 1 and 2 give specific loadings for NIN-1 and NIE-1 elements of four different lengths - 16 inch, 17.34 inch, 23.13 inch, and 24 inch - in any of the KER loops. Figure 1 gives the high outlet temperature trip, maximum outlet temperature, and boiling point suppression trip settings as a function of the observed tube ΔT . This graph is valid for all of the loadings in Tables 1 and 2, since it is based on the most restrictive loading, Q, and is conservative for the others. If, after a loading has been charged, Figure 1 is too restrictive, additional approved operating conditions will be issued for the particular loading.

W. K. Kratzer
Process and Reactor Development Subsection
RESEARCH AND ENGINEERING SECTION

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APPROVED:

J. H. Brown, Manager
Process and Reactor Development Subsection
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Process Technology Subsection
RESEARCH AND ENGINEERING SECTION

- 1) Kratzer, W. K. Production Test IP-377-A, Irradiation of N-Reactor Inner Fuel Tubes in the KER Loops, HW-67756. December 13, 1960. (SECRET)
- 2) Kusler, L. E. and W. K. Kratzer, Method for Designating Experimental Coextruded Zircaloy-2 Jacketed Fuel Elements, HW-67225. October 26, 1960. (CONFIDENTIAL-UNDOCUMENTED)
- 3) Kratzer, W. K. Loading and Operating Conditions for NIN-1 and NIE-1 Elements in the KER Loops Under PT-IP-377-A, HW-67912. December 23, 1960. (SECRET)
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FIG. 55.1

Operating conditions for the system given in Tables 1 and 2.

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TABLE 1

LOADINGS FOR 16 INCH OR 17.34 INCH
NIN-1 OR NIE-1 ELEMENTS

Loading Designation	Loop	Elements		Charge Makeup From Downstream End
		Number	Type	
A	1	5	NIN-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Tri
B	1	6	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Tri
C	1	7	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIN-1 Elements, One 8" Tri
D	2,3,4	5	NIN-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Tri
E	2,3,4	6	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Tri
F	2,3,4	7	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIN-1 Elements, One 8" Tri
G	1	5	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Tri
H	1	6	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIE-1 Elements, One 8" Tri
I	2,3,4	5	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Tri
J	2,3,4	6	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIE-1 Elements, One 8" Tri
K	2,3,4	7	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIE-1 Elements, One 8" Tri

TABLE 2

LOADINGS FOR 23.13 INCH OR 24 INCH
NIN-1 OR NIE-1 ELEMENTS

Loading Designation	Loop	Elements		Charge Makeup From Downstream End
		Number	Type	
L	1	4	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIN-1 Elements, One 8" Tri
M	1	5	NIN-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Tri
N	2,3,4	4	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIN-1 Elements, One 8" Tri
O	2,3,4	5	NIN-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Tri
P	2,3,4	6	NIN-1	One 8" Perf, Twenty-two 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Tri
Q	1	3	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Three NIE-1 Elements, One 8" Tri
R	1	4	NIE-1	One 8" Perf, Twenty-Six 8" Spacers, One 8" Triangular Perf, Four NIE-1 Elements, One 8" Tri
S	2,3,4	4	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIE-1 Elements, One 8" Tri
T	2,3,4	5	NIE-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Tri

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TABLE 1

LOADINGS FOR 16 INCH OR 17.34 INCH
NIN-1 OR NIE-1 ELEMENTS

Loop	Elements		Charge Makeup From Downstream End
	Number	Type	
1	5	NIN-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Triangular Perf
1	6	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Triangular Perf
1	7	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIN-1 Elements, One 8" Triangular Perf
2,3,4	5	NIN-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Triangular Perf
2,3,4	6	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Triangular Perf
2,3,4	7	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIN-1 Elements, One 8" Triangular Perf
1	5	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Triangular Perf
1	6	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIE-1 Elements, One 8" Triangular Perf
2,3,4	5	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Triangular Perf
2,3,4	6	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Six NIE-1 Elements, One 8" Triangular Perf
2,3,4	7	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Seven NIE-1 Elements, One 8" Triangular Perf

TABLE 2

LOADINGS FOR 23.13 INCH OR 24 INCH
NIN-1 OR NIE-1 ELEMENTS

Loop	Elements		Charge Makeup From Downstream End
	Number	Type	
1	4	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIN-1 Elements, One 8" Triangular Perf
1	5	NIN-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Triangular Perf
2,3,4	4	NIN-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIN-1 Elements, One 8" Triangular Perf
2,3,4	5	NIN-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIN-1 Elements, One 8" Triangular Perf
2,3,4	6	NIN-1	One 8" Perf, Twenty-two 8" Spacers, One 8" Triangular Perf, Six NIN-1 Elements, One 8" Triangular Perf
1	3	NIE-1	One 8" Perf, Twenty-eight 8" Spacers, One 8" Triangular Perf, Three NIE-1 Elements, One 8" Triangular Perf
1	4	NIE-1	One 8" Perf, Twenty-Six 8" Spacers, One 8" Triangular Perf, Four NIE-1 Elements, One 8" Triangular Perf
2,3,4	4	NIE-1	One 8" Perf, Twenty-six 8" Spacers, One 8" Triangular Perf, Four NIE-1 Elements, One 8" Triangular Perf
2,3,4	5	NIE-1	One 8" Perf, Twenty-five 8" Spacers, One 8" Triangular Perf, Five NIE-1 Elements, One 8" Triangular Perf

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