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MASTER

COVER SHEET

DOCUMENT TITLE

AVAILABILITY OF ENDF/B NEUTRON CROSS SECTION DATA

AUTHOR

H. ALTER

CLASSIFICATION TYPE
(RD OR DI)

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(S, C OR U)

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TECHNICAL DATA RECORD

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PAGE 1 OF 50	H Alter
DATE 1/8/68	S.D Carpenter
GO NO 7701	
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AUTHOR: H. Alter

DEPT & GROUP NO: 736-644

TITLE: Availability of ENDF/B Neutron Cross Section Data

SECURITY CLASSIFICATION

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UNCL.	☒	☐
CONF.	☐	☐
SECRET	☐	☐

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RESTRICTED DATA ☐
DEFENSE INFO. ☐

AUTHORIZED CLASSIFIER SIGNATURE DATE

PROGRAM: Reactor Development

SUBACCOUNT TITLE: Reactor Physics Cross Section Analysis

DISTRIBUTION: See Attached List

STATEMENT OF PROBLEM

Prepare a summation of neutron cross section data distributed through ENDF/B and available at Atomics International.

ABSTRACT

Over the past several months Brookhaven National Laboratory has been distributing ENDF/B Neutron Cross Section Data to participating members of the Cross Section Evaluation Working Group (CSEWG). This report summarizes data received and available for use at Atomics International as of January 1, 1968

Over the past several months BNL has been distributing ENDF/B neutron cross section data to participating members of the Cross Section Evaluation Working Group (CSEWG). This report lists the nuclides for which data has been received and filed. With the exception of ENDF/B tape No. 999, all data is considered to be category 1 data, that is, checked and found free of mechanical error. Category 2 data has not been so certified. The data listed is generally identified in terms of an ENDF/B identification number (MAT), nuclide name, magnetic tape number and the number of BCD cards per nuclide on the tape. A set of CRT's for a typical nuclide is appended. Listings and some writeups of the data are available from the author.

ENDF/B Data Tape 114

MAT	Nuclide	No. of Cards	MAT	Nuclide	No. of Cards
1005	Li-6	1263	1025	Mo	570
1006	Li-7	1140	1030	Gd	601
1009	B-10	456	1035	Ta-181	721
1010	C-12	1938	1053	Pu-240	807
1012	N-14	3674	1059	Na	1330
1014	Mg	502	1060	W-182	585
1016	Ti	650	1061	W-183	667
1017	V	716	1062	W-184	568
1019	Mn	1326	1063	W-186	530
1042	U-233 FP	87	Rapidly saturating fission products		
1066	"	76	Slowly "	"	"
1067	"	72	Non "	"	"
1045	U-235 FP	87	Rapidly "	"	"
1068	"	76	Slowly "	"	"
1069	"	72	Non "	"	"
1052	Pu-239 FP	87	Rapidly "	"	"
1070	"	76	Slowly "	"	"
1071	"	72	Non "	"	"

ENDF/B Data Tape 115

MAT	Nuclide	No. of Cards	MAT	Nuclide	No. of Cards
1001	H	205	1043	U-234	684
1003	D	263	1046	U-236	675
1013	O-16	2380	1047	U-238	953
1018	Cr	2296	1051	Pu-239	1008
1020	Fe	3299	1054	Pu-241	2145
1021	Ni	3082	1056	Am-241	656
1026	Xe-135	386	1057	Am-243	436
1027	Sm-149	897			

ENDF/B Data Tape 116

MAT	Nuclide	No. of Cards	MAT	Nuclide	No. of Cards
1007	Be	639	1037	Au-197	1081
1024	Nb	924	1044	U-235	2670
1028	Eu-151	859	1048	Np-237	655
1029	Eu-153	858	1050	Pu-238	697
1031	Dy-164	875	1055	Pu-242	695
1032	Lu-175	800	1058	Cm-244	680
1033	Lu-176	828			

ENDF/B Data Tape 117

MAT	Nuclide	No. of Cards
1015	Al	1559

ENDF/B Data Tape 999

MAT	Nuclide	MAT	Nuclide
1034	Hf	1074	Hf-178
1041	U-233	1075	Hf-179
1072	Hf-176	1076	Hf-180
1073	Hf-177	1082	Hf-174

Thermal cross sections and scattering law data for H_2O, D_2O, Be, BeO, C, CH_2 and Z_rH have also been received and filed on magnetic tape.

For Be, C, BeO and ZrH the data is tabulated at the following temperatures, °K, 296, 400, 500, 600, 700, 800, 1000 and 1200. Data for H_2O and D_2O is tabulated for temperatures of 296, 350, 400, 450, 500 and 600 while data for CH_2 is available at temperatures of 296 and 350.

7712
0117 011

MOLYBDENUM CROSS SECTIONS MATERIAL 1025

THE PRIMARY SOURCE FOR THIS EVALUATION IS KFK-120 BY J.J.SCHMIDT.
THIS DATA WAS PREPARED BY E.PENNINGTON,A.N.L.,IN OCTOBER 1966.
THE FOLLOWING MODIFICATIONS WERE MADE OF THE DATA FROM THE PRIMARY SOURCE-

RESONANCE PARAMETERS FROM JETP 17,803,(1963),PLUS SOME SMOOTH CAPTURE WERE USED FROM 4 EV. TO 1 KEV.

INELASTIC SCATTERING CROSS SECTIONS FROM 200 KEV. TO 1.5 MEV. FOR FOUR RESOLVED LEVELS WERE OBTAINED FROM A.B.SMITH AND R.HAYES (TO BE PUBLISHED).

N-2N AND N-3N CROSS SECTIONS WERE OBTAINED FROM S.PEARLSTEIN. SEE N.S.E.23,238-250(1965).

THE TOTAL CROSS SECTION WAS EXTENDED FROM 10 TO 15 MEV. USING BNL-325 DATA.

THE N-GAMMA CROSS SECTION WAS EXTENDED FROM 10 TO 15 MEV. USING 1/E BEHAVIOR.

THE REACTION CROSS SECTION WAS ASSUMED CONSTANT FROM 10 TO 15 MEV

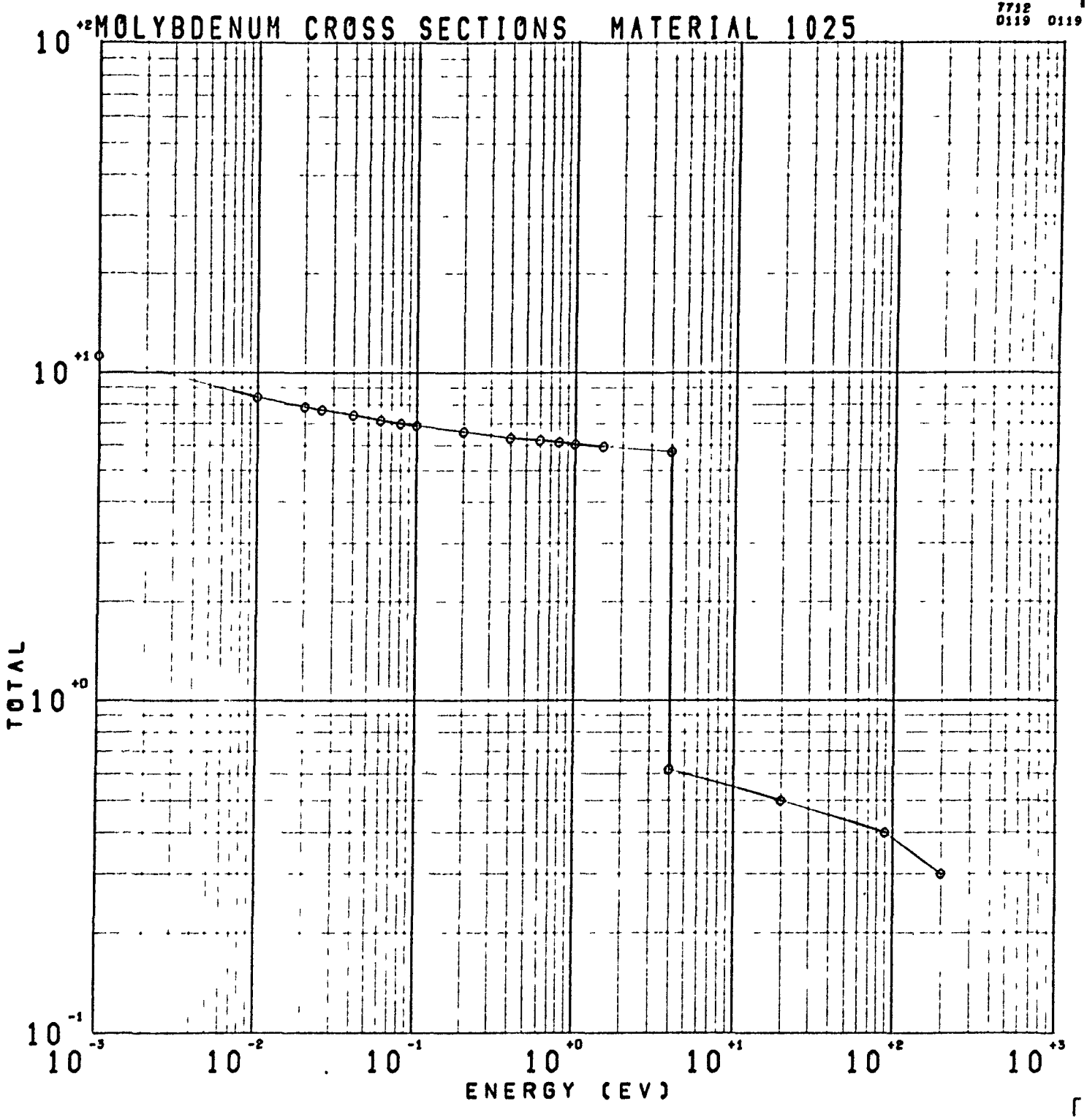
THE INELASTIC SCATTERING CROSS SECTION WAS OBTAINED ABOVE THE N-2N THRESHOLD BY SUBTRACTING OTHER REACTIONS FROM THE REACTION CROSS SECTION.

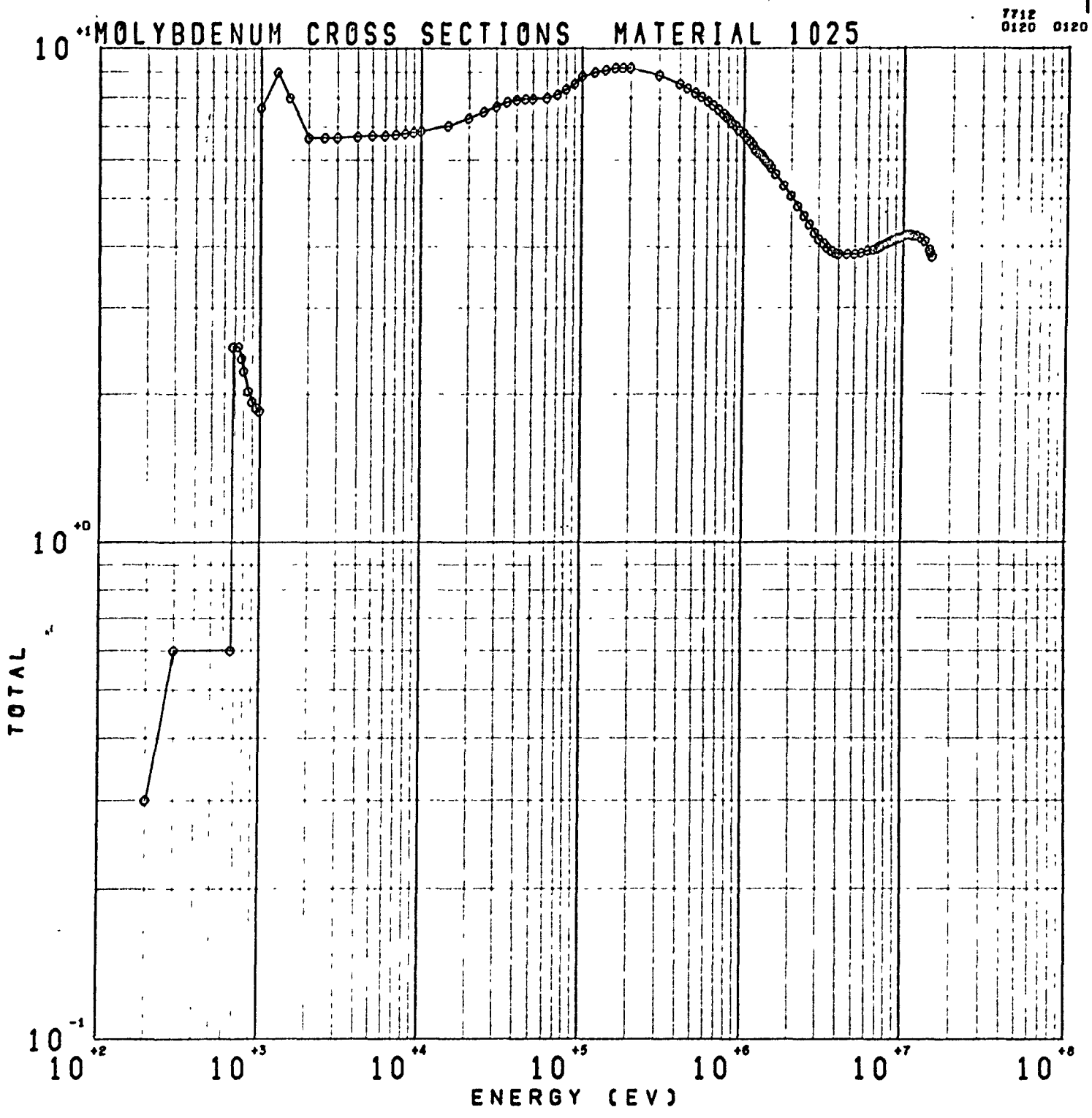
NUCLEAR TEMPERATURES WERE ESTIMATED FOR CONTINUUM INELASTIC SCATTERING AS IN YIFTAH-OKRENT-MOLDAUER.

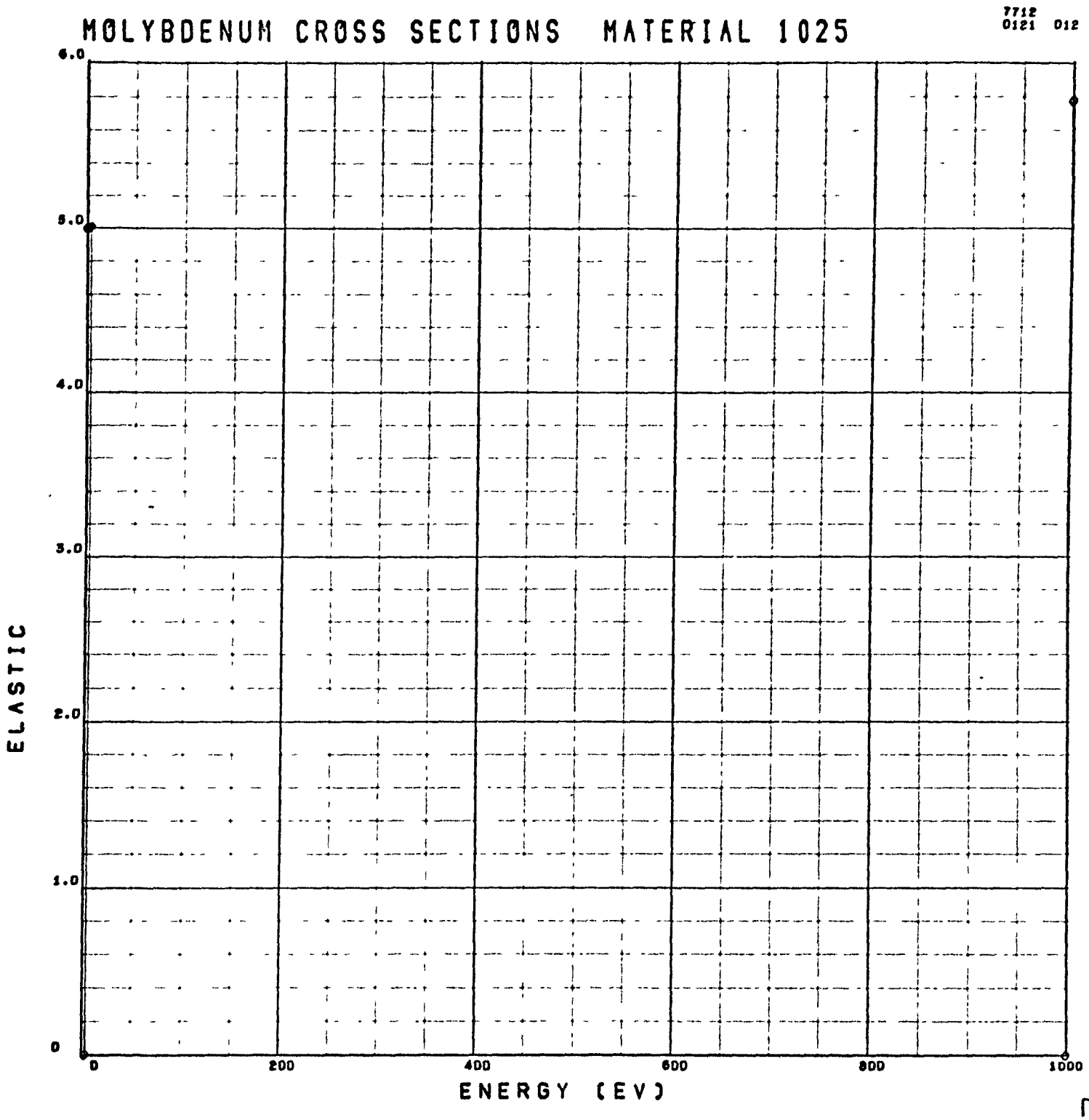
LEGENDRE COEFFICIENTS FOR ELASTIC SCATTERING WERE OBTAINED FROM H.ALTER UP TO 6 MEV.(SEE NAA-SR-11980 VOL.IV).ABOVE 6 MEV. ABACUS OPTICAL MODEL CALCULATIONS PROVIDED THE COEFFICIENTS.

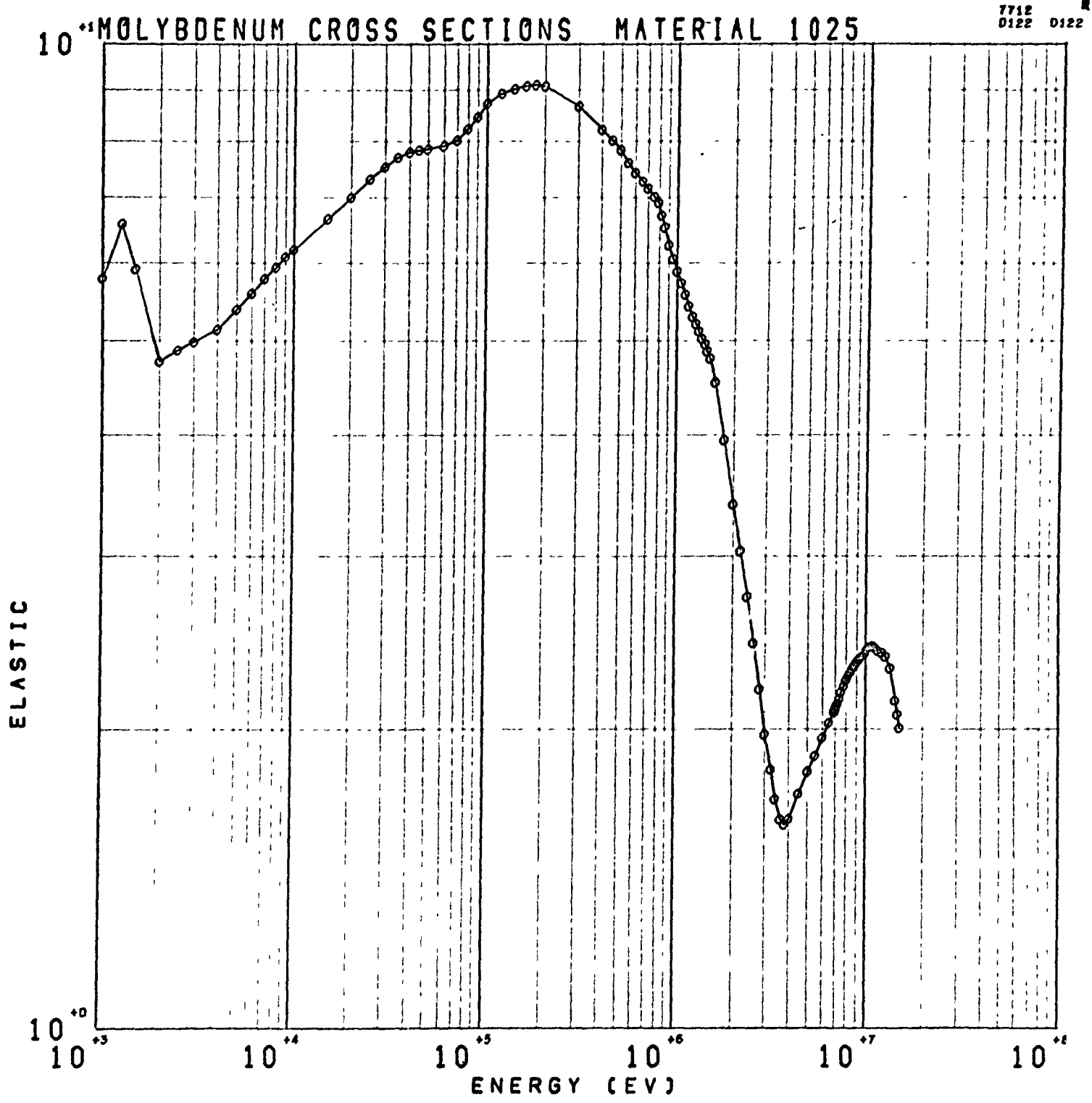
7712
0116 011

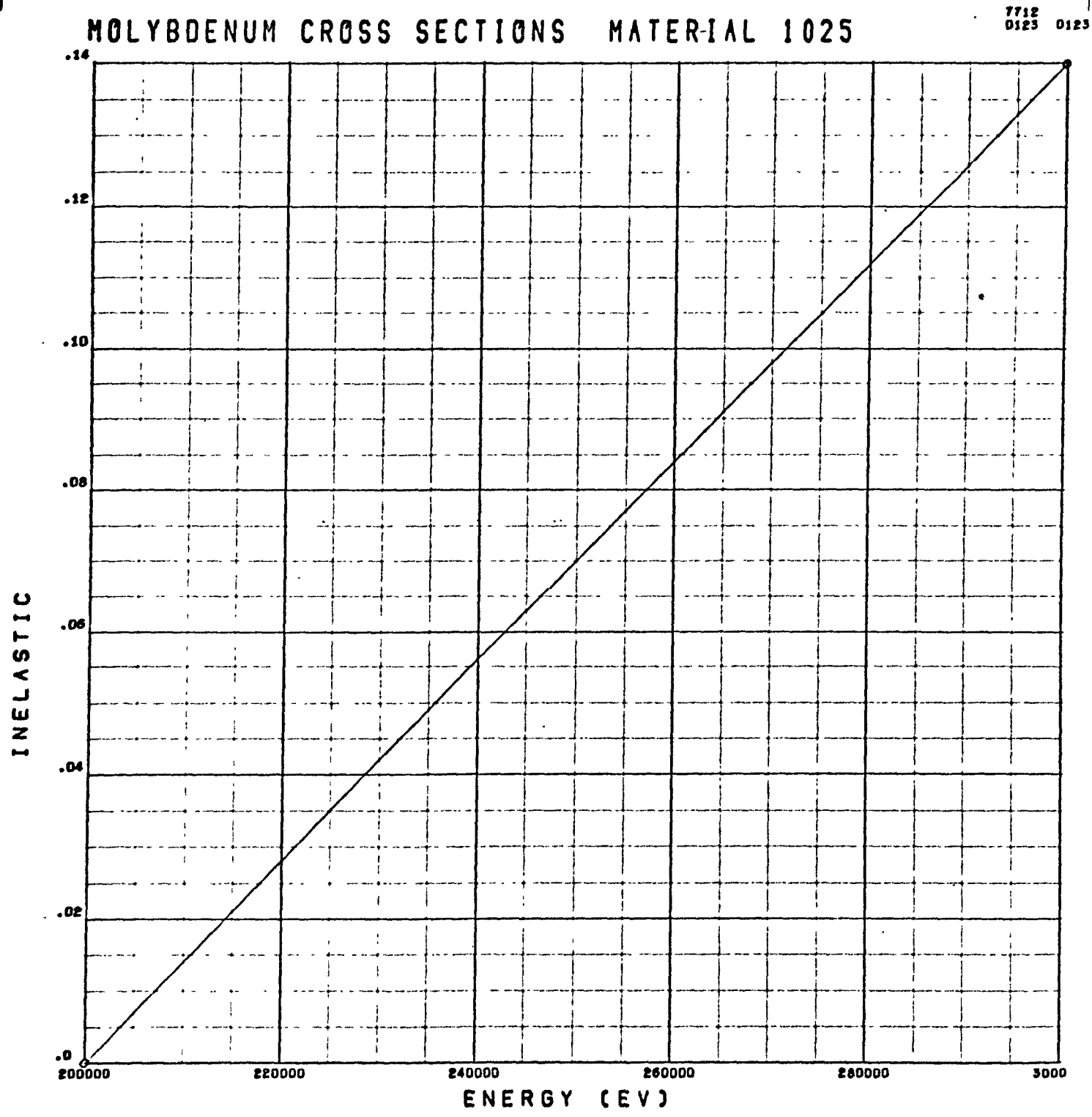
VALUES OF MU BAR LAB,XI,AND GAMMA WERE CALCULATED FROM THE
LEGENDRE COEFFICIENTS.
PARAMETERS FOR THE FREE GAS THERMAL SCATTERING LAW WERE INCLUDED.

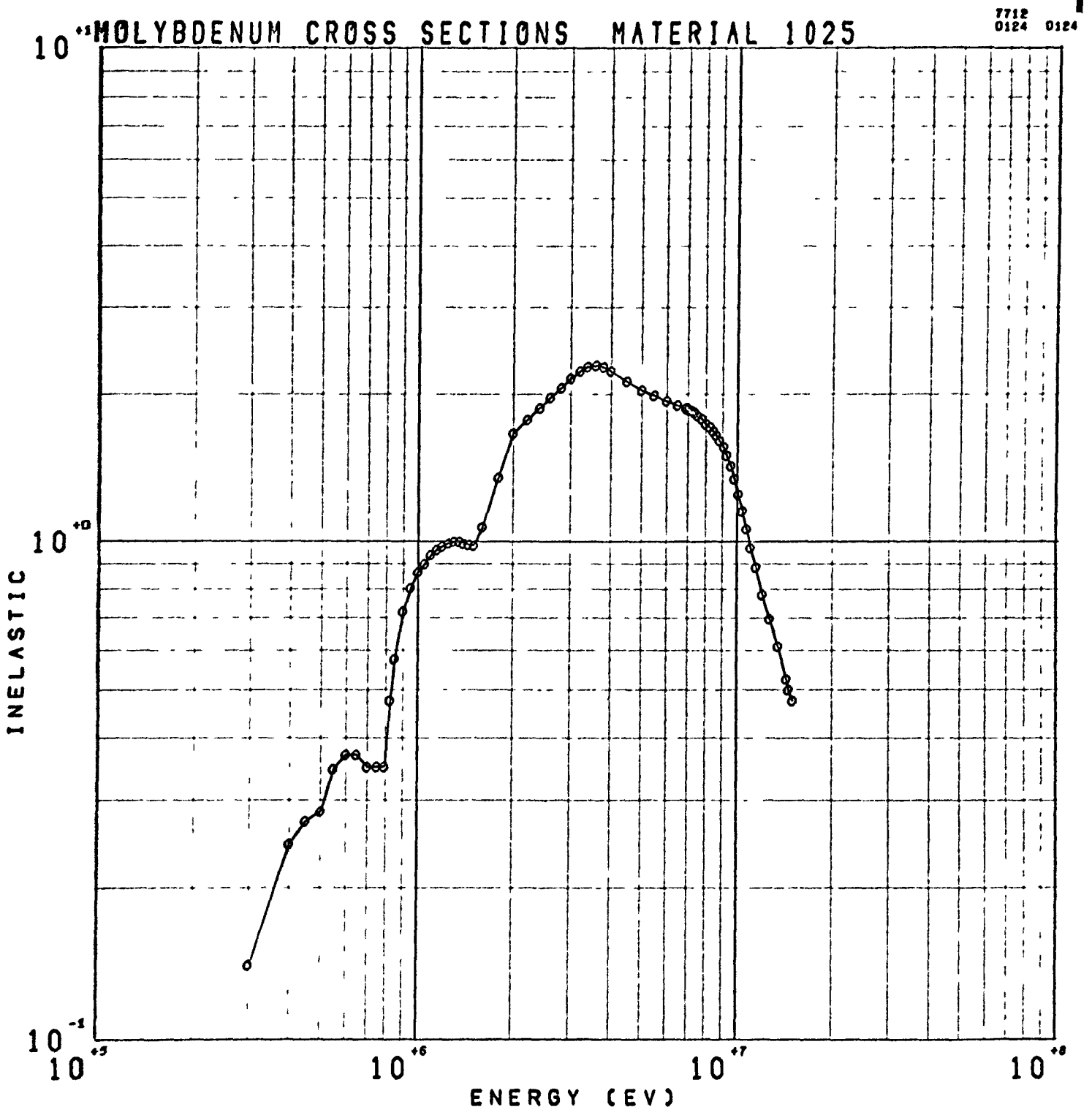

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0119 0119
TOTAL
ENERGY (EV)
10+2
10+1
10+0
10-1
10-3
10-2
10-1
10+0
10+1
10+2
10+3

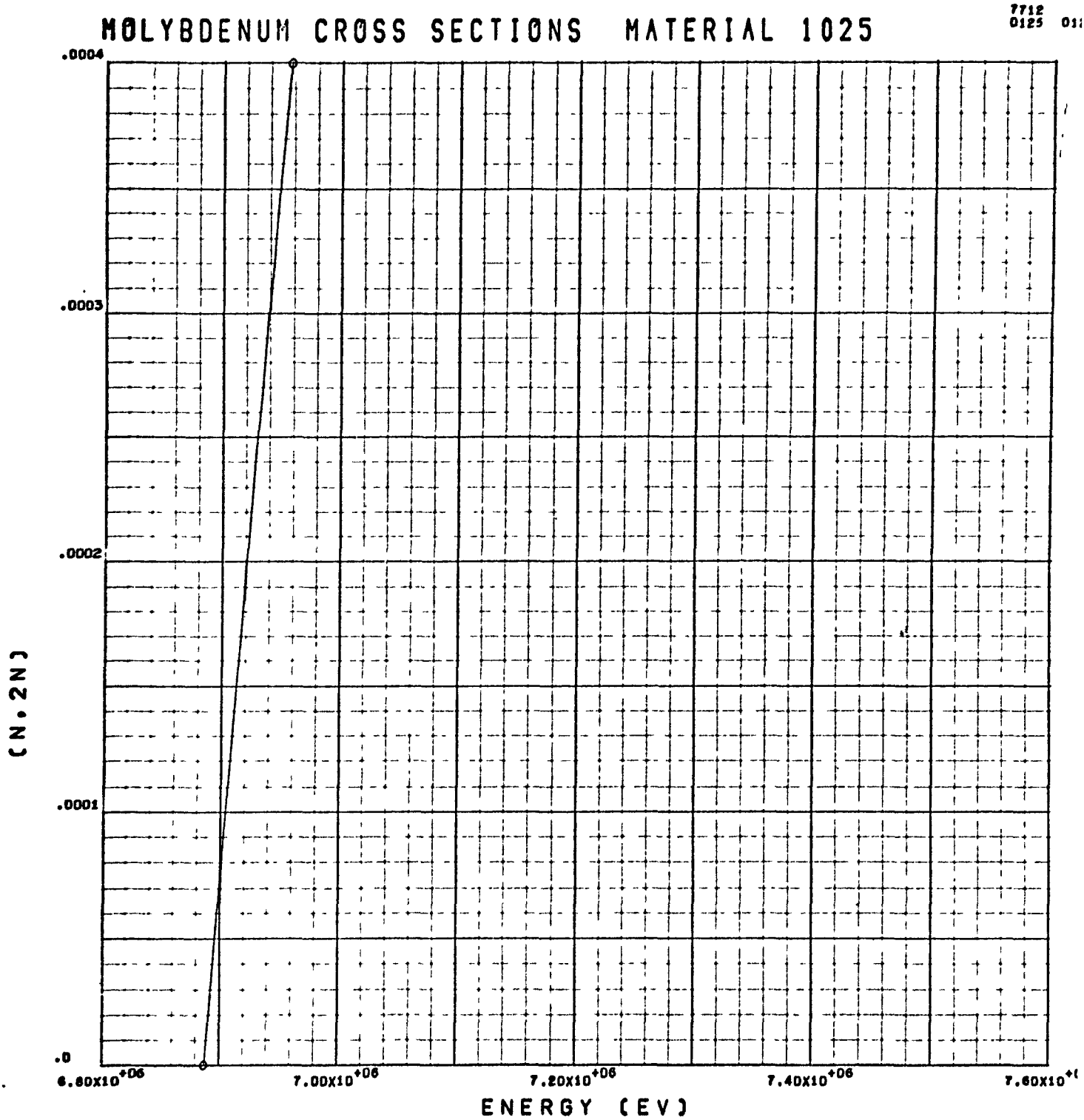

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0120 0120
10+1
10+0
10-1
TOTAL
10+2
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

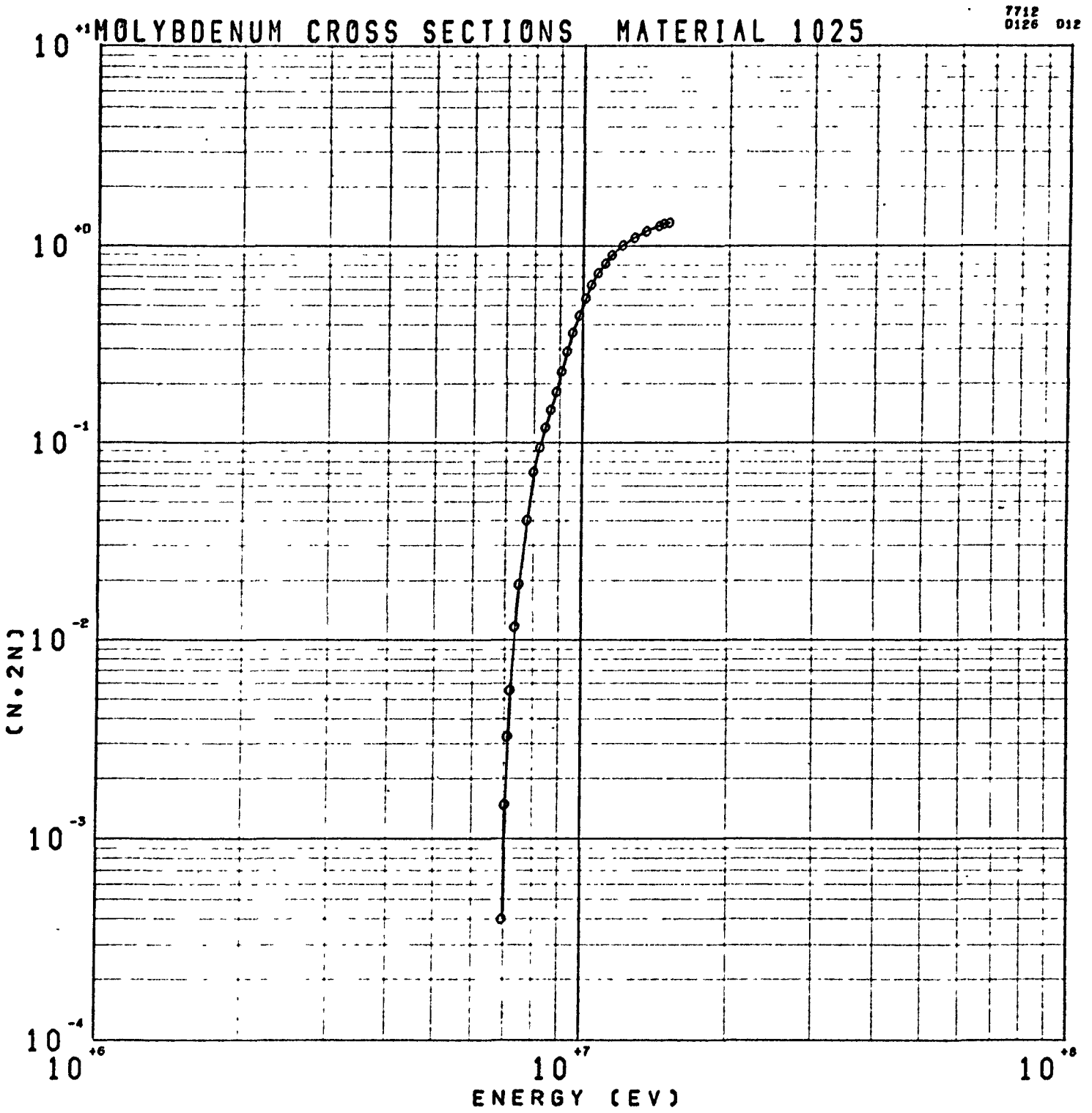

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0121 012
ELASTIC
6.0
5.0
4.0
3.0
2.0
1.0
0
0
200
400
600
800
1000
ENERGY (EV)

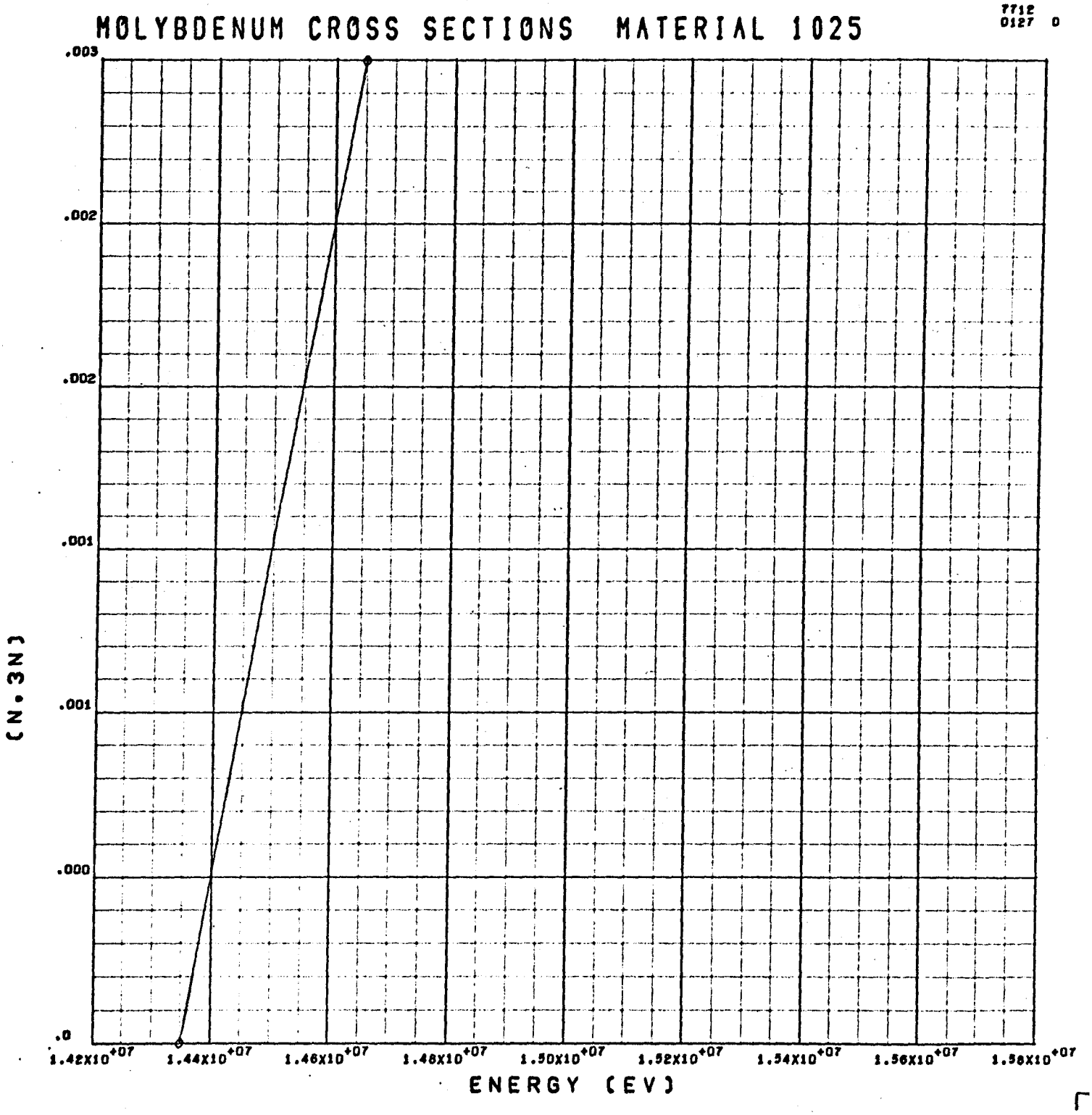

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
D122 D122
10+1
ELASTIC
10+0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

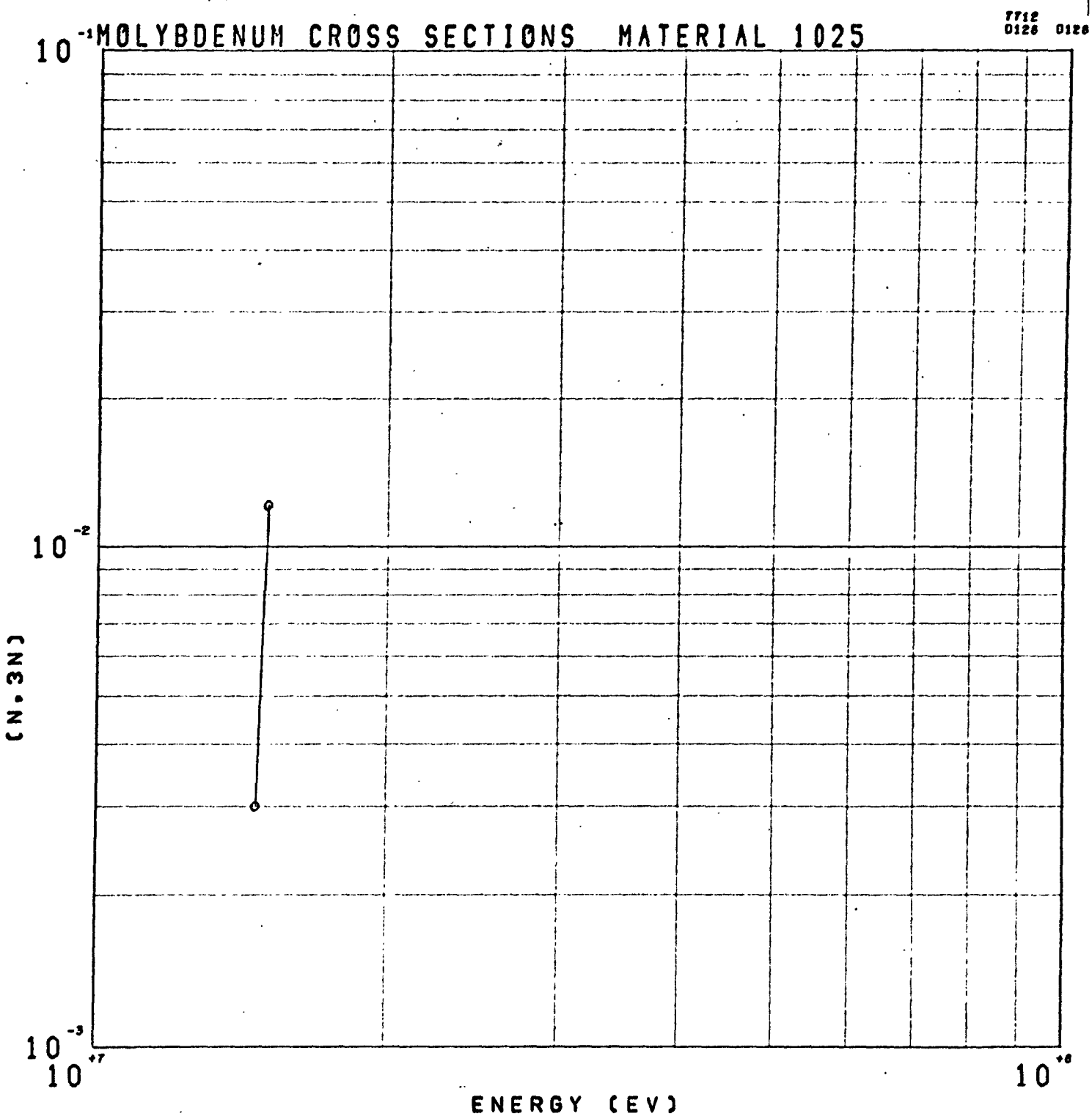

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0123 0123
INELASTIC
.14
.12
.10
.08
.06
.04
.02
.0
200000
220000
240000
260000
280000
3000
ENERGY (EV)

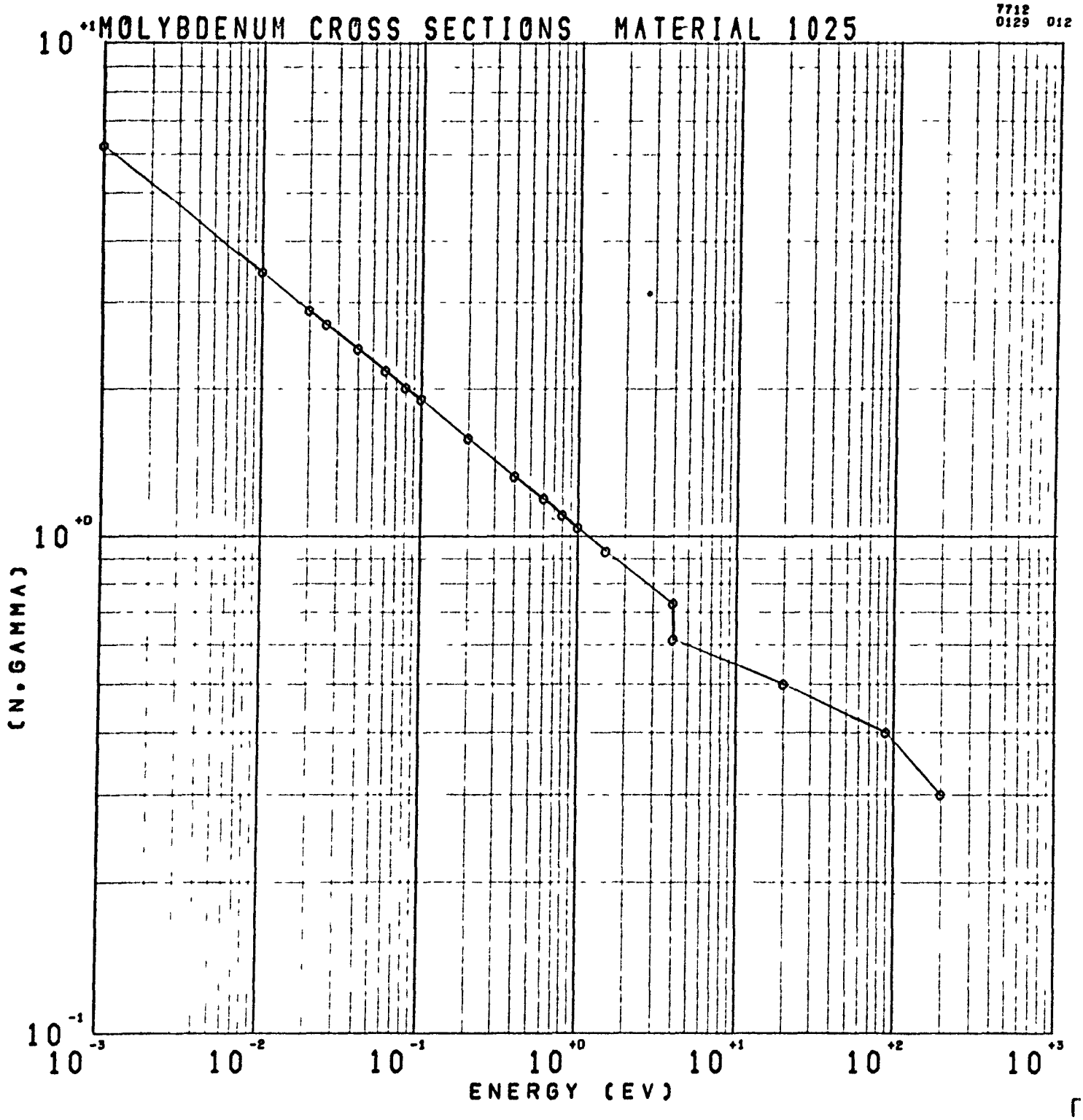

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0124 0124
10+1
10+0
10-1
INELASTIC
10+5
10+6
10+7
10+8
ENERGY (EV)

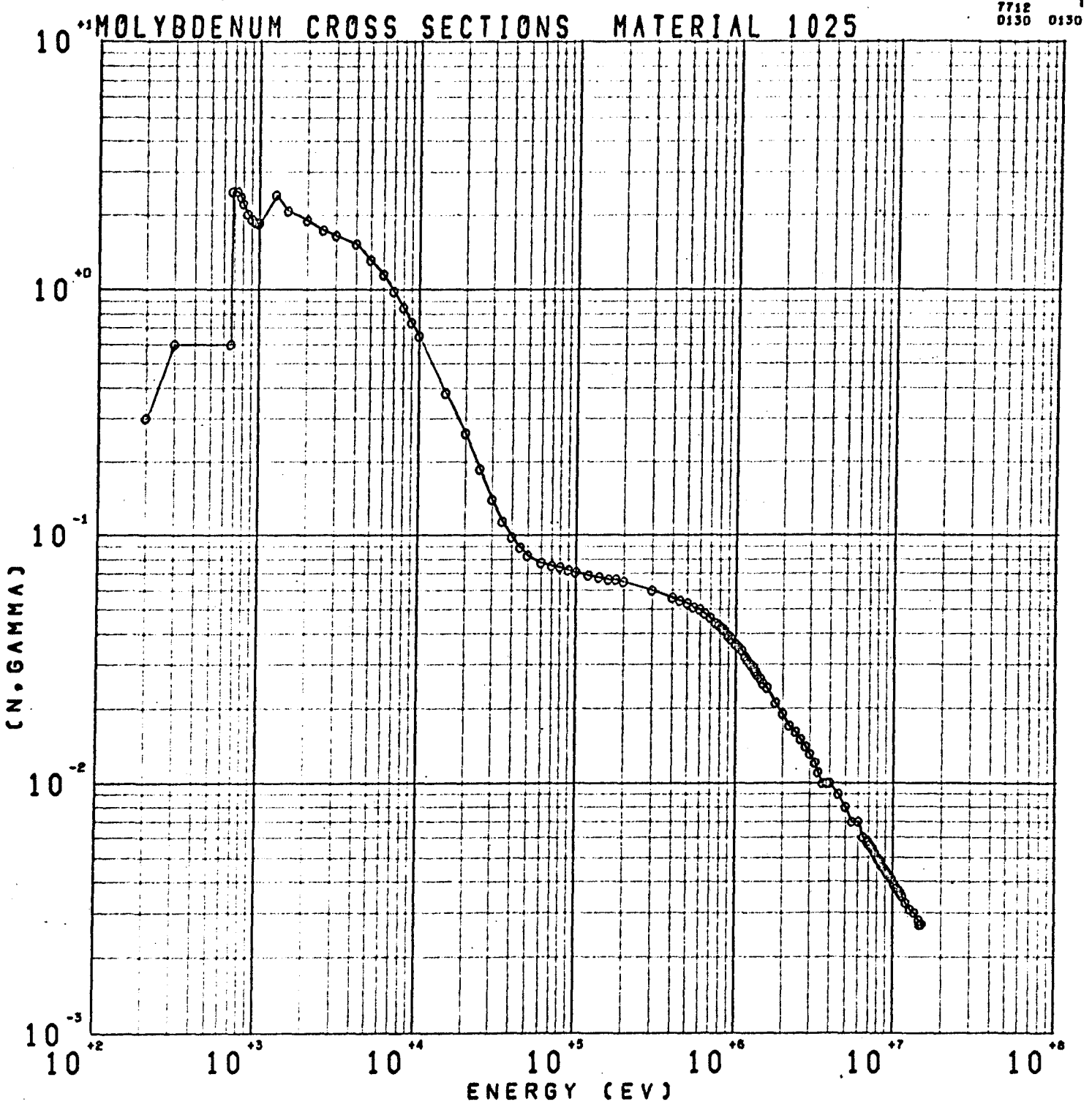

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0125 01
.0004
.0003
.0002
.0001
.0
(N,2N)
6.80X10+06
7.00X10+06
7.20X10+06
7.40X10+06
7.60X10+
ENERGY (EV)

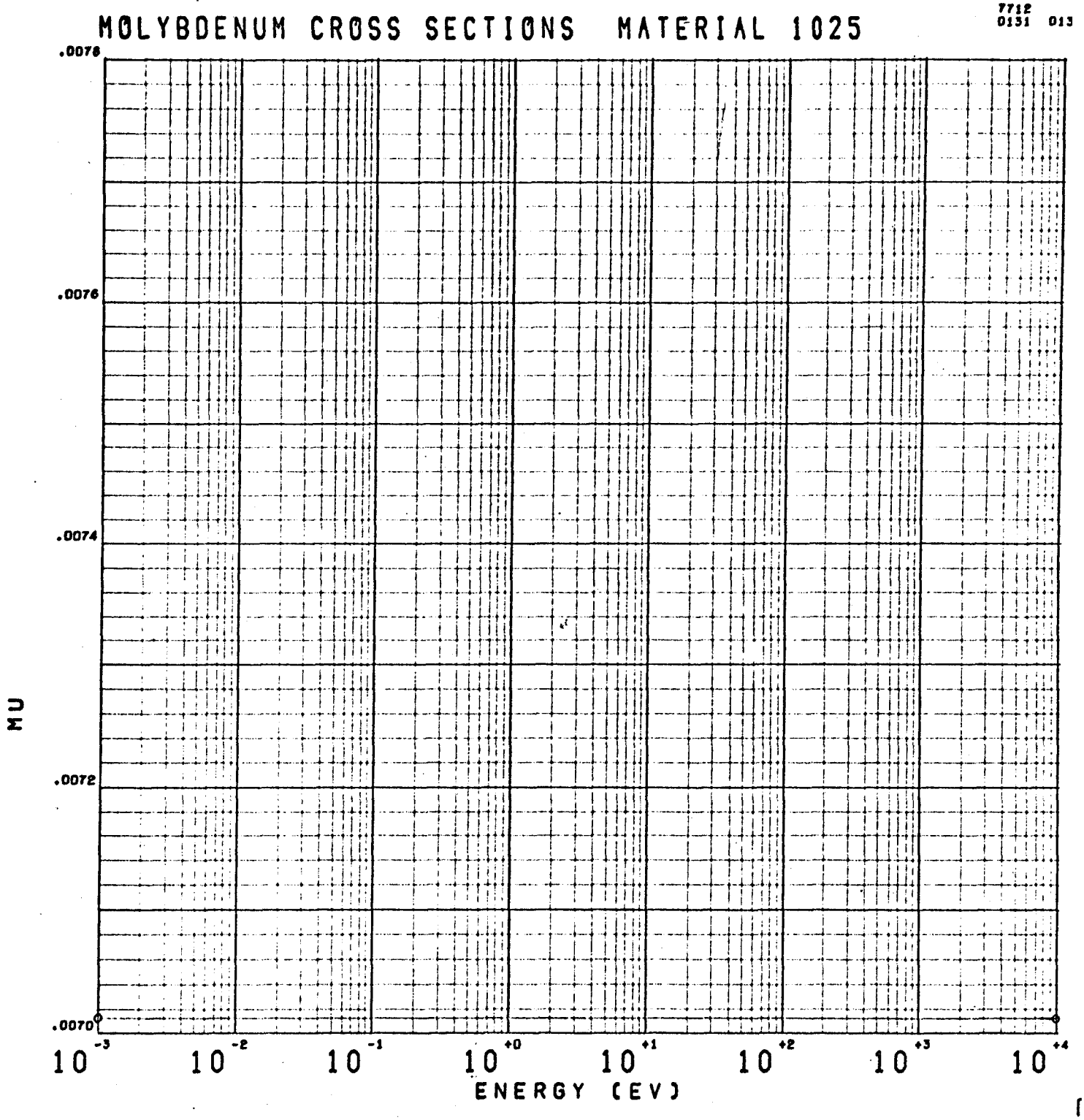

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
D126 D12
10+1
10+0
10-1
10-2
10-3
10-4
(N,2N)
10+6
10+7
10+8
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0127 0
.003
.002
.002
.001
.001
.000
.0
(N,3N)
1.42X10+07
1.44X10+07
1.46X10+07
1.48X10+07
1.50X10+07
1.52X10+07
1.54X10+07
1.56X10+07
1.58X10+07
ENERGY (EV)

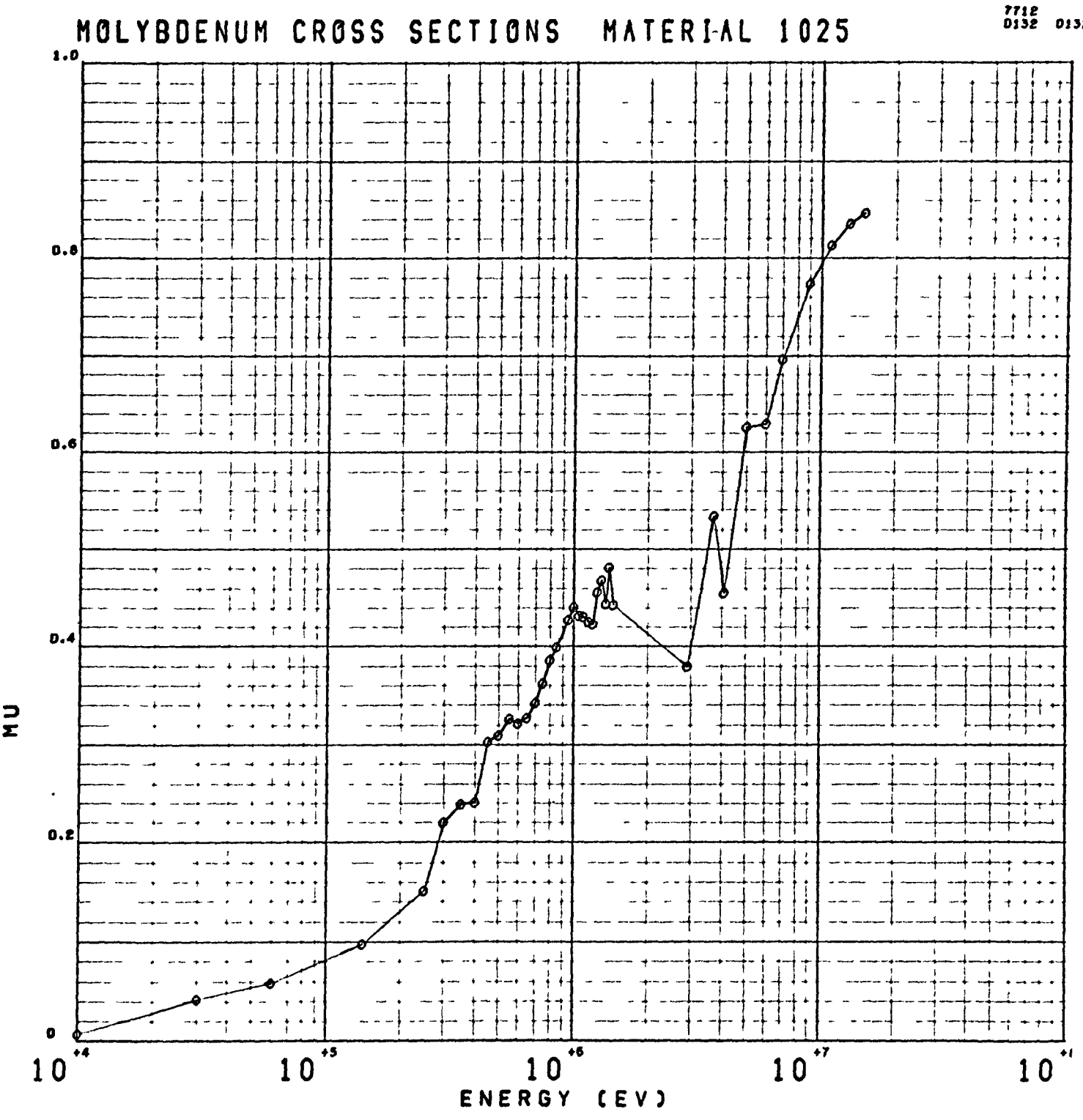

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0126 0126
10^-1
10^-2
10^-3
(N,3N)
10^+7
10^+6
ENERGY (EV)

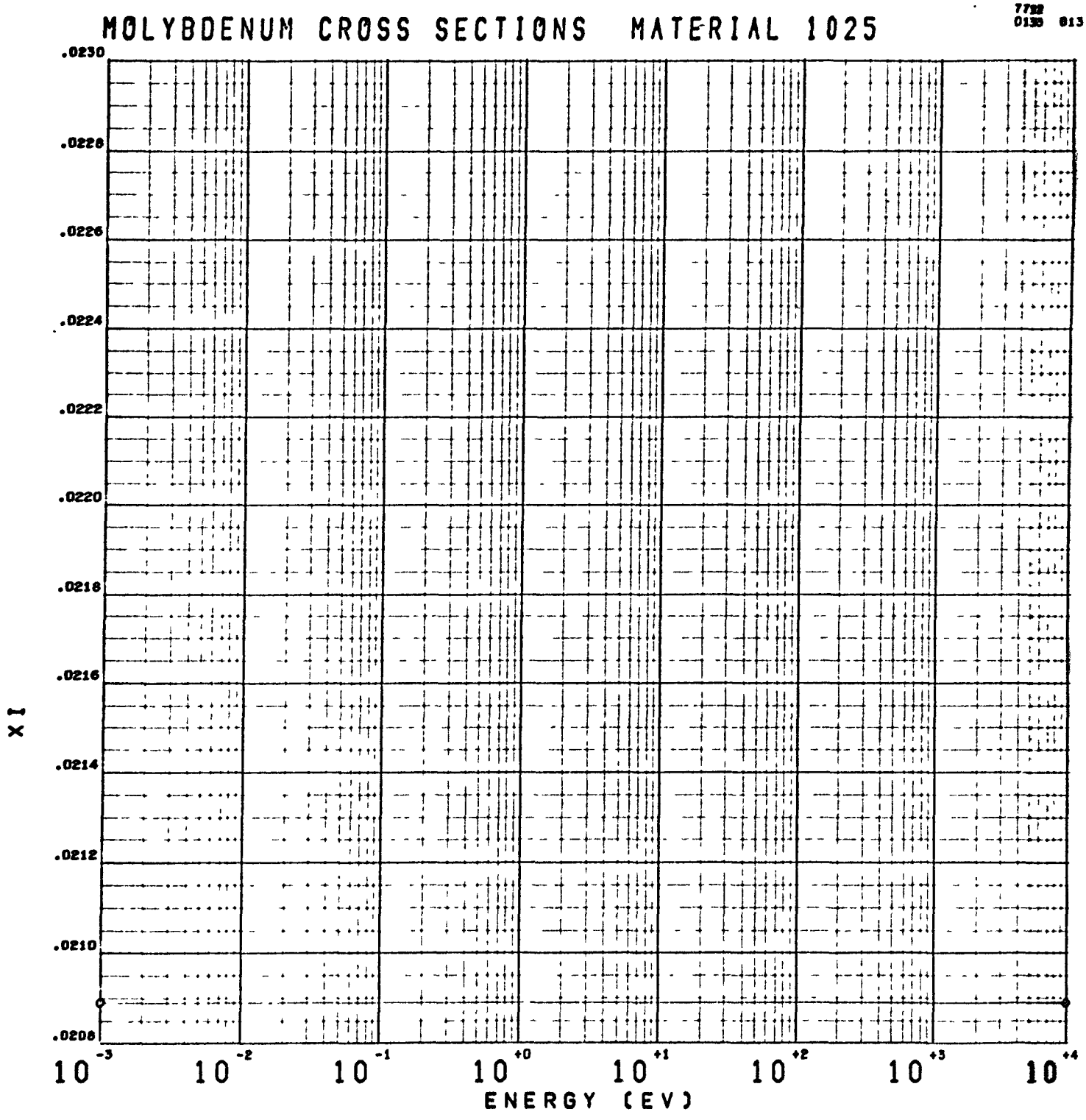

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0129 012
10+1
10+0
10-1
(N.GAMMA)
10-3
10-2
10-1
10+0
10+1
10+2
10+3
ENERGY (EV)

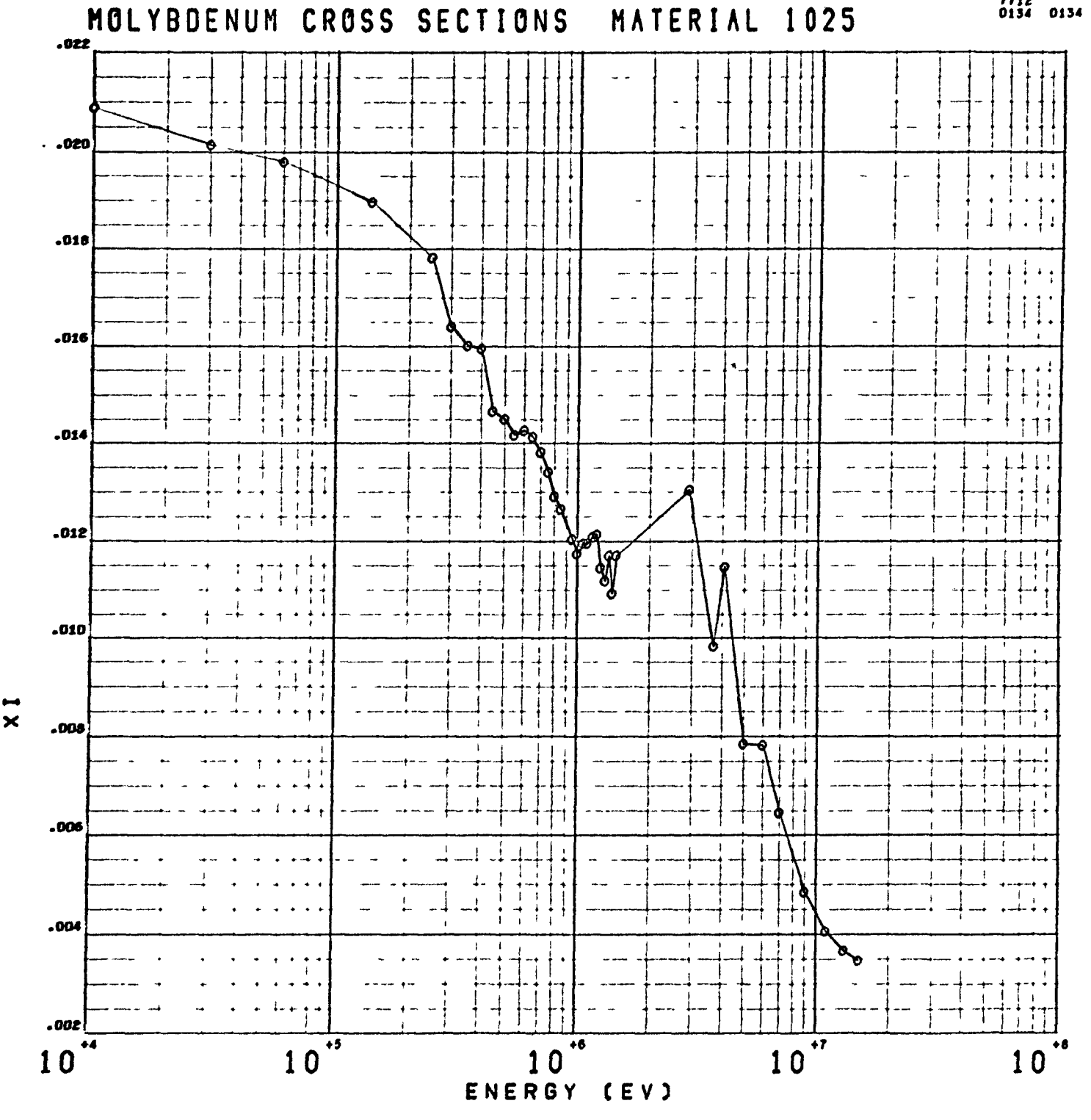

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0130 0130
10+1
10+0
10-1
10-2
10-3
(N,GAMMA)
10+2
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

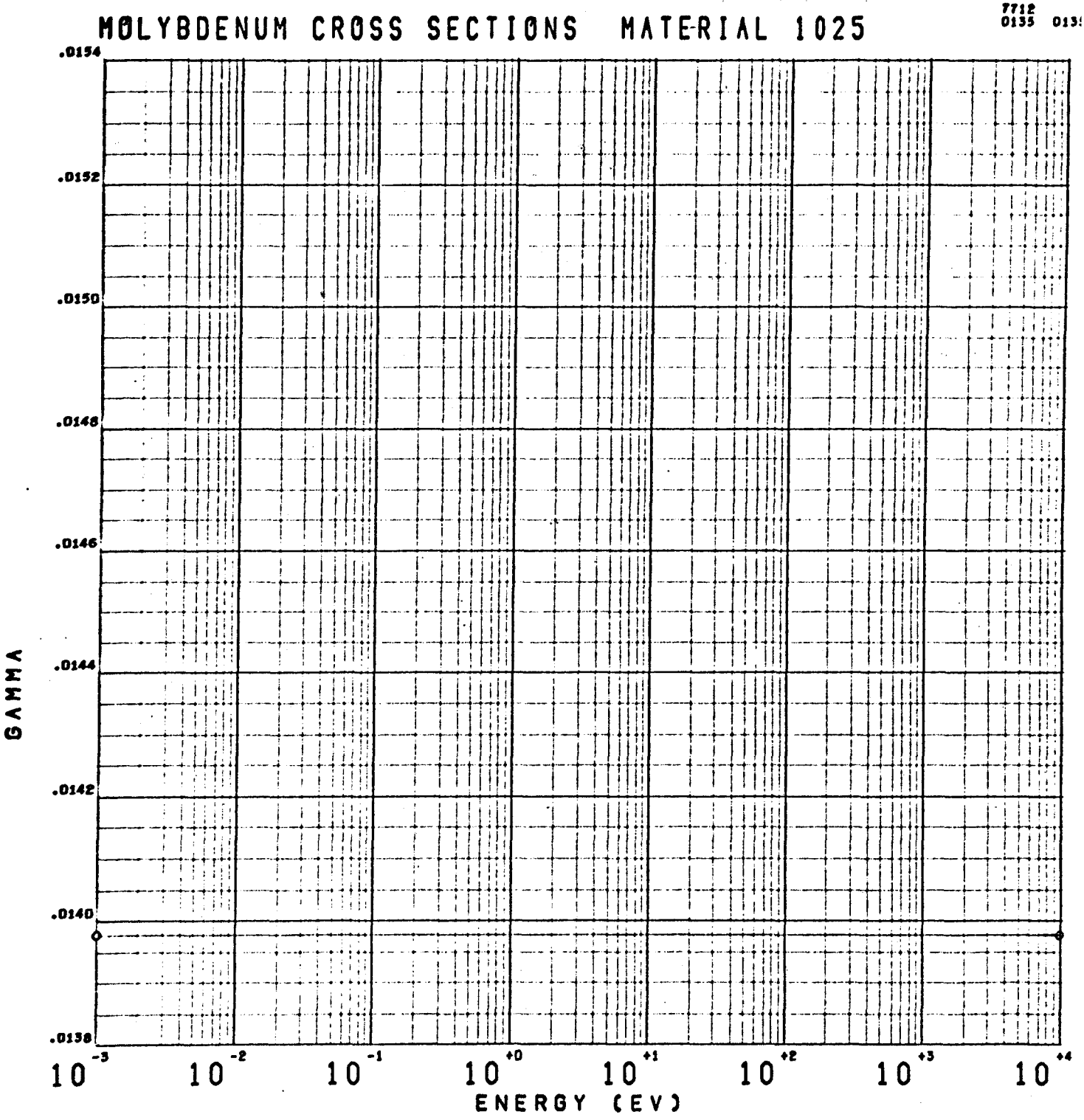

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0131 013
.0078
.0076
.0074
.0072
.0070
MU
10^-3
10^-2
10^-1
10^+0
10^+1
10^+2
10^+3
10^+4
ENERGY (EV)

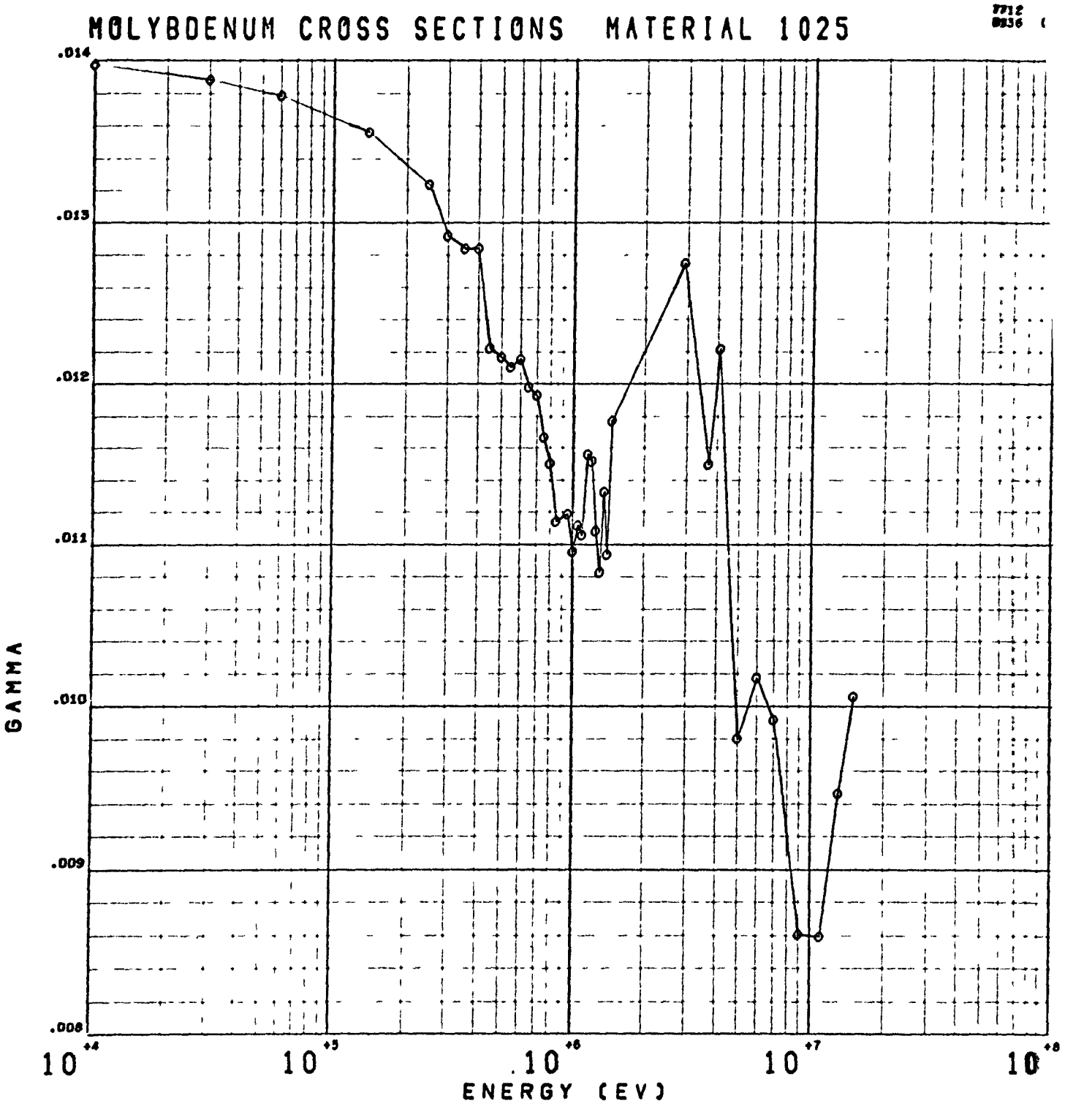
7712
0132 0132

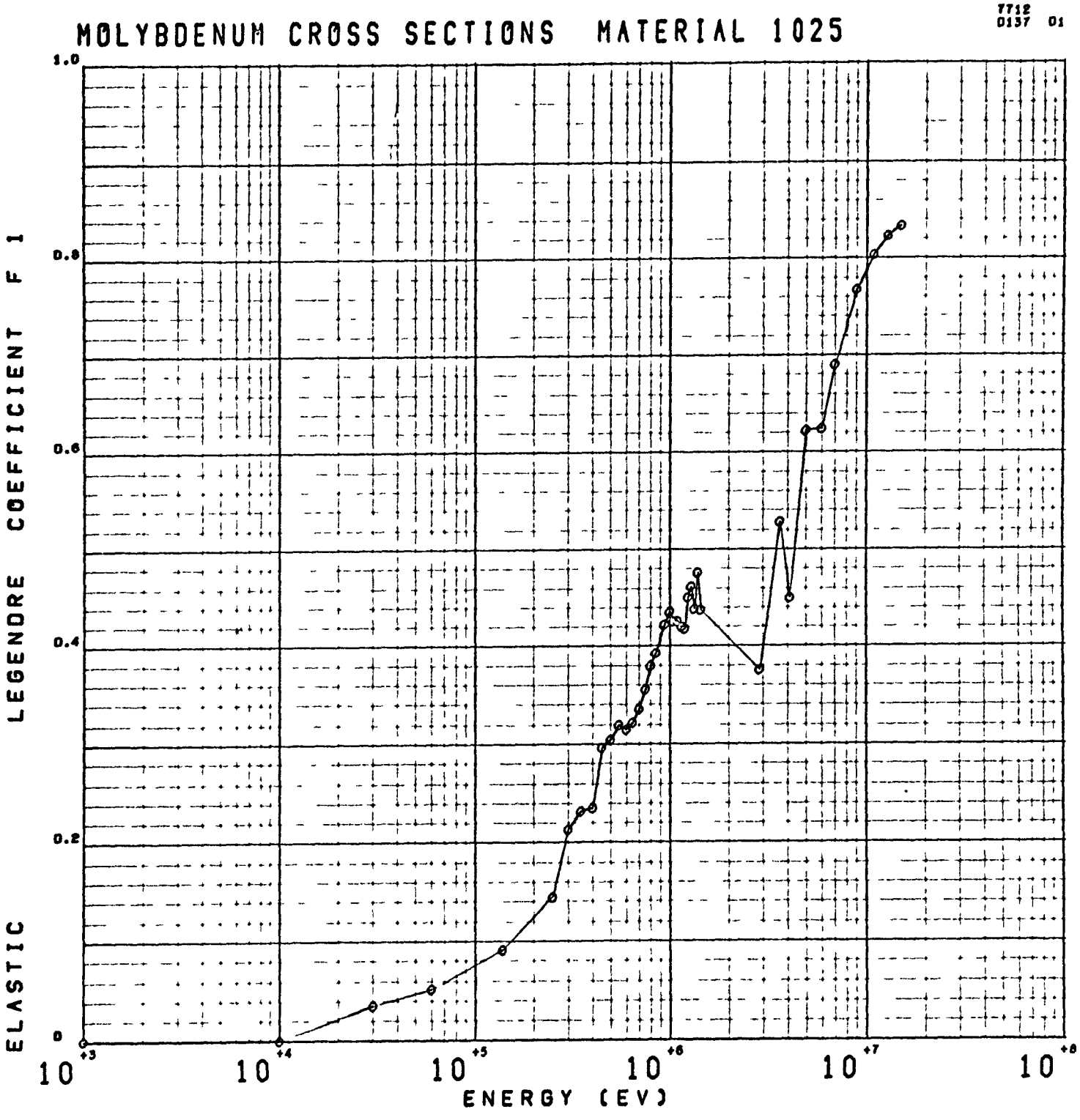


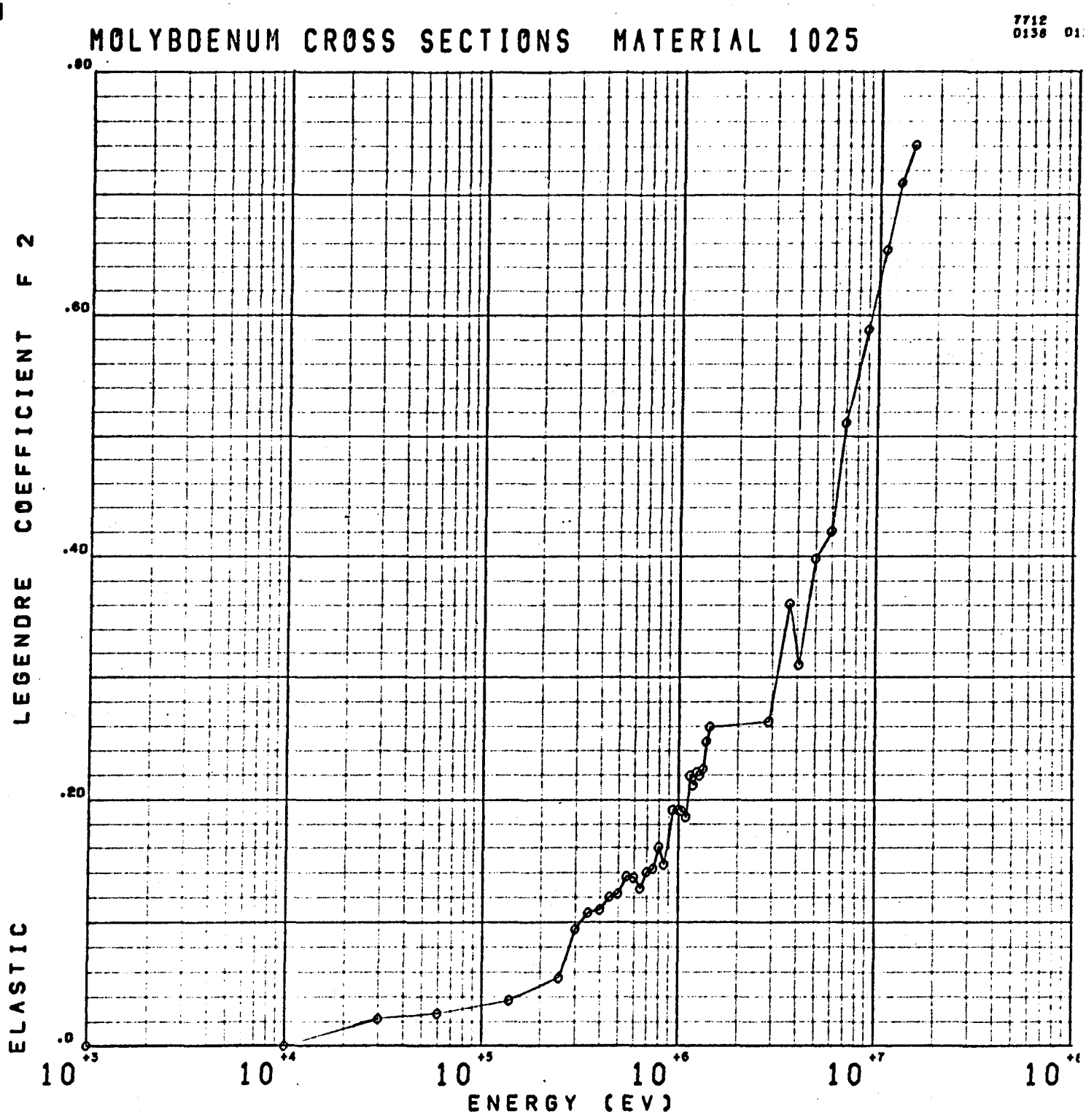

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7722
0135 013
.0230
.0228
.0226
.0224
.0222
.0220
.0218
.0216
.0214
.0212
.0210
.0208
X 1
10^-3 10^-2 10^-1 10^+0 10^+1 10^+2 10^+3 10^+4
ENERGY (EV)

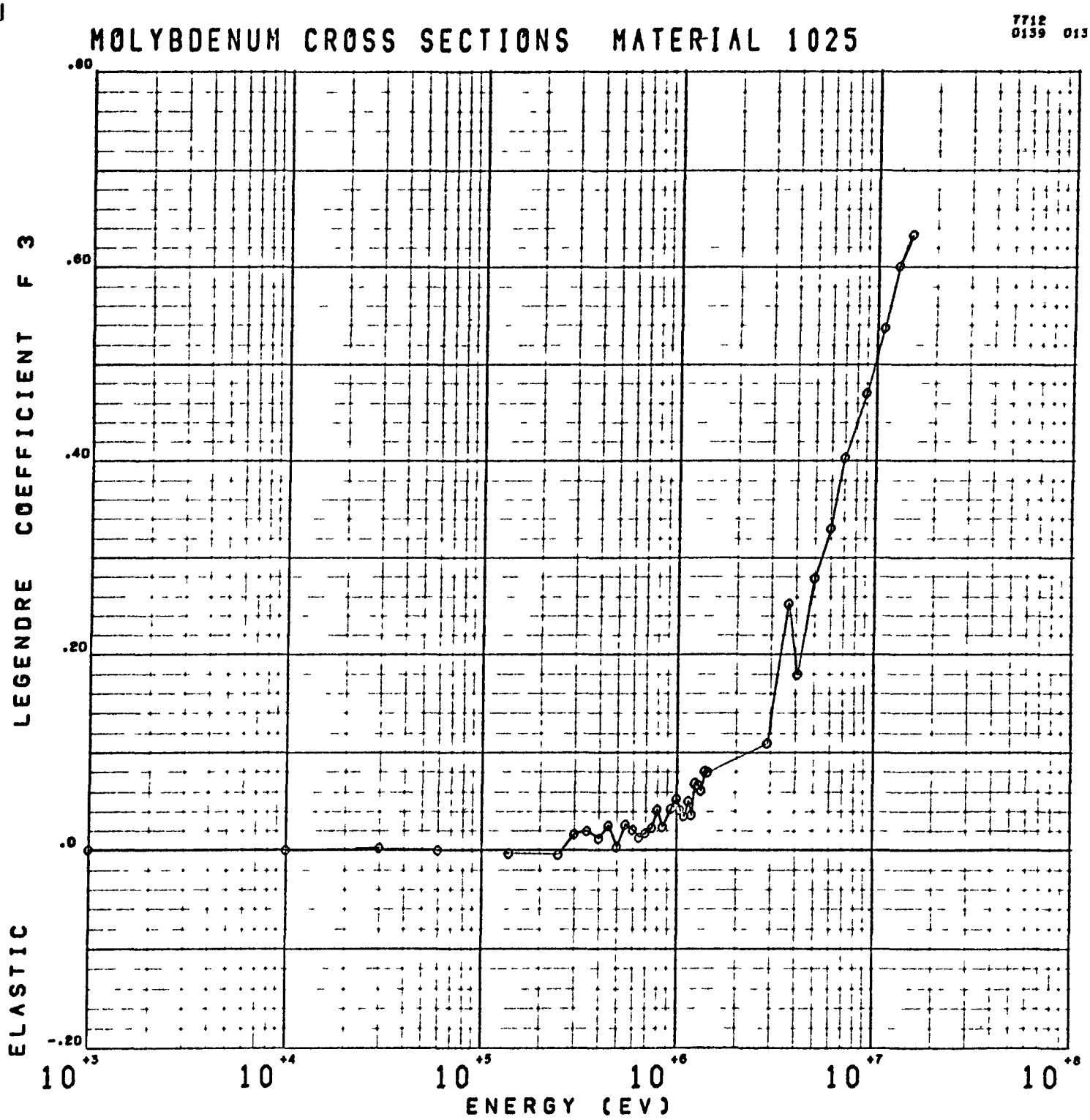

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0134 0134
.022
.020
.018
.016
.014
.012
.010
.008
.006
.004
.002
XI
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

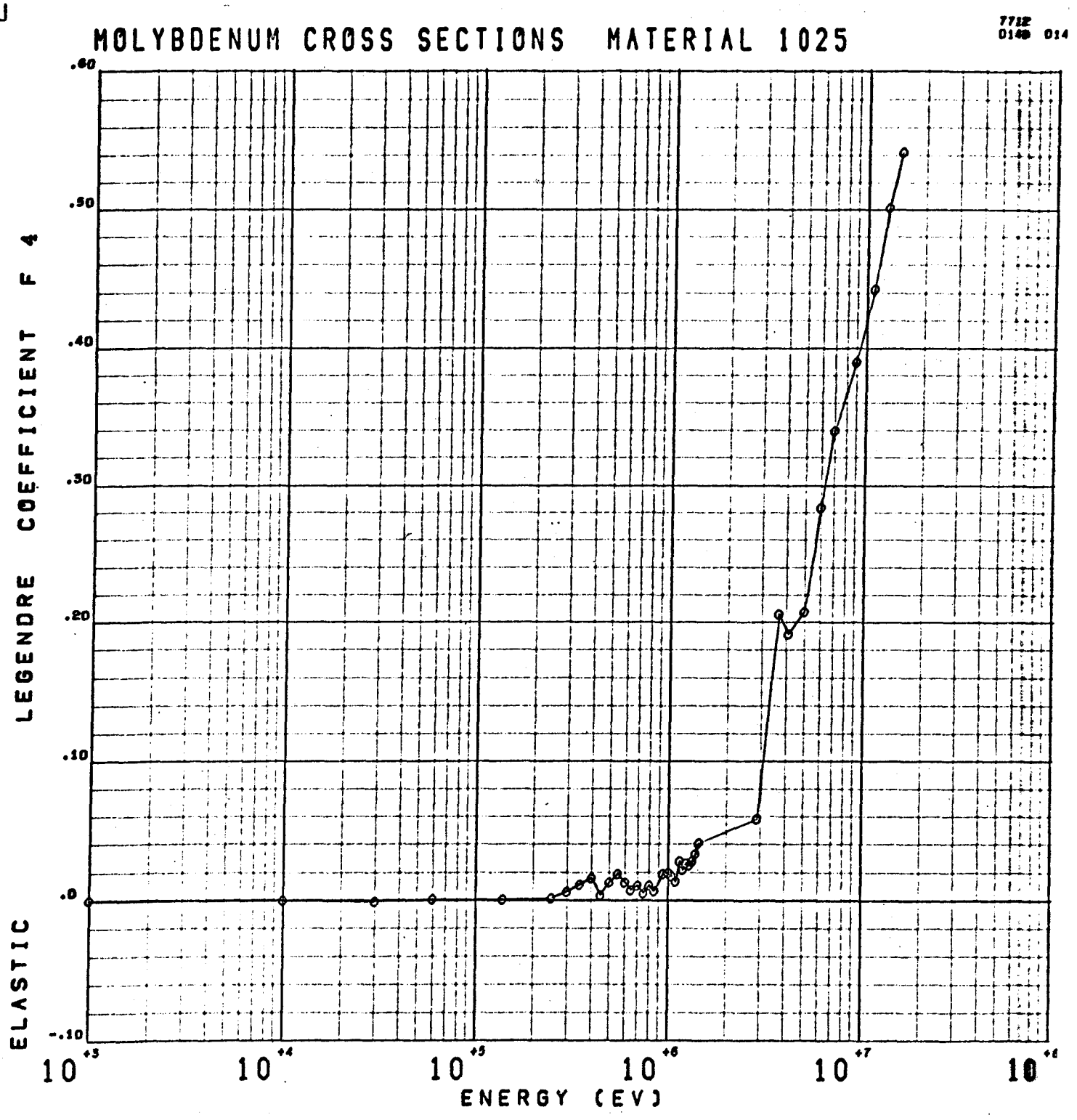

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0135 013
GAMMA
.0154
.0152
.0150
.0148
.0146
.0144
.0142
.0140
.0138
10^-3 10^-2 10^-1 10^+0 10^+1 10^+2 10^+3 10^+4
ENERGY (EV)

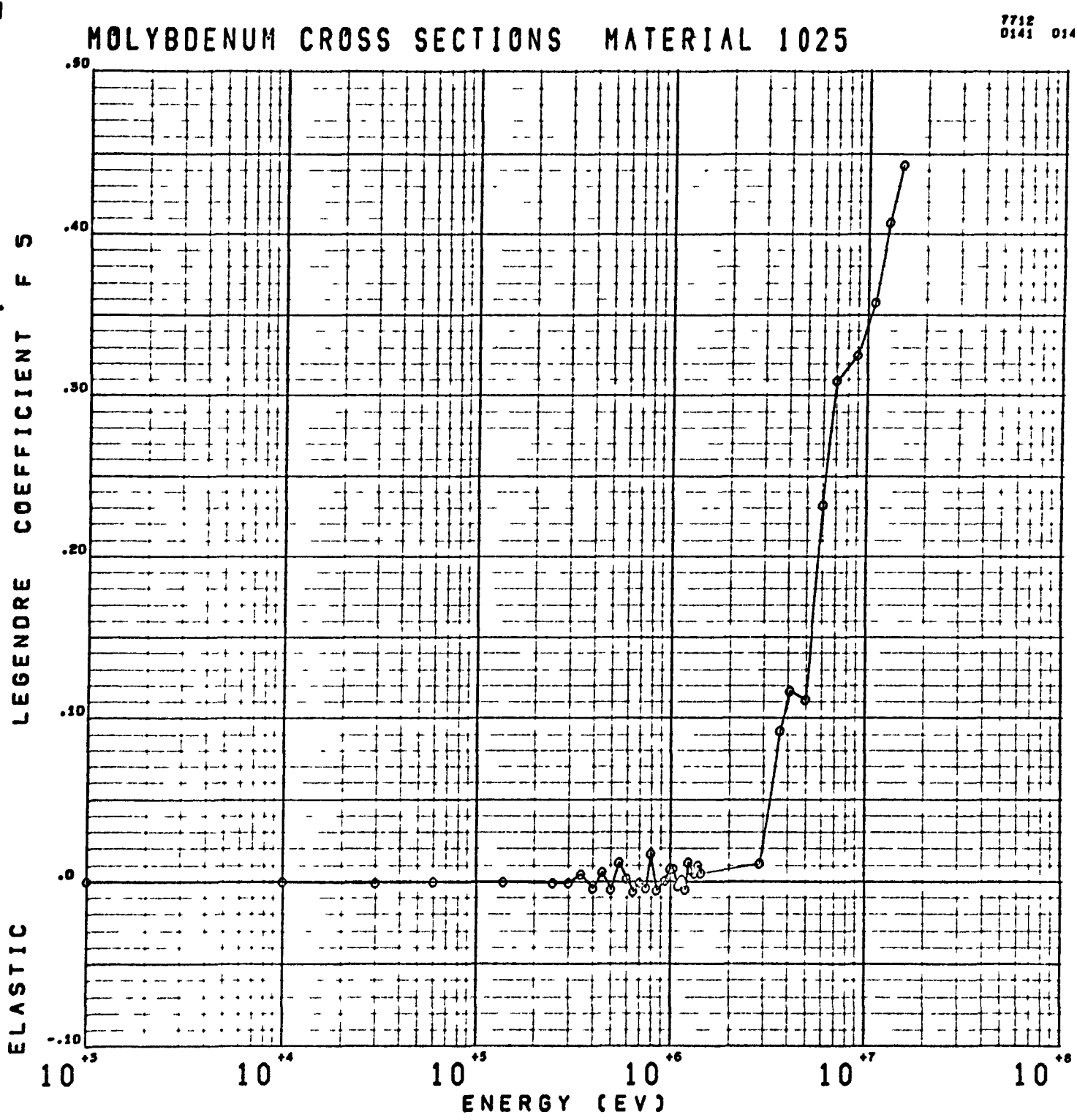

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
.014
.013
.012
.011
.010
.009
.008
GAMMA
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0137 01
ELASTIC LEGENDRE COEFFICIENT F 1
1.0
0.8
0.6
0.4
0.2
0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0138 01
ELASTIC LEGENDRE COEFFICIENT F 2
.80
.60
.40
.20
.0
10+3
10+4
10+5
10+6
10+7
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0139 013
ELASTIC LEGENDRE COEFFICIENT F 3
.80
.60
.40
.20
.0
-.20
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0140 014
ELASTIC LEGENDRE COEFFICIENT F 4
.60
.50
.40
.30
.20
.10
.0
-.10
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)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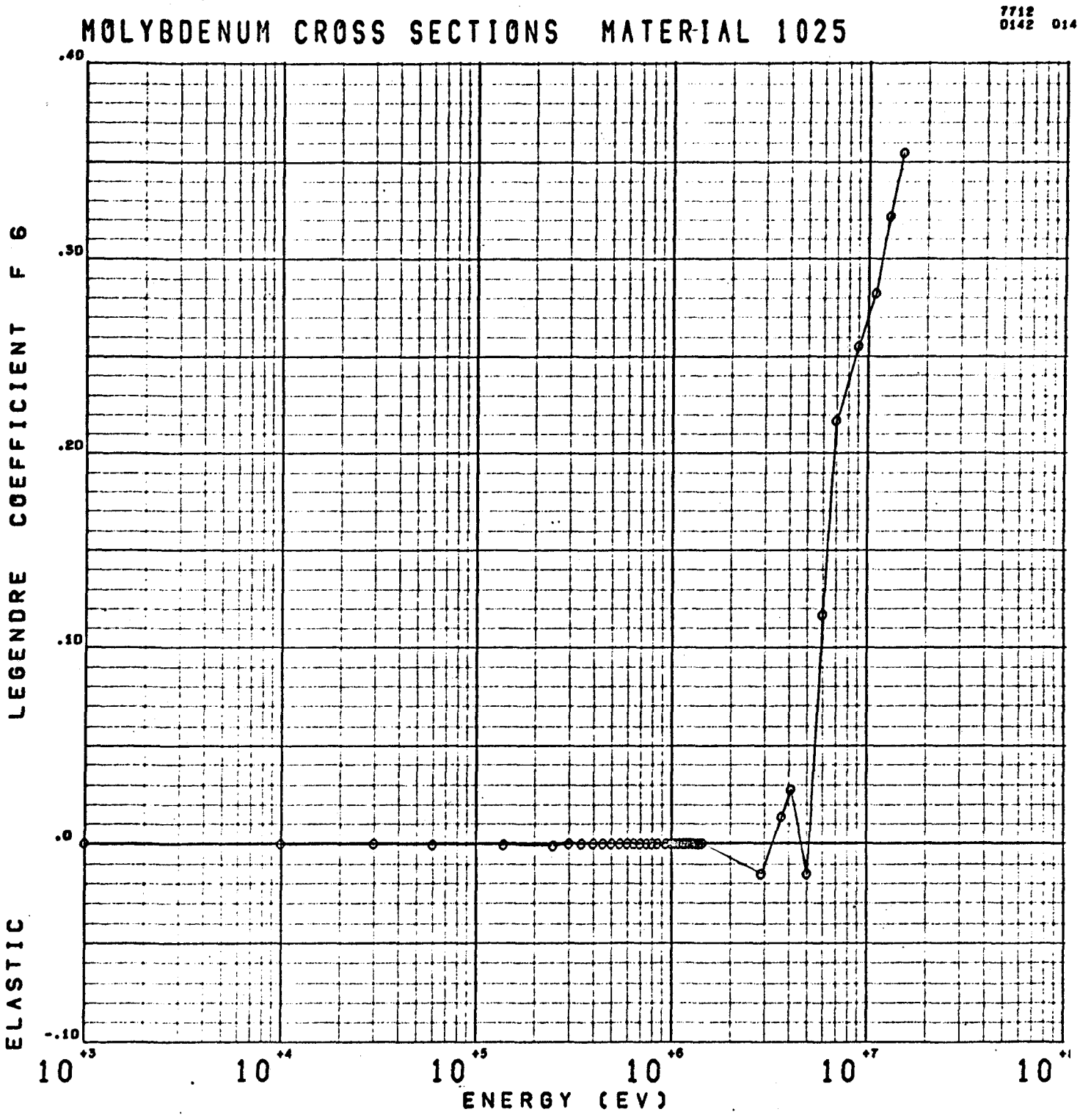
7712
0141 014
ELASTIC LEGENDRE COEFFICIENT F S
.50
.40
.30
.20
.10
.0
-.10
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)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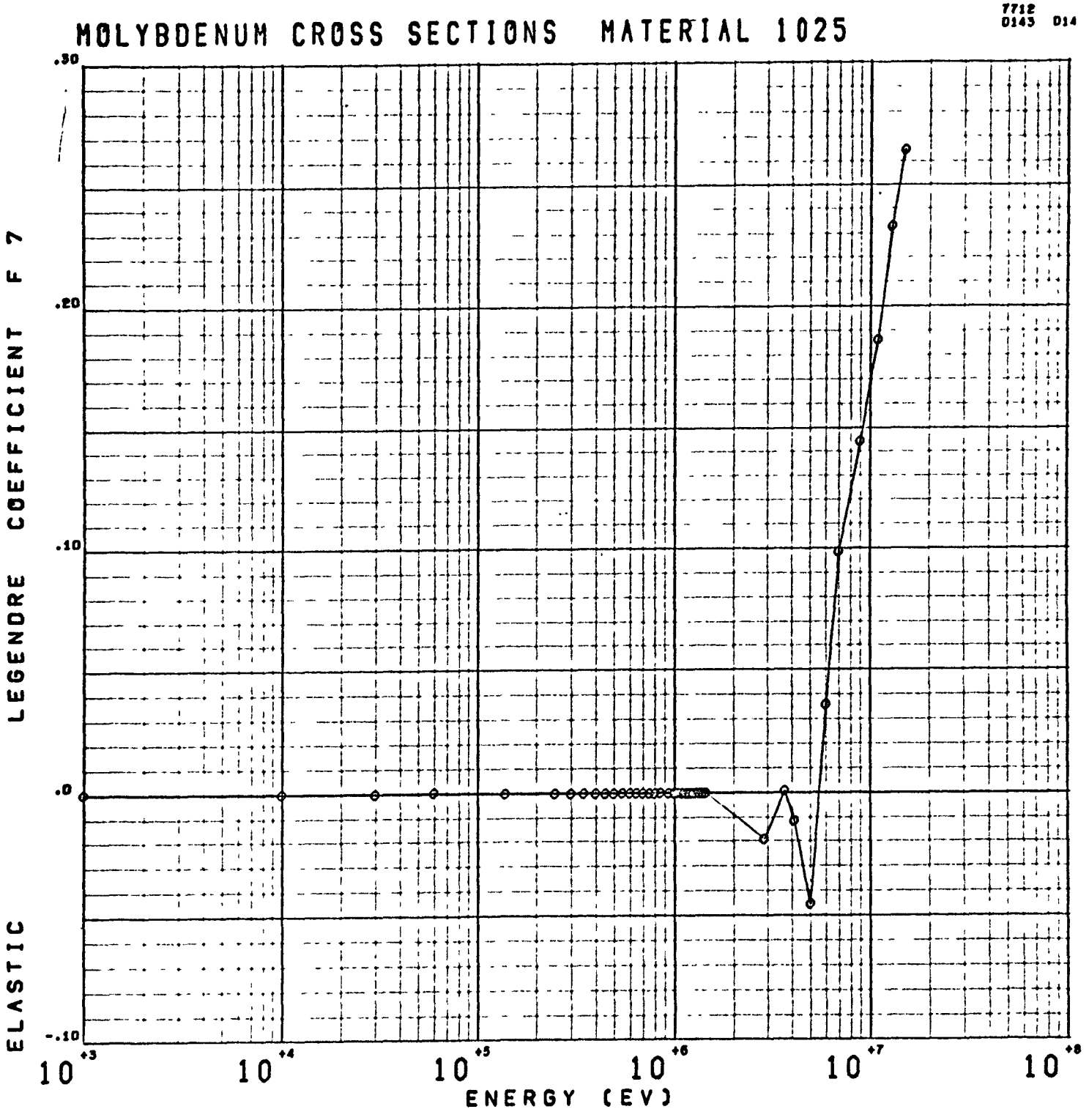
0142 014
ELASTIC LEGENDRE COEFFICIENT F 6
.40
.30
.20
.10
.0
-.10
10+3
10+4
10+5
10+6
10+7
ENERGY (EV)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7712
D143 D14
ELASTIC LEGENDRE COEFFICIENT F 7
.30
.20
.10
.0
-.10
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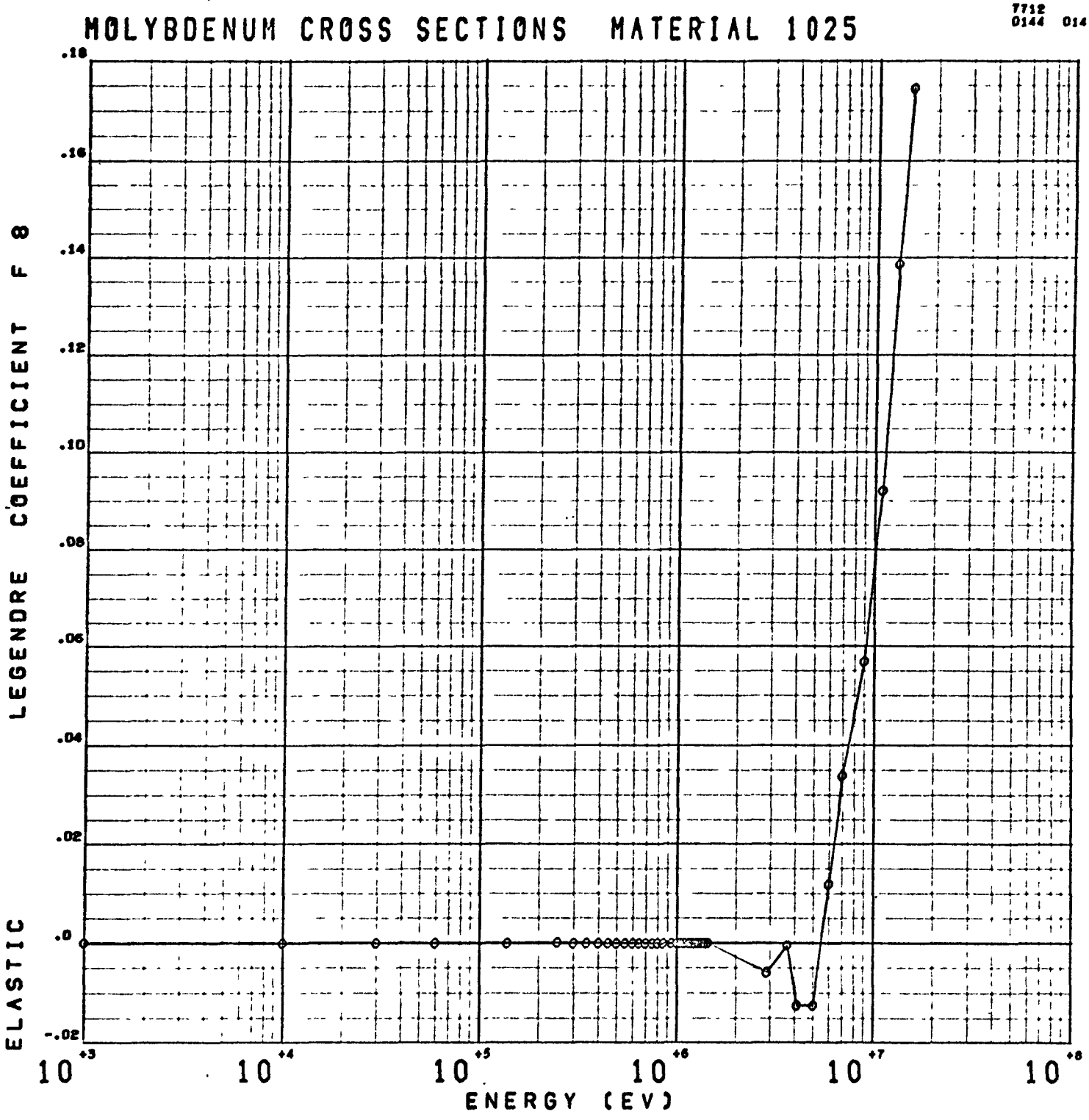
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)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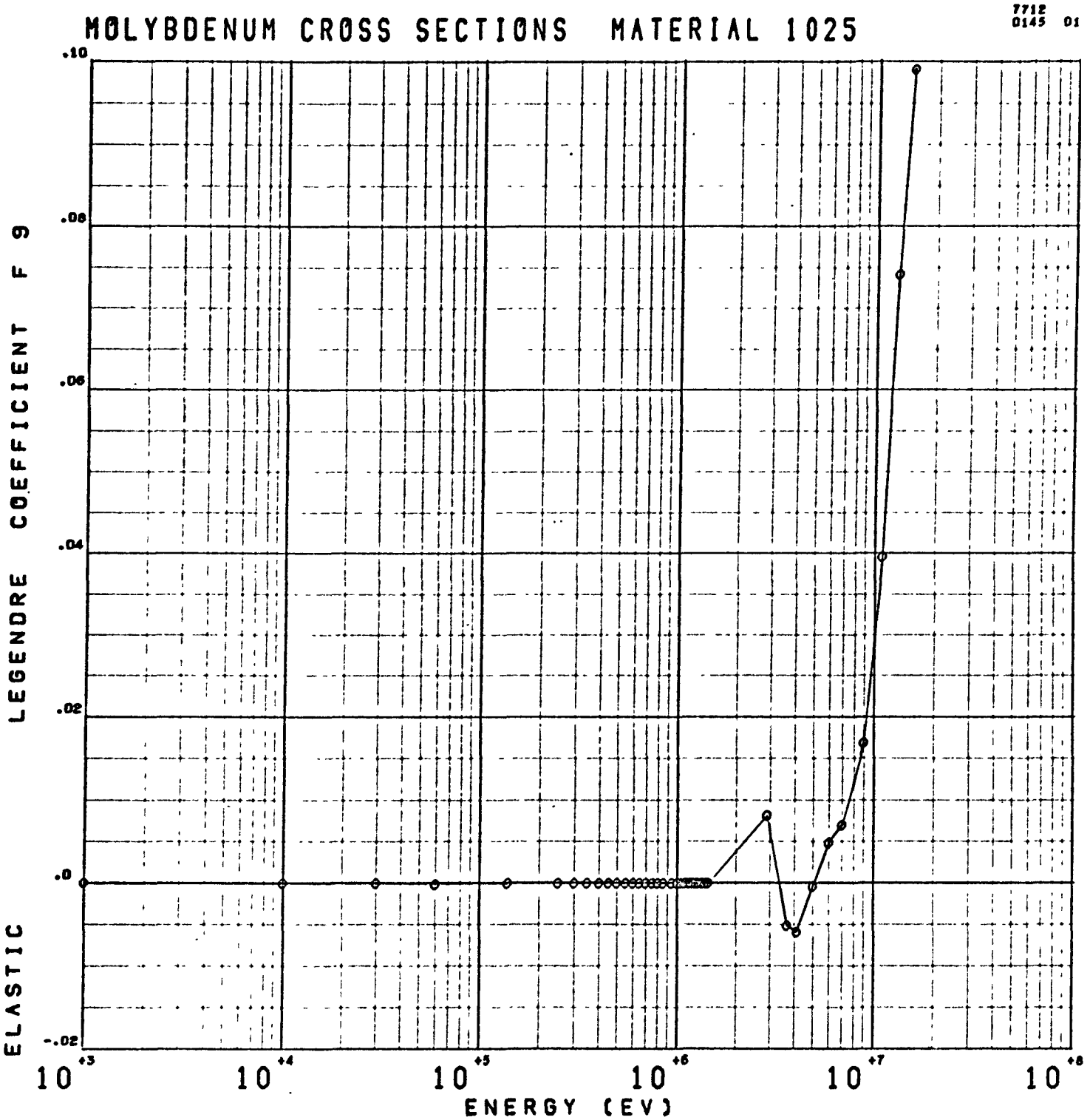
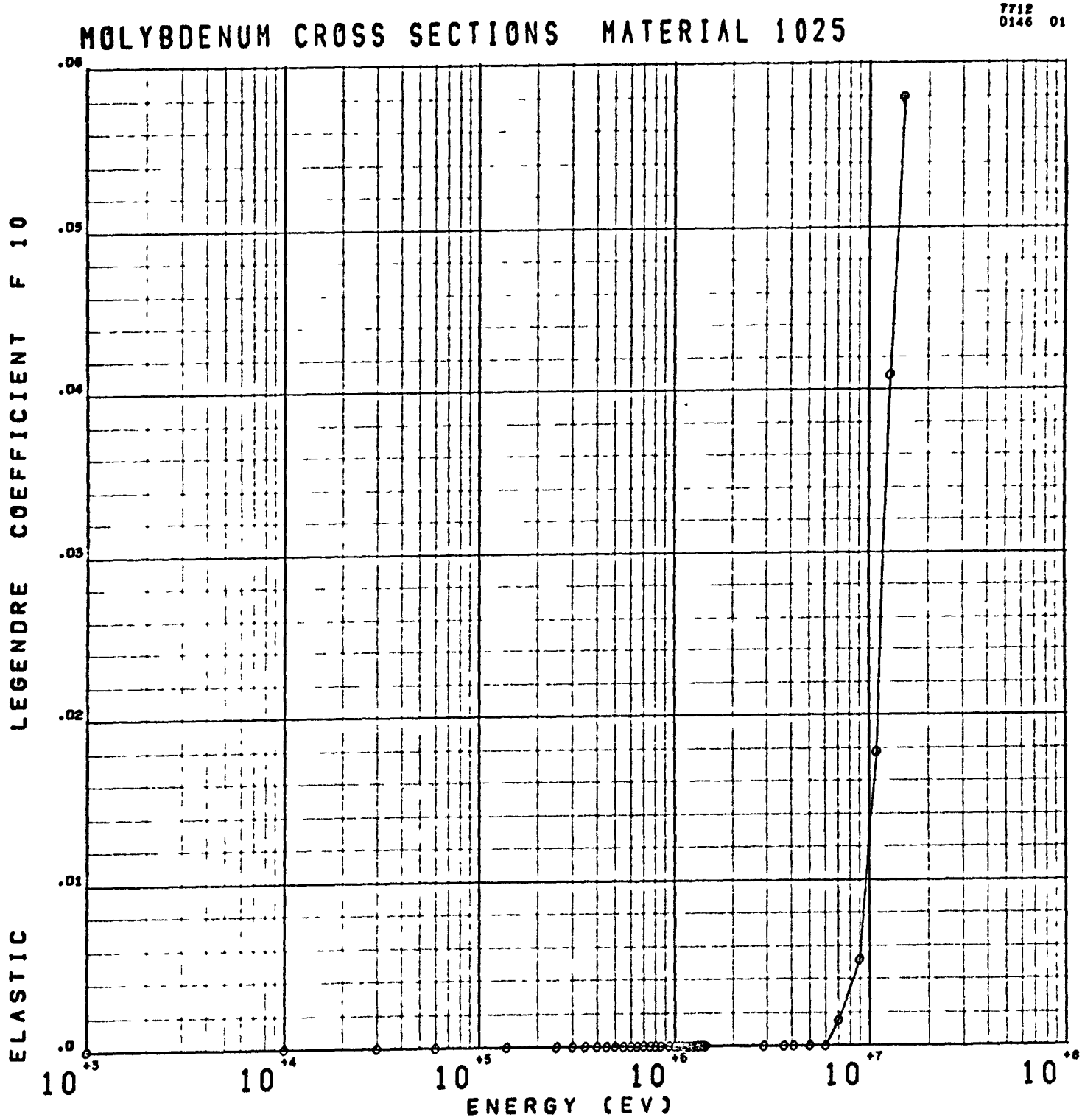
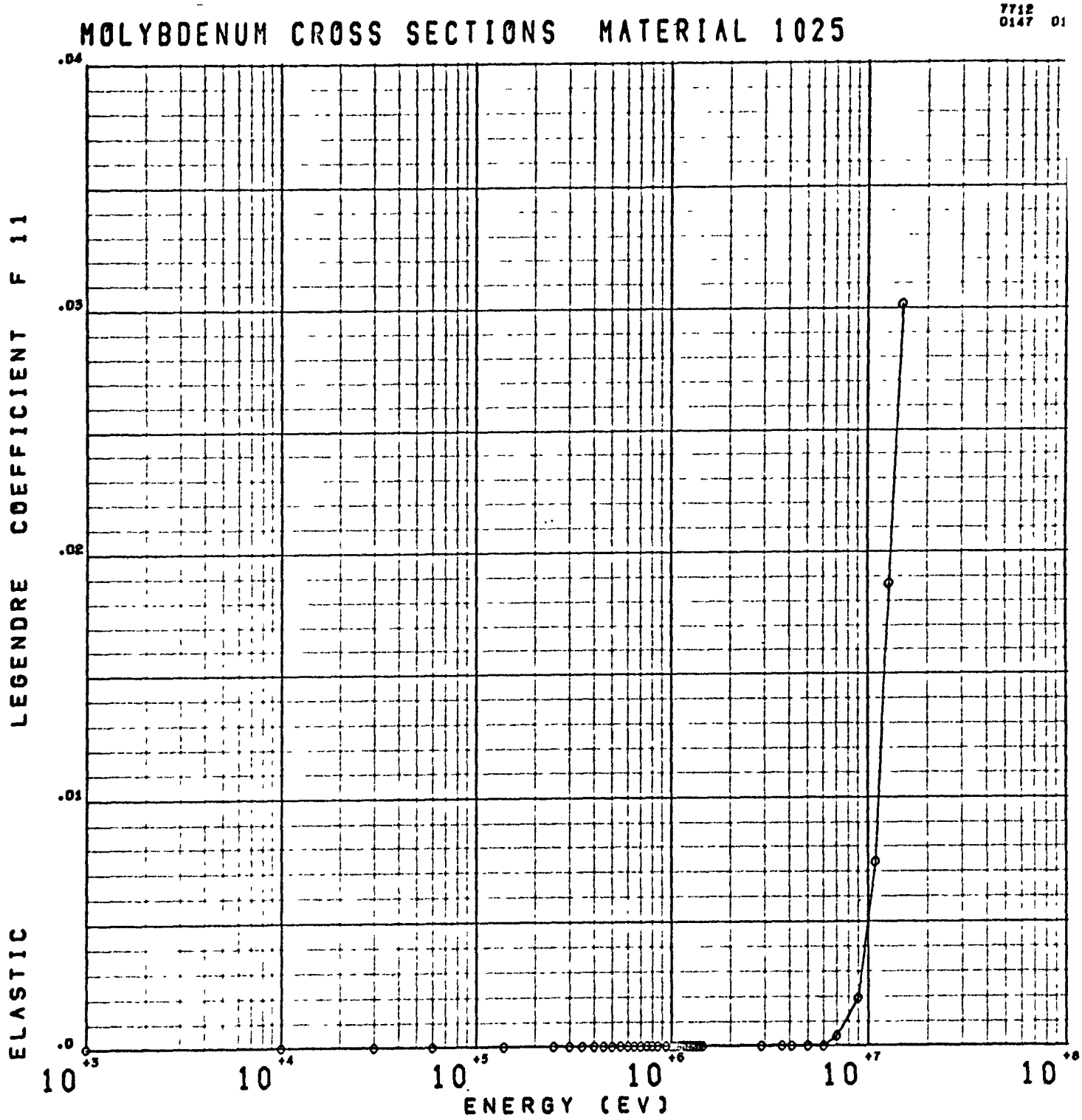
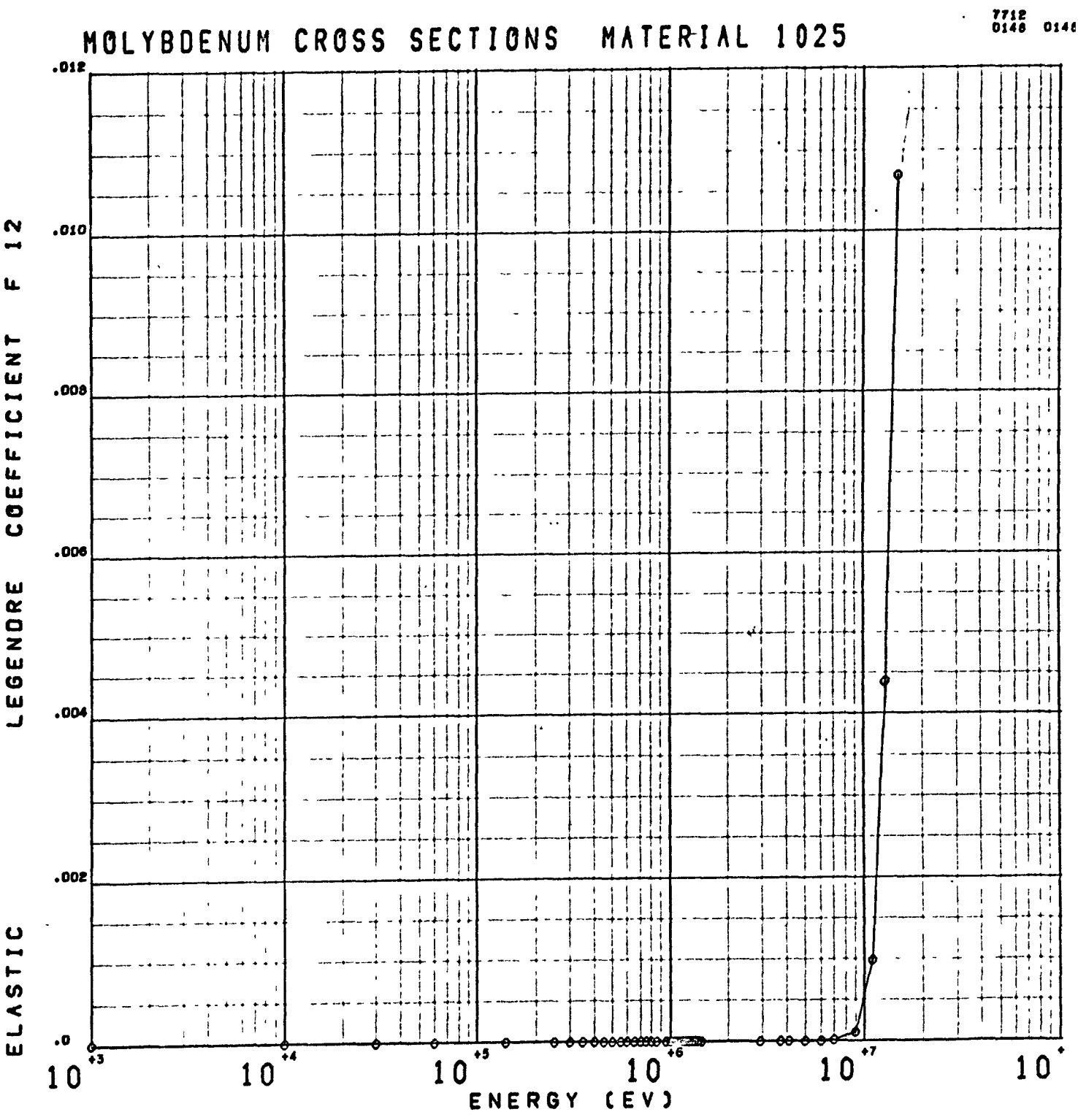
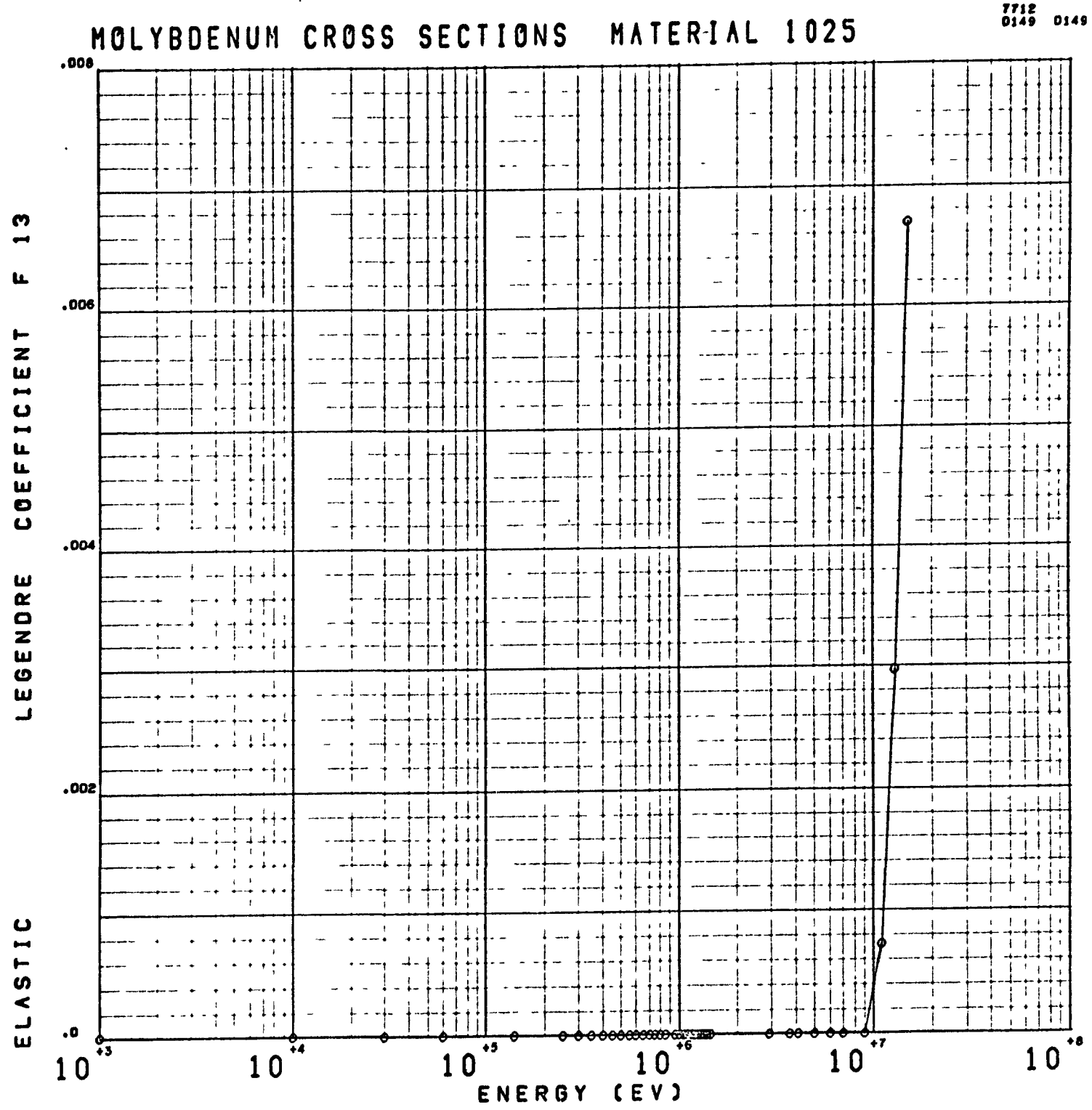
7712
0144 014
ELASTIC LEGENDRE COEFFICIENT F 8
.18
.16
.14
.12
.10
.08
.06
.04
.02
.0
-.02
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

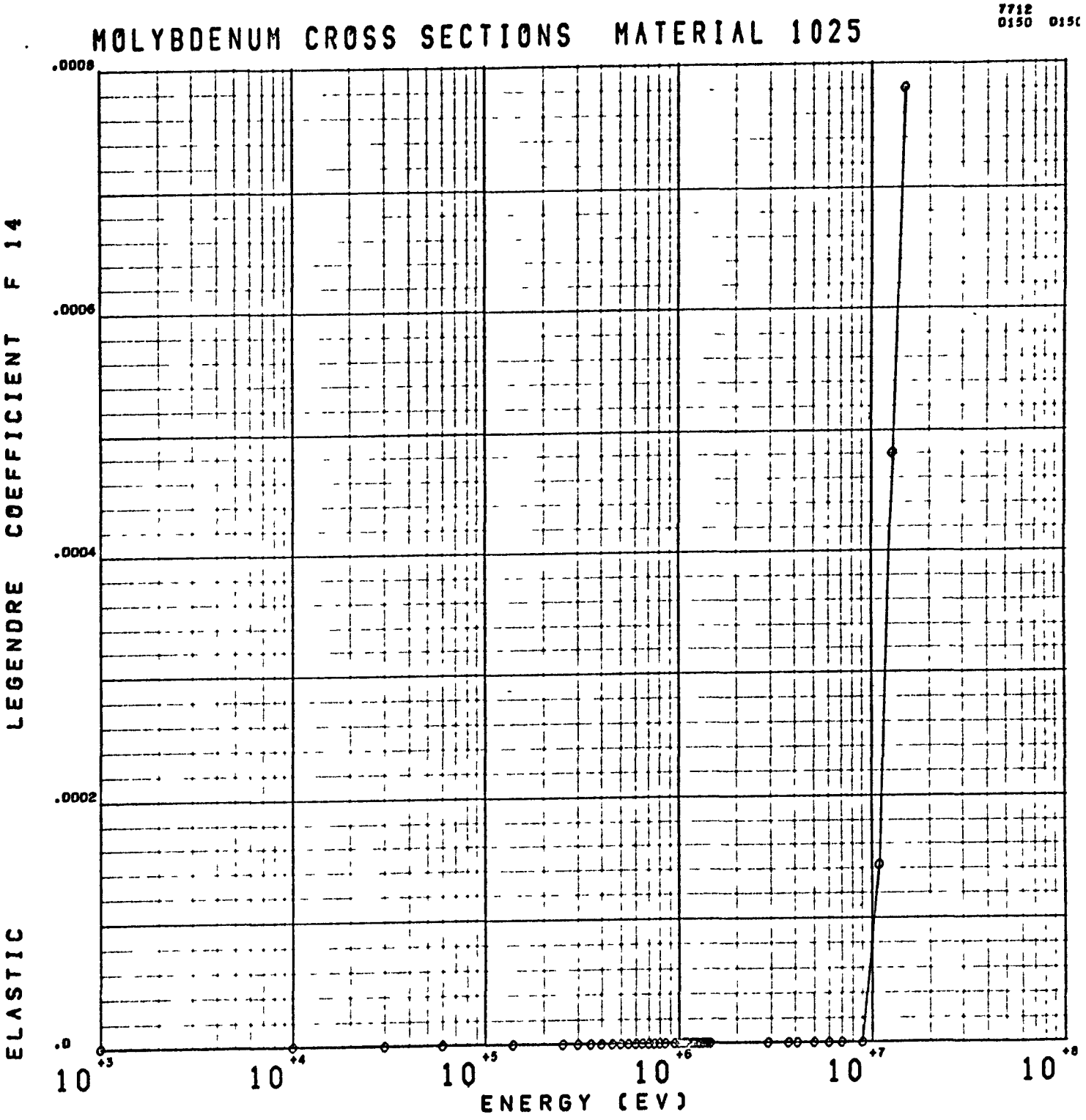

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0145 01
ELASTIC LEGENDRE COEFFICIENT F 9
.10
.08
.06
.04
.02
.0
-.02
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

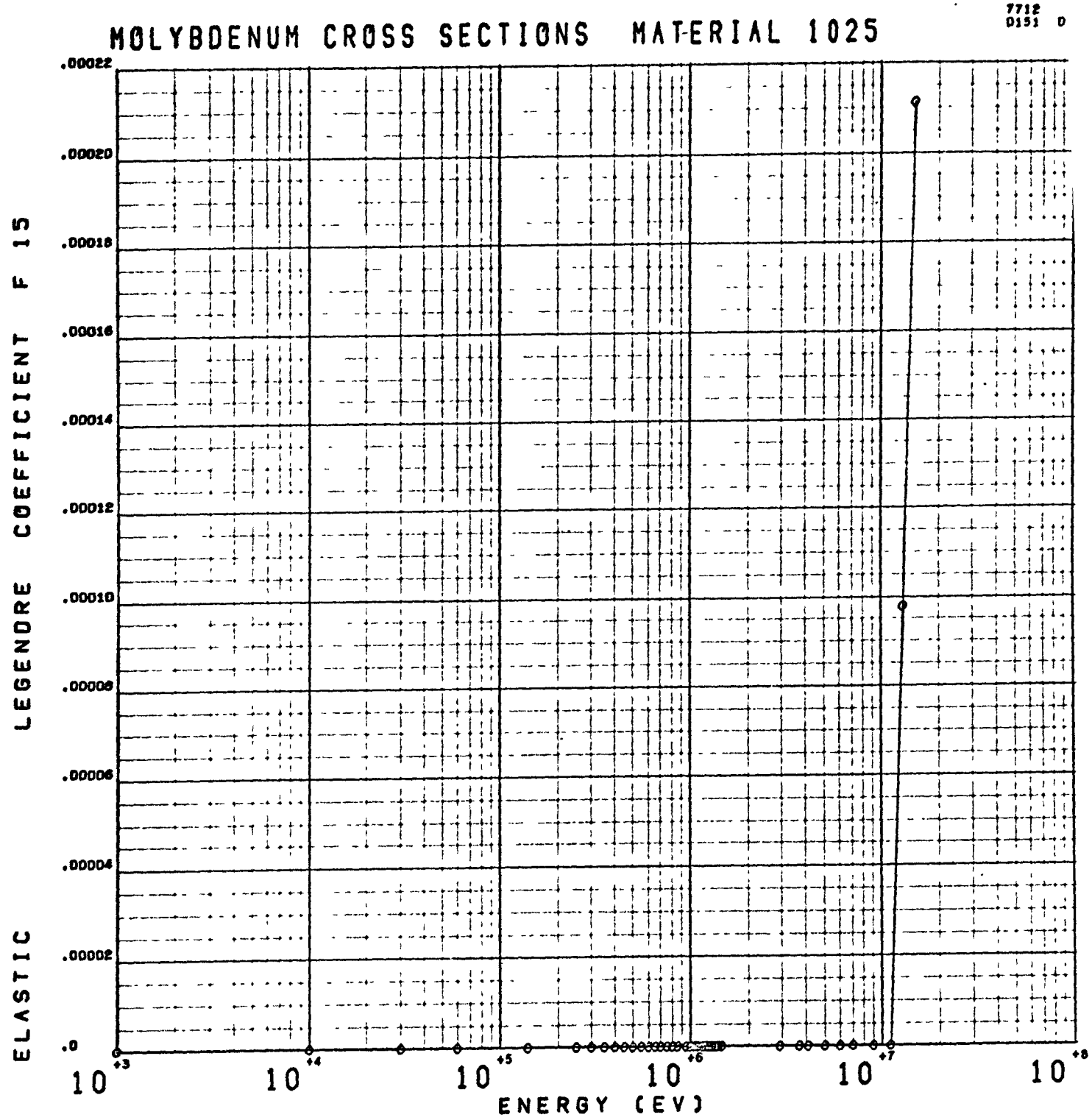

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0146 01
ELASTIC LEGENDRE COEFFICIENT F 10
.06
.05
.04
.03
.02
.01
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

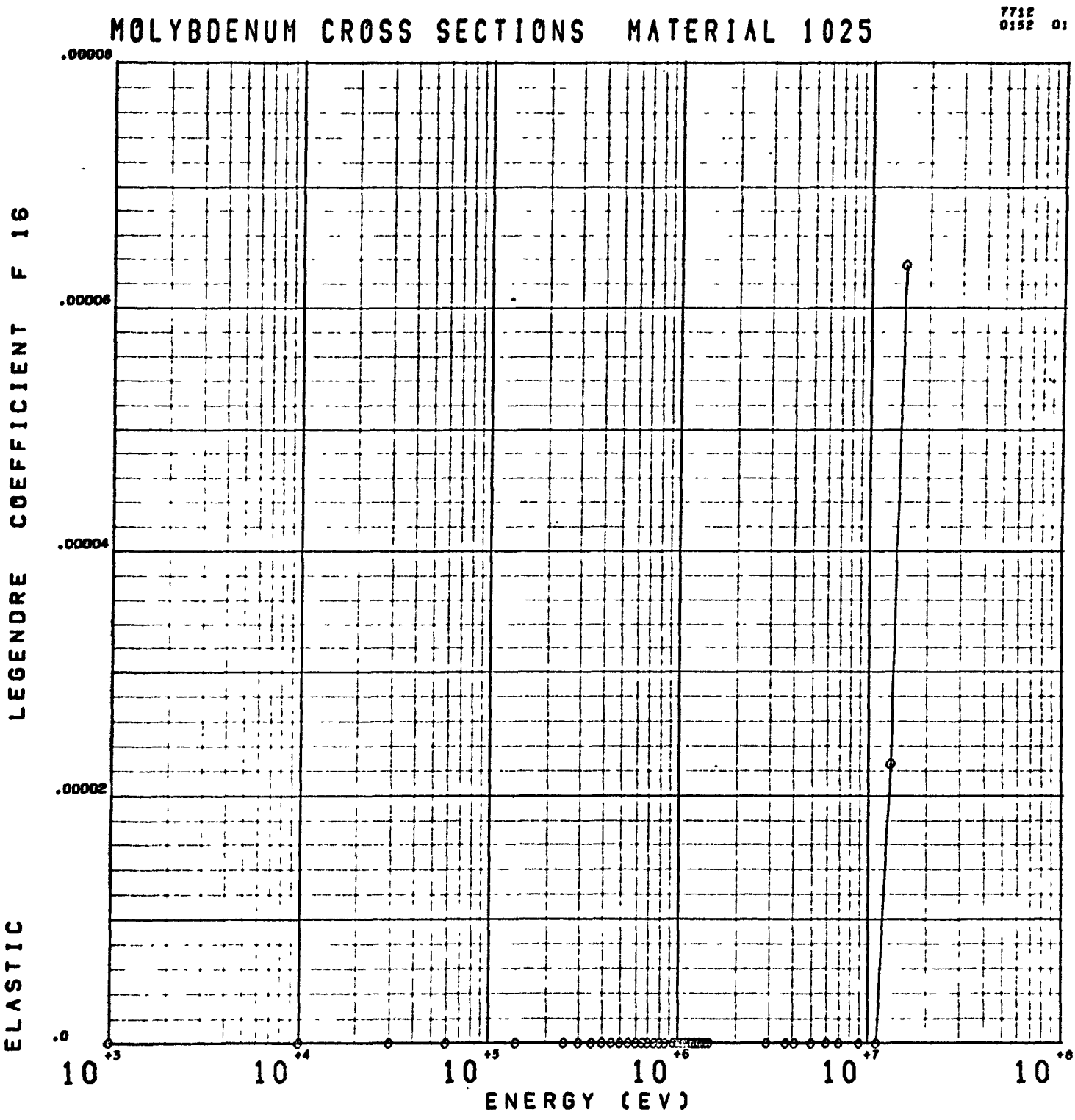

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0147 01
ELASTIC LEGENDRE COEFFICIENT F 11
.04
.03
.02
.01
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

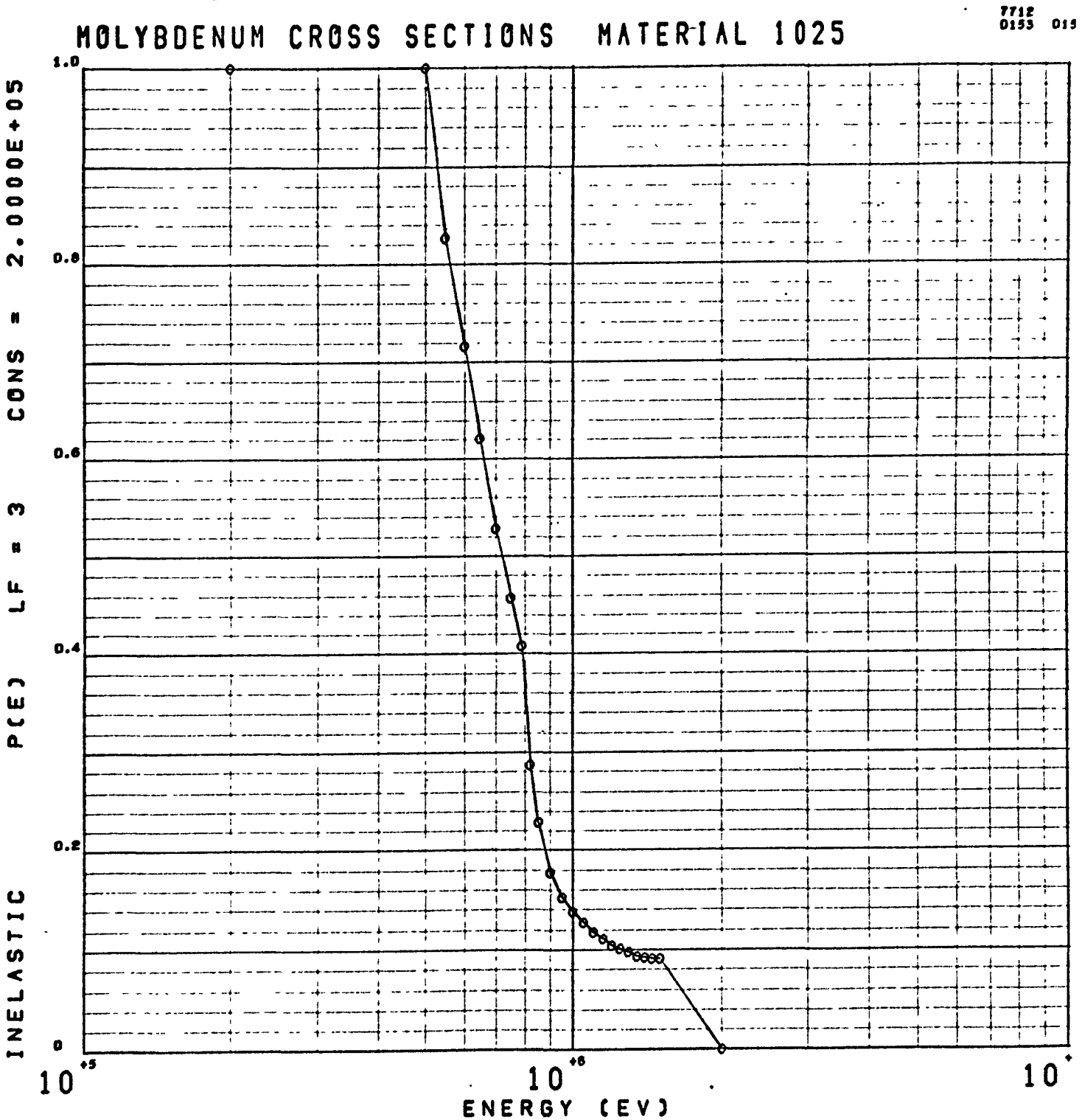

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0146 0146
ELASTIC LEGENDRE COEFFICIENT F 12
.012
.010
.008
.006
.004
.002
.0
10+3
10+4
10+5
10+6
10+7
10+
ENERGY (EV)

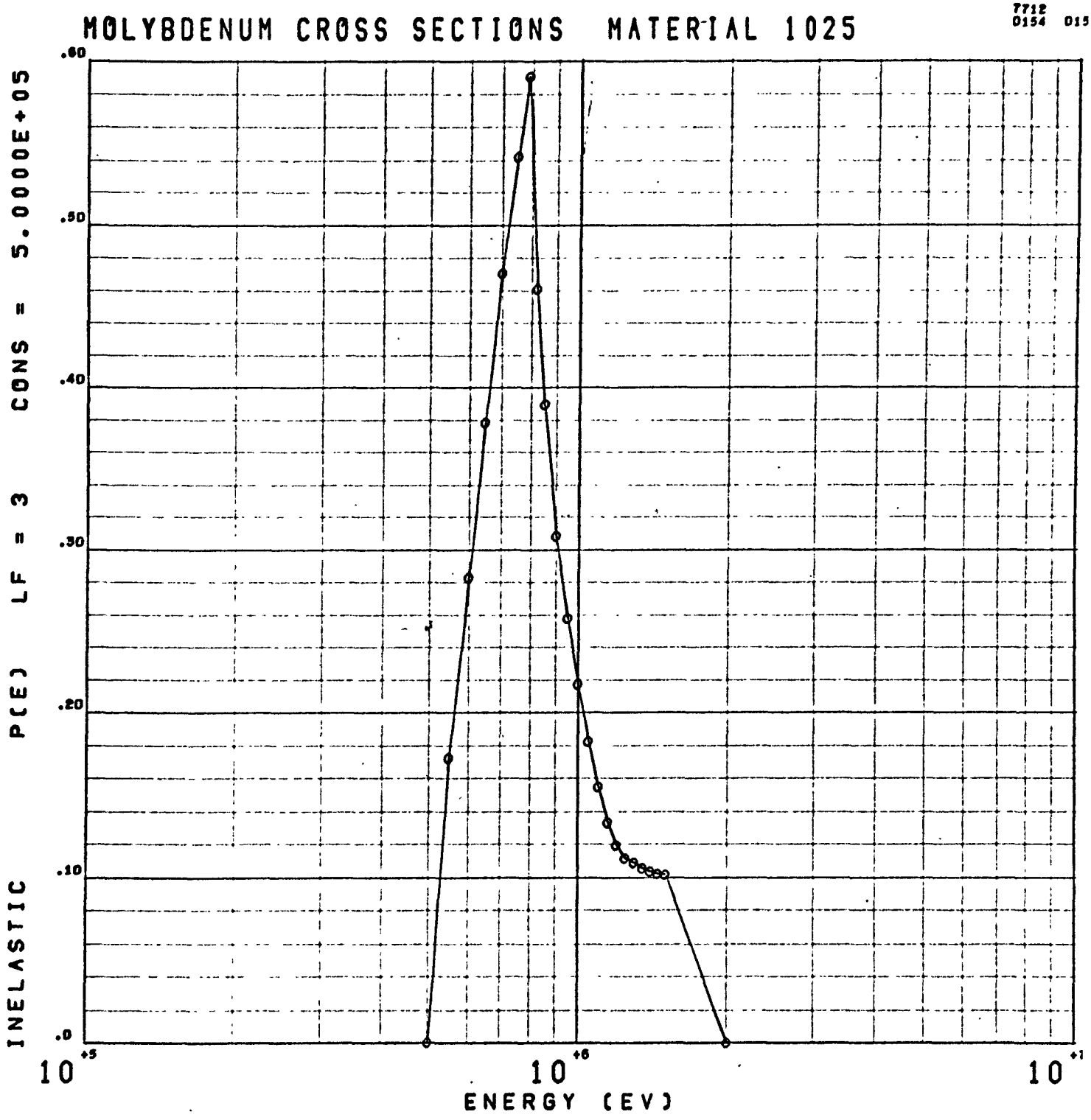

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0149 0149
ELASTIC LEGENDRE COEFFICIENT F 13
.008
.006
.004
.002
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

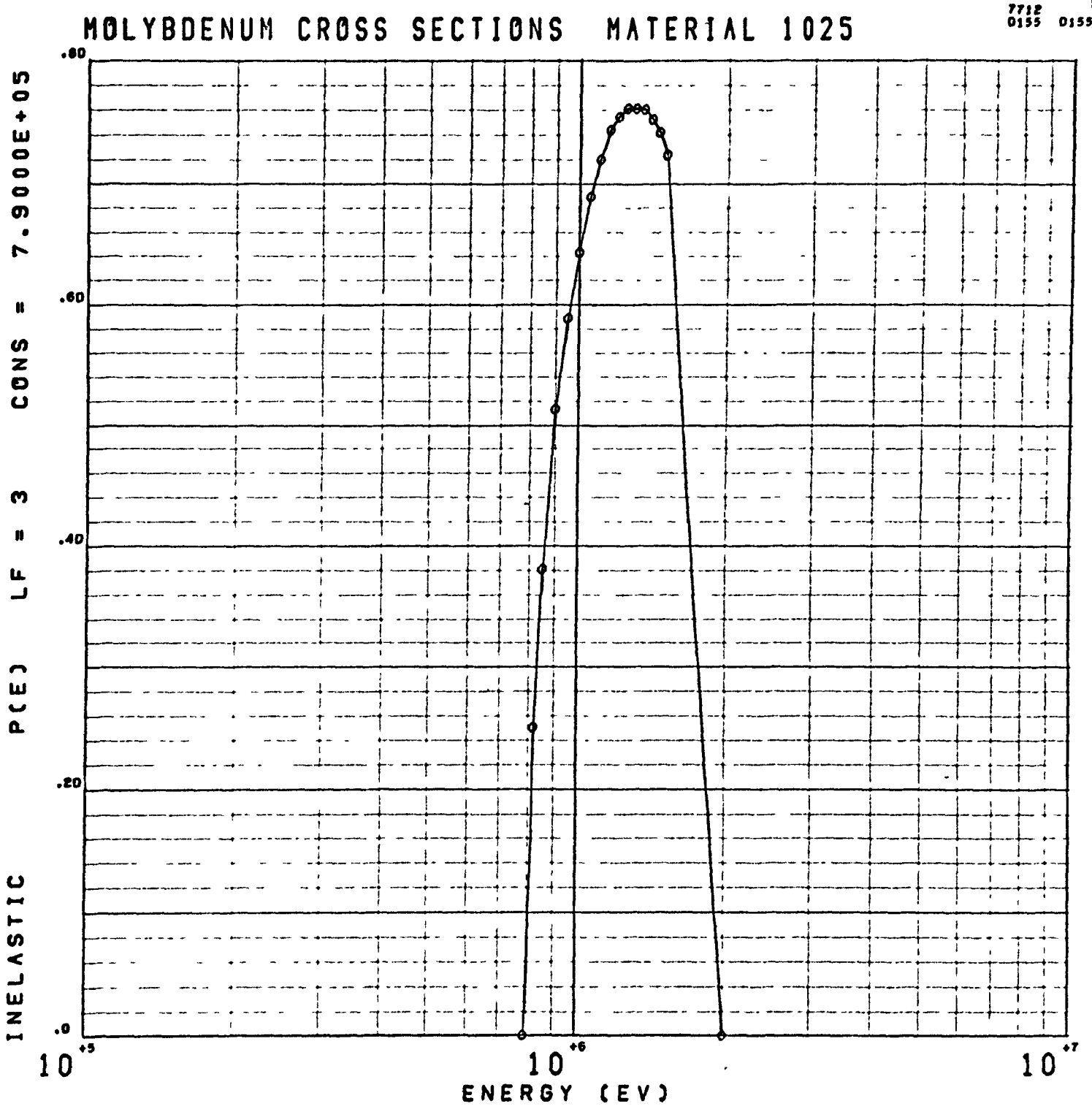

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0150 0150
ELASTIC LEGENDRE COEFFICIENT F 14
.0008
.0006
.0004
.0002
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

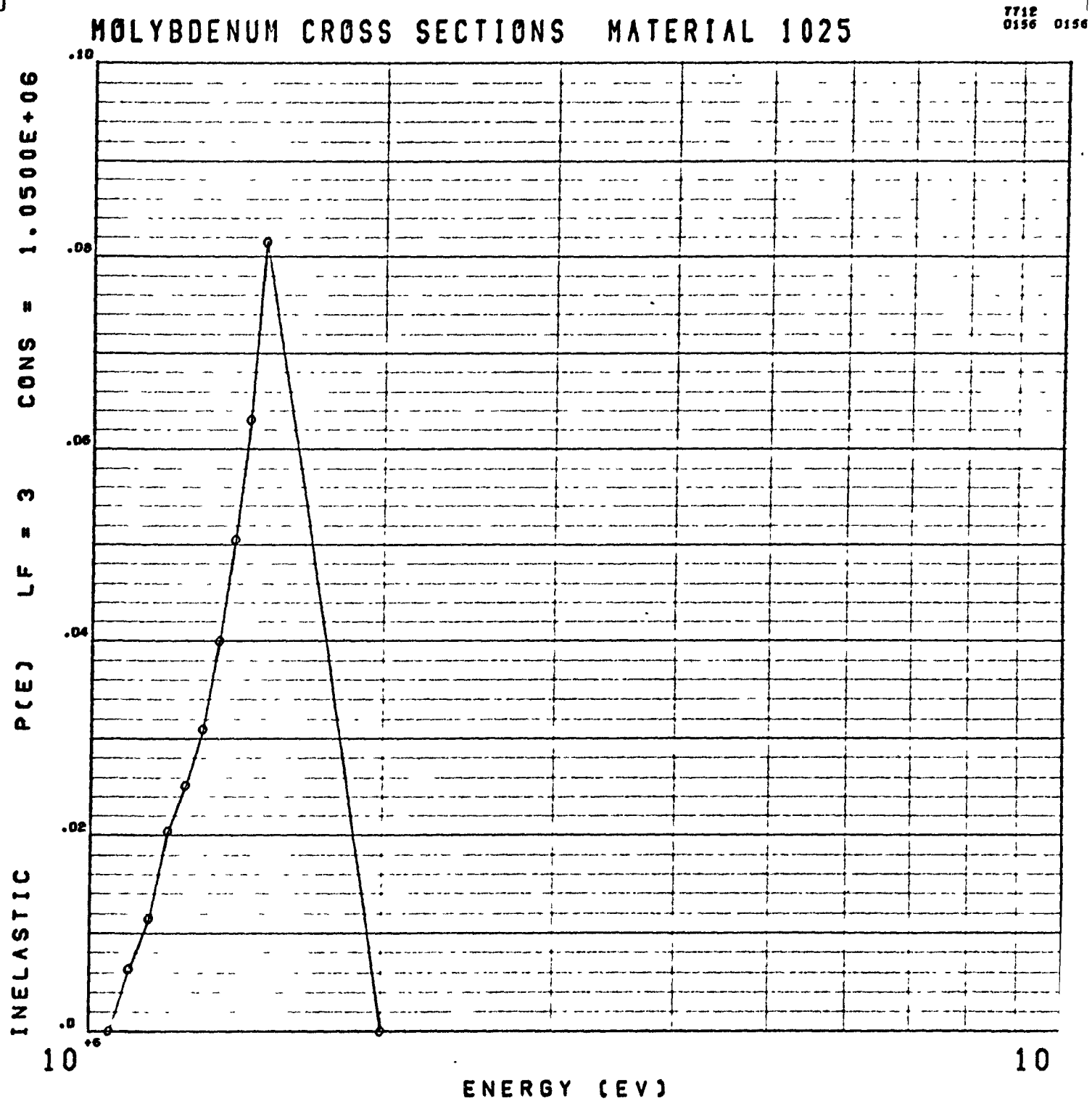

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
D151 D
ELASTIC LEGENDRE COEFFICIENT F 15
.00022
.00020
.00018
.00016
.00014
.00012
.00010
.00008
.00006
.00004
.00002
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

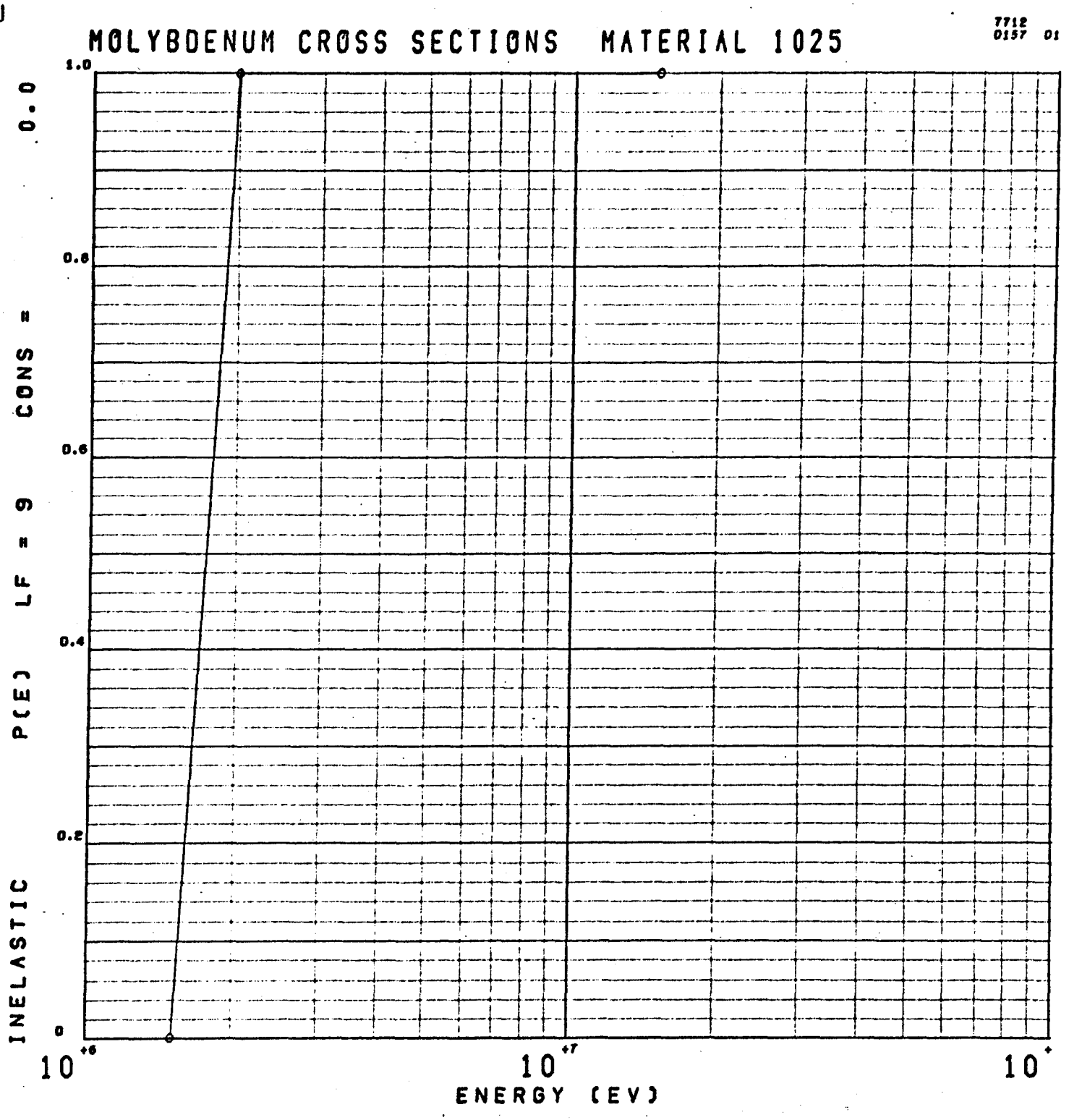

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0152 01
ELASTIC LEGENDRE COEFFICIENT F 16
.00008
.00006
.00004
.00002
.0
10+3
10+4
10+5
10+6
10+7
10+8
ENERGY (EV)

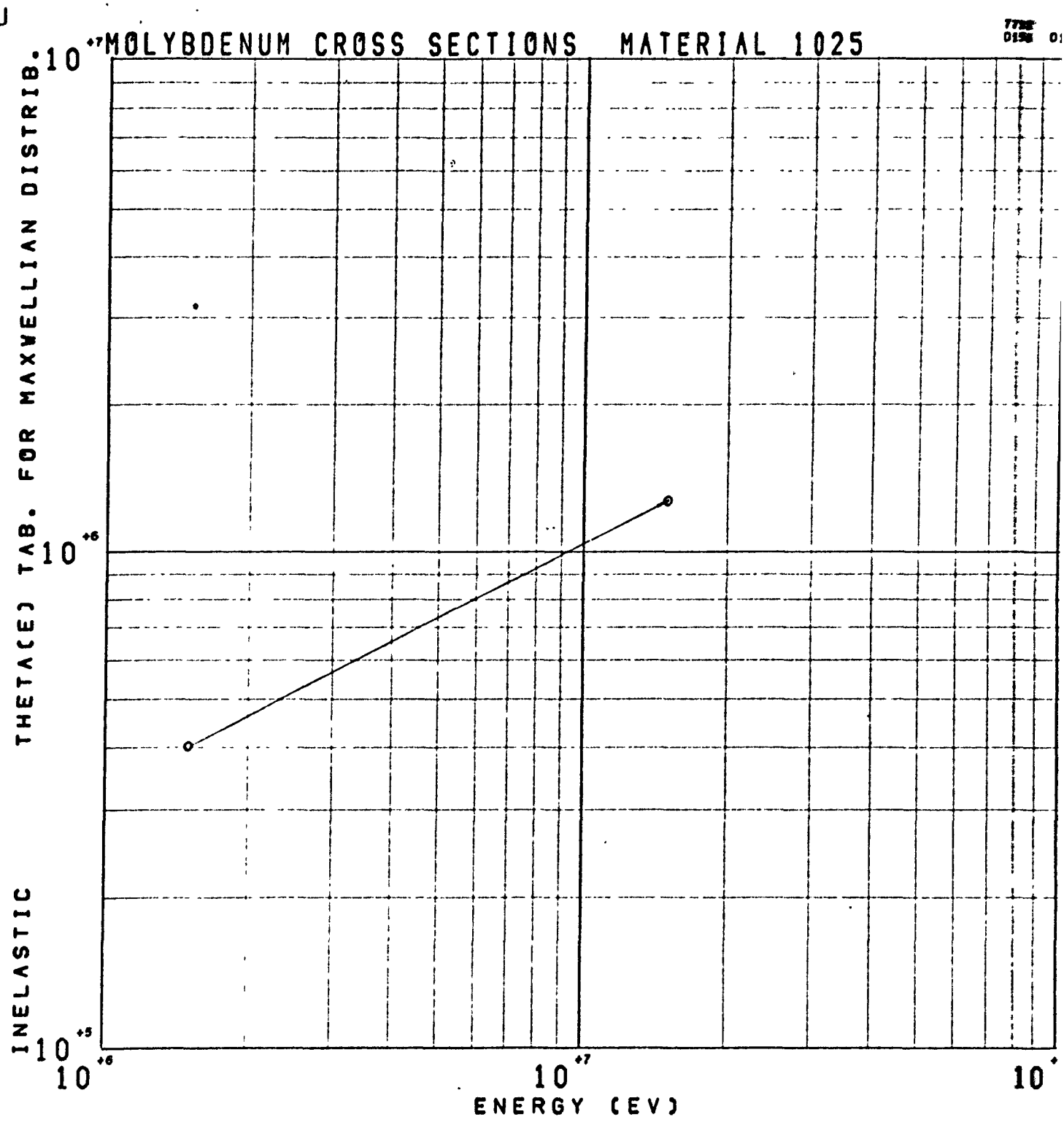

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0153 015
INELASTIC P(E) LF = 3 CONS = 2.0000E+05
1.0
0.8
0.6
0.4
0.2
0
10+5
10+6
10+
ENERGY (EV)

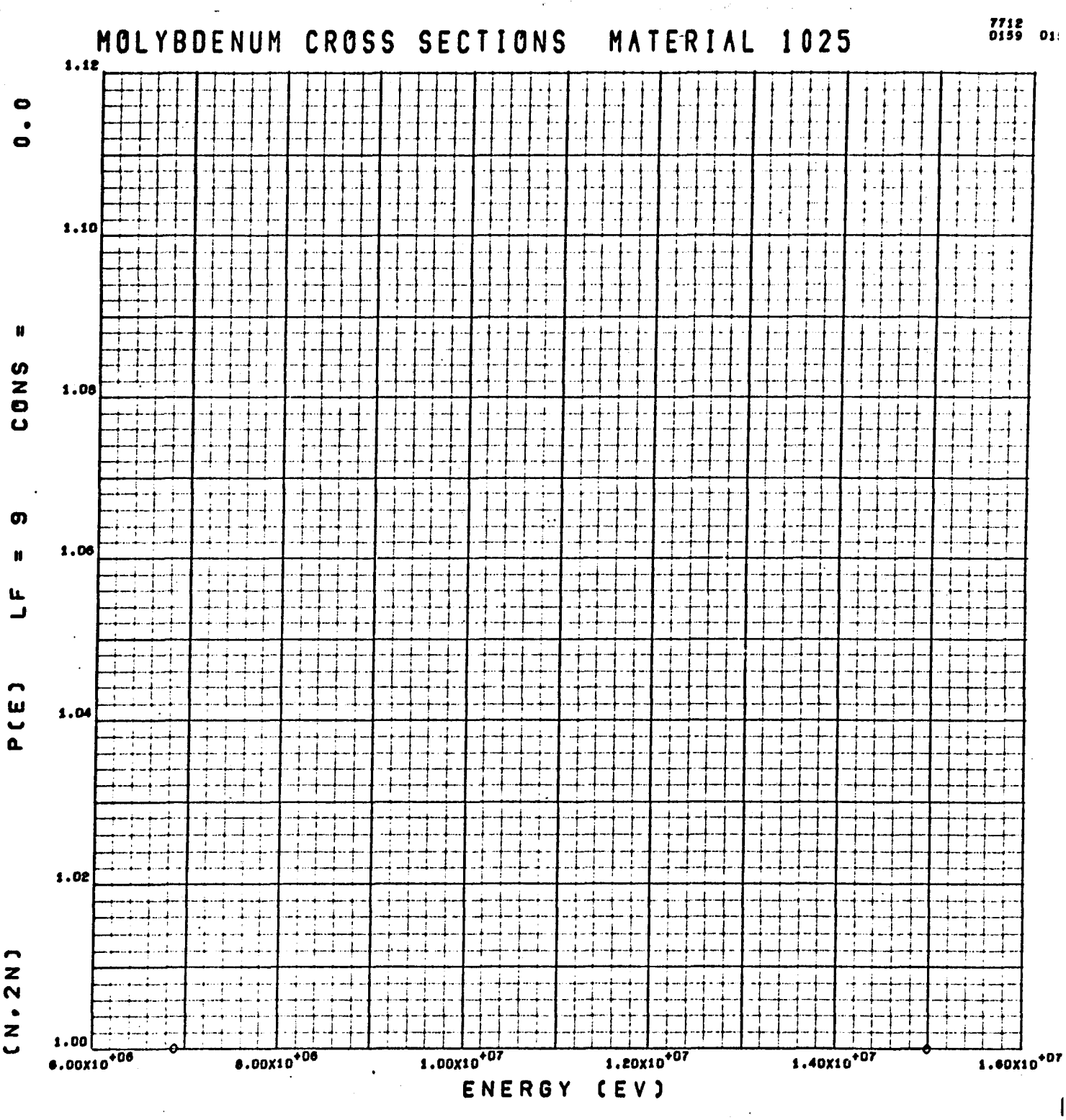

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0154 015
INELASTIC P(E) LF = 3 CONS = 5.0000E+05
.60
.50
.40
.30
.20
.10
.0
10+5
10+6
10+1
ENERGY (EV)

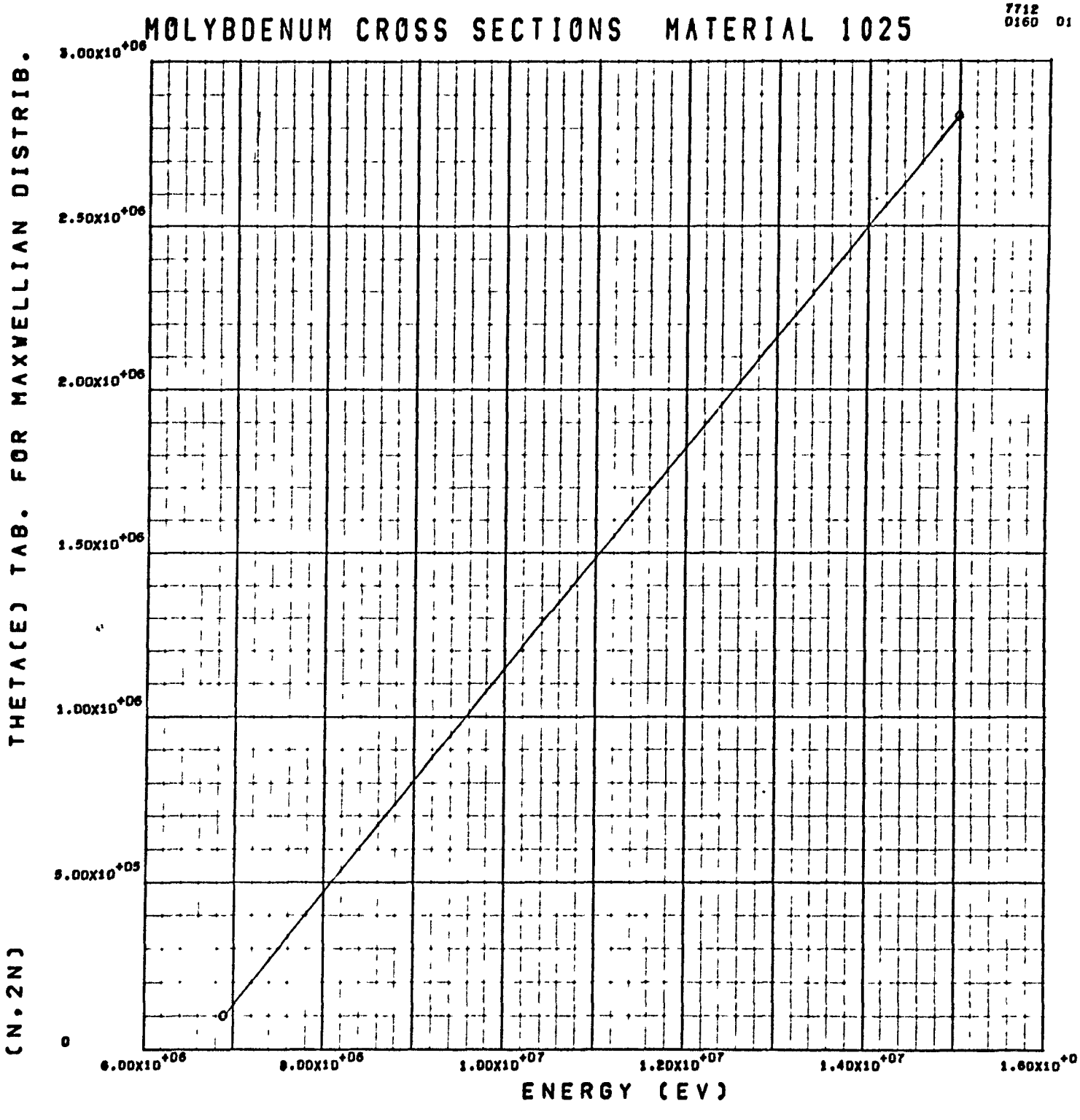

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0155 0155
INELASTIC P(E) LF = 3 CONS = 7.9000E+05
.80
.60
.40
.20
.0
10+5
10+6
10+7
ENERGY (EV)

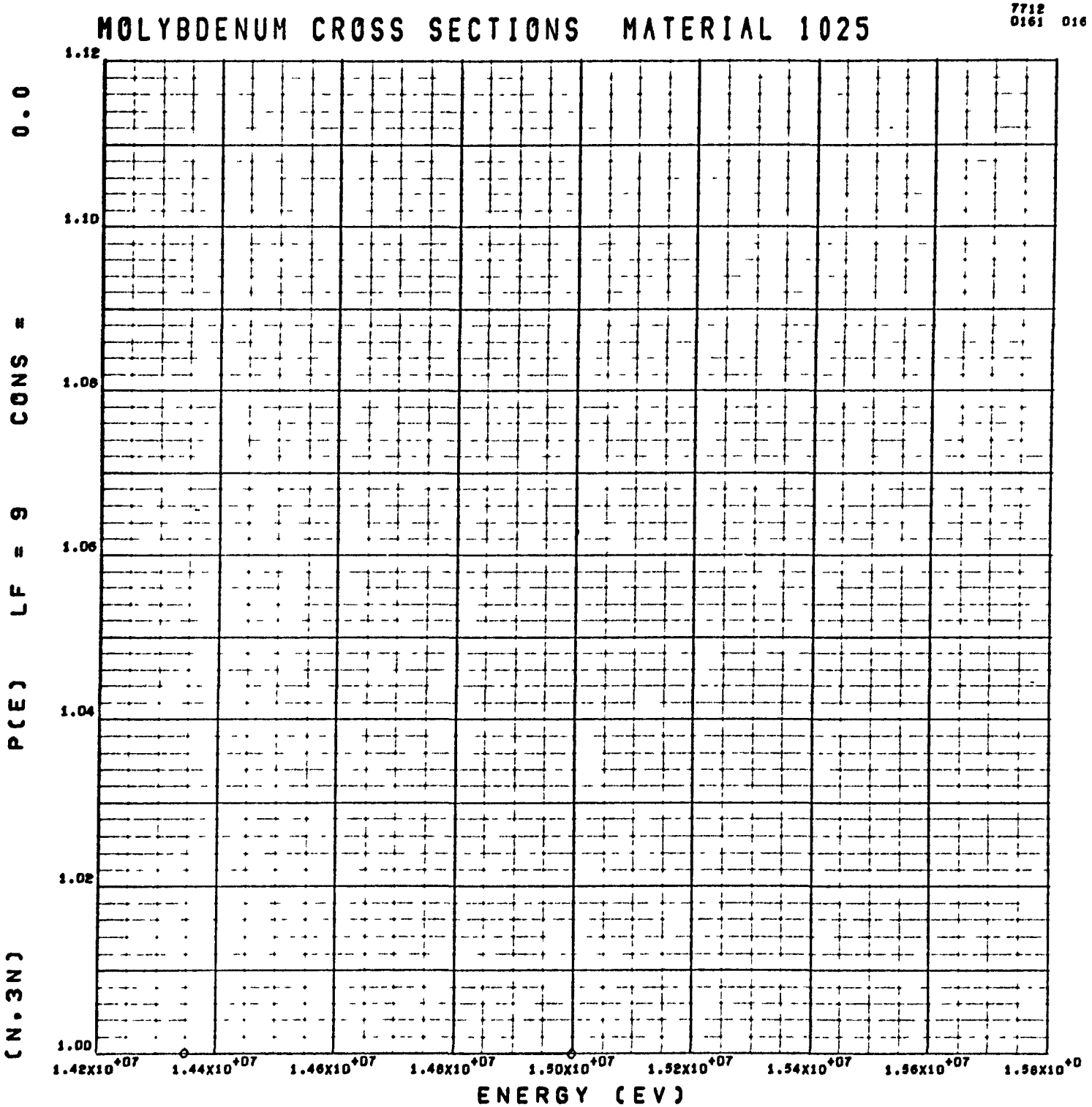

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0156 0156
INELASTIC P(E) LF = 3 CONS = 1.0500E+06
.10
.08
.06
.04
.02
.0
10 +6
10
ENERGY (EV)

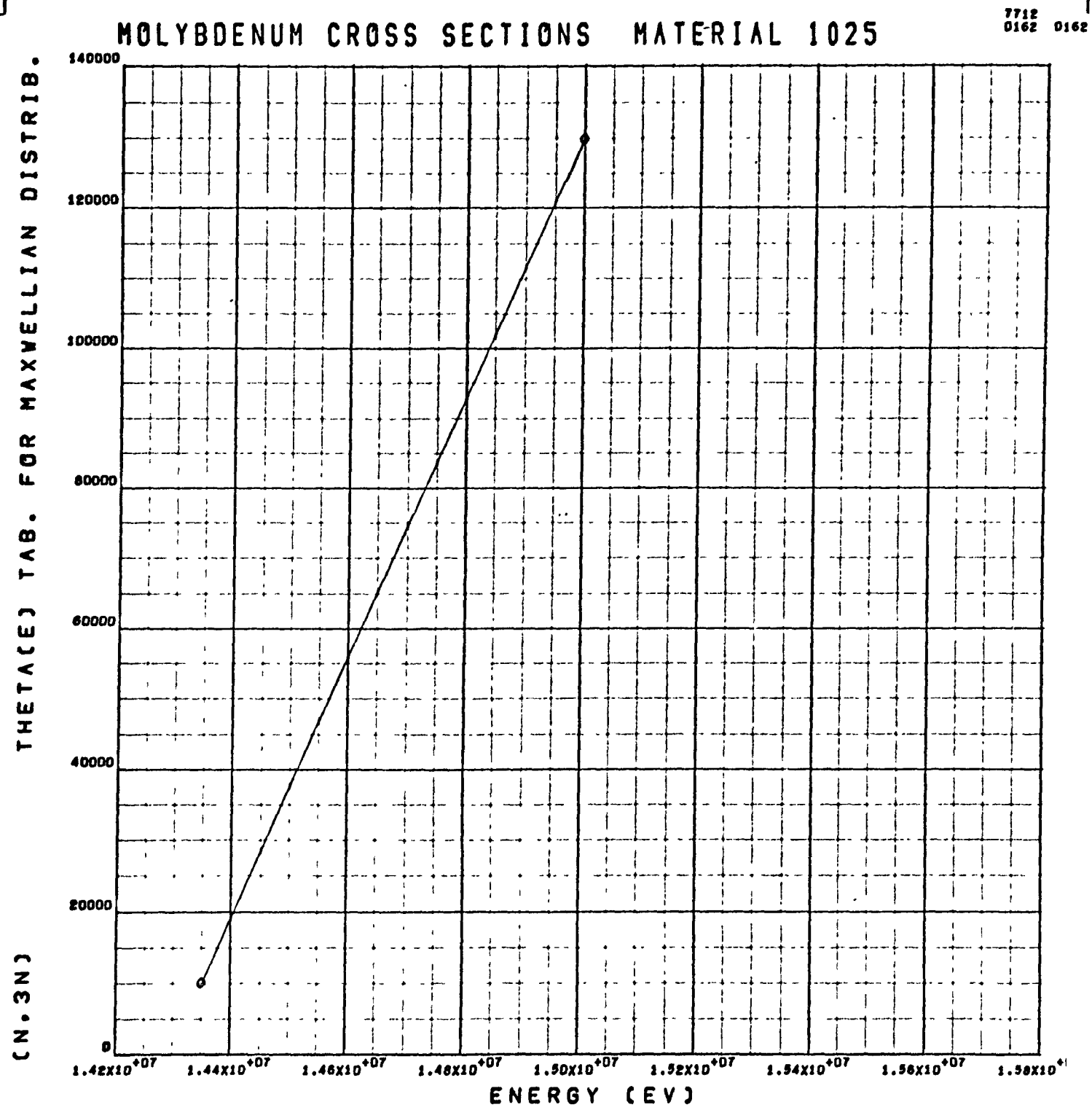

MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0157 01
INELASTIC P(E) LF = 9 CONS = 0.0
1.0
0.8
0.6
0.4
0.2
0
10+6
10+7
10+
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
INELASTIC THETA(E) TAB. FOR MAXWELLIAN DISTRIB.
10+7
10+6
10+5
10+6
10+7
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0159 01
P(E) LF = 9 CONS = 0.0
(N,2N)
1.12
1.10
1.08
1.06
1.04
1.02
1.00
6.00X10+06
8.00X10+06
1.00X10+07
1.20X10+07
1.40X10+07
1.60X10+07
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0160 01
THETA(E) TAB. FOR MAXWELLIAN DISTRIB.
(N,2N)
3.00X10+06
2.50X10+06
2.00X10+06
1.50X10+06
1.00X10+06
5.00X10+05
0
6.00X10+06
8.00X10+06
1.00X10+07
1.20X10+07
1.40X10+07
1.60X10+0
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0161 016
P(E) LF = 9 CONS = 0.0
(N,3N)
1.12
1.10
1.08
1.06
1.04
1.02
1.00
1.42X10+07
1.44X10+07
1.46X10+07
1.48X10+07
1.50X10+07
1.52X10+07
1.54X10+07
1.56X10+07
1.58X10+0
ENERGY (EV)


MOLYBDENUM CROSS SECTIONS MATERIAL 1025
7712
0162 0162
THETA(E) TAB. FOR MAXWELLIAN DISTRIB.
(N.3N)
140000
120000
100000
80000
60000
40000
20000
0
1.42X10+07
1.44X10+07
1.46X10+07
1.48X10+07
1.50X10+07
1.52X10+07
1.54X10+07
1.56X10+07
ENERGY (EV)