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CINDA Reader's Manual

Revised by

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NEA Data Bank

on behalf of the
Nuclear Data Centers Network

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Abstract: CINDA is a computerized index to the literature and numeric data files of microscopic neutron cross sections and evaluated data such as angular distributions, resonance parameters, fission-product data, etc. Retrievals from CINDA files are available through the WWW as well as from CDs and the CINDA books published regularly by the nuclear reaction data centres network. This document contains the rules to be observed by the CINDA indexers when preparing the CINDA input.

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CINDA READER'S MANUAL

April 2003

This manual replaces all previous issues of the CINDA Reader's manual.

The manual is in three parts:

Section I	General summary for everyday use by Readers.
Section II	Detailed specifications and instructions for coding.
Section III	Dictionaries of CINDA quantities, laboratory and reference codes.

The manual is distributed in loose-leaf form, allowing modifications to be made by replacement and inclusion of pages as is the current fashion in EXFOR. Modifications can be made on request or following suggestions of CINDA Readers after discussion and agreement by the 4-Centre network of Nuclear -Data Centres (NEA-DB, CJD, NDS, NNDC). Suggestions should be sent to NEA-DB for circulation.

Revised by: M. A. Kellett
April 2003

COMPUTER INDEX TO NEUTRON DATA

CINDA MANUAL

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Introduction

The scope of CINDA is limited to publications giving information about nuclear reactions initiated by a neutron-nucleus collision. Primarily this includes neutron scattering, neutron capture, fission, and other reactions producing charged particles or neutrons, but a few other categories of information of interest to reactor physicists have been included: scattering of neutrons by bound atoms, some photon-induced reactions and spontaneous fission.

CINDA is a computerised file; identical copies of which are maintained by the four co-operating Neutron Data Centres. These master files are simultaneously updated by means of an exchange mechanism between the centres. Input to the file is made periodically in the form of CINDA entries coded by indexers at the data centres or, in the case of NEA-DB, also by a network of external readers, from scanning of current literature. Each entry contains coded information on nuclear reaction, target material, laboratory, reference, neutron energy range and a few brief comments. This information is tested on input to the file for formal irregularities. This manual is intended to provide a complete and intelligible guide to CINDA indexers for correct coding of relevant articles.

CINDA centres may change old and introduce new compiler symbols and codes for laboratories or references belonging to their service area. The codes for labs and references must be in accordance with the coding rules set up in the EXFOR manual, pages 7.11 (institute codes) to 7.13 and with the special rules for CINDA as stated in part II.10 for references. They must be communicated to the other centres prior to the exchange of the respective CINDA entries.

For changes to and introduction of other codes and changes to coding rules the agreement of all four CINDA centres is required.

Warning: Within the CINDA system, various formats exist for the storage, exchange and publication of CINDA entries, which differ from the "Reader format" for coding of entries. In particular, the codes given in the CINDA book may be different from the input format. Therefore, no other codes except those permitted in this manual should be used for the coding of entries.

I. Summary of CINDA entry format

Record field	Coded information	Detailed specifications
1	TARGET Single isotope Inverse reactions Mixtures of elements Chemical compounds	II.1
2	REACTION QUANTITY	II.2
3	LABORATORY	II.3
4	BLOCK NUMBER	II.4
5	READER CODE	II.5
6	OPERATION CODE	II.6
7	HIERARCHY CODE	II.7
8	WORKTYPE	II.8
9	NEUTRON ENERGY	II.9
10	REFERENCE	II.10
11	AUTHOR NAME AND COMMENTS	II.11
12	CINDA EXCHANGE FORMAT SPECIFICATIONS	II.12

BRIEF GUIDE TO CODING

TARGET **columns 1 - 5**

Z	columns 1 - 2	Single element specification.
A	columns 3 - 5	Single isotopes and mono-isotopic elements. Leave blank for natural multi-isotope elements.

Alternative Codes

CMP	columns 3 - 5	Chemical compounds other than those with special codes. Enter Z of principal element
MANY	columns 1 - 4	References with many target elements.
FPROD	columns 1 - 5	Unseparated fission products.

Hydrogen isotopes are coded as H 002, and H 003. The target isotope should be coded even when the reference is to properties of the compound nucleus (resonance parameters, fission barriers, capture gamma spectra).

CROSS SECTION **columns 6 - 8**

Coded information on reaction type and measured property. See Section II.2 for a list of codes. Follow the convention of least Z for light particle products.

LABORATORY **columns 9 - 11**

Enter the code for the laboratory of the principal authors; see Section II.3 for ambiguous cases.

BLOCK NUMBER **columns 12 - 14**

Leave blank for new entries unless you wish two or more entries to be blocked together: Section II.4.

READER **column 15**

Enter your Reader number or letter.

OPERATION **column 16**

BLANK	Entries for work in other service areas
A	New entries in the reader's service area
B	To block a new entry with existing entries
M	To modify an existing entry
D	To delete an existing entry
L	To link two blocks together
K	To destroy an existing block.

HIERARCHY **column 17**

Usually blank giving a default hierarchy 3, but a code may be used if appropriate.

M	Main references - definitive publications
T	Translations
N	Progress reports, abstracts, etc., not to appear in the book after blocking with a complete report.
D	Data index entries.

WORKTYPE **column 18**

D	Evaluations
C	Compilations
E	Experimental measurements
T	Theoretical calculations
M	Mixtures of experimental and theoretical work

ENERGY **columns 19 - 26**

Lower and upper neutron energy limits in eV. The format is mantissa times exponent, e.g., 3 MeV is coded as 30+6. The decimal point is included implicitly between columns 19 and 20, and between 23 and 24. Single energy values should be coded in columns 19-22 ONLY.

The following alphabetic codes are also allowed:

NDG	No energy information given	
MAXW	Average over a maxwellian spectrum	
COLD	Unspecified energy average below 1 eV	
FISS	Average over a fission produced neutron spectrum	
PILE	Average over a Thermal reactor neutron spectrum	
FAST	Average over a Fast reactor neutron spectrum.	
SPON	Spontaneous fission	
TR UP	From threshold upwards	"TR"in columns 19 & 20, "UP" in columns 23 and 24

For details and combinations of codes see Section II.9.

REFERENCE **columns 27 - 44**

Reference type column 27

	J	Jour	Journal
	*	Abst	Abstract in journal or conference
	C	Conf	Conference: published proceedings or separate papers
	S	Conf	Conference proceedings published as a laboratory report
	R	Rept	Laboratory report
	P	Prog	Progress report, usually contains short notes on many different projects
	B	Book	Book. Rarely used
	T	Diss	Thesis
	W	Priv	Private Communication
(zero)	0	Data	EXFOR entry exists but numerical data are not available
	4	Data	Numerical data exchanged in EXFOR format
	3	Data	Other tape files available (at present, only evaluations)

Reference code columns 28 - 41

Use reference code according to EXFOR

Dictionary	5	for journals
	6	for reports
	7	for books and conference

For coding of volume, issue and page number, see Section II.10.

Reference date columns 42 - 44

month in column 42 (1 - 9 for January - September,
0 = 0ctober (letter "O" or zero "0")
N = November
D = December
blank = unknown)

year (last 2 digits) in columns 43 - 44

<u>COMMENT</u> **columns 45 - 80**

Name of the first author followed by a stop '.' for a single author or a plus '+' for more than one author. The abbreviated free text following the author name should specify:

formula of chemical compound if code is ambiguous

some indication of experimental method used, e.g. VDG,LINAC

status of experiment, e.g.,

TBD	to be done
TBC	to be completed
TBP	to be published
PRELIM	preliminary results

in what form the data are given, e.g. :

NDG	No data given
TBL	Table
CURV	Curves
GRPH	Graph

further data specification if necessary, e.g.,

ANGDIST angular distribution
Cross section to metastable state
Specific isotopes in fission yields.

Abbreviations should be intelligible to users whose mother language is not English. See pages II.11.2 - II.11.4.

II. Detailed Specifications of CINDA entry format

1 - TARGET

Format

Columns 1 - 2 Chemical symbol of the target element, left adjusted for single letter symbols.

Columns 3 - 5 Isotope mass number, right adjusted with leading zeros. Leave blank for natural elements containing a mixture of isotopes.

Coding rules

1. Single isotopes

Experiments and calculations giving information for specific isotopes, either using isotopically enriched target, or by identification of isotopes from the reactions themselves, should be coded with the specific isotope numbers.

Monoisotopic and nearly monoisotopic elements should be coded with the appropriate isotope number. A list of elements in this category is given below.

Inclusion of an element in this list implies that an experiment using a natural element target will only yield useful information about the isotope specified.

Examples

Isotope	Code
A1-27	AL027
W-186	W 186

SYMBOL	Z	ELEMENT	SYMBOL	Z	ELEMENT
AR	18	ARGON	MN	25	MANGANESE
AC	89	ACTINIUM	MO	42	MOLYBDENUM
AG	47	SILVER	N	7	NITROGEN
AL	13	ALUMINIUM	NA	11	SODIUM
AM	95	AMERICIUM	NB	41	NIOBIUM
AS	33	ARSENIC	ND	60	NEODYMIUM
AT	85	ASTATINE	NE	10	NEON
AU	79	GOLD	NI	28	NICKEL
B	5	BORON	NN	O	NEUTRON
BA	56	BARIUM	NO	102	NOBELIUM
BE	4	BERYLLIUM	NP	93	NEPTUNIUM
BI	83	BISMUTH	O	8	OXYGEN
BK	97	BERKELIUM	OS	76	OSMIUM
BR	35	BROMINE	P	15	PHOSPHORUS
C	6	CARBON	PA	91	PROTACTINIUM
CA	20	CALCIUM	PB	82	LEAD
CD	48	CADMIUM	PD	46	PALLADIUM
CE	58	CERIUM	PM	61	PROMETHIUM
CF	98	CALIFORNIUM	PO	84	POLONIUM
CL	17	CHLORINE	PR	59	PRASEODYMIUM
CM	96	CURIUM	PT	78	PLATINUM
CO	27	COBALT	PU	94	PLUTONIUM
CR	24	CHROMIUM	RA	88	RADIUM
CS	55	CESIUM	RB	37	RUBIDIUM
CU	29	COPPER	RE	75	RHENIUM
DY	66	DYSPROSIUM	RH	45	RHODIUM
ER	68	ERBIUM	RN	86	RADON
ES	99	EINSTEINIUM	RU	44	RUTHENIUM
EU	63	EUROPIUM	S	16	SULFUR
F	9	FLUORINE	SB	51	ANTIMONY
FE	26	IRON	SC	21	SCANDIUM
FM	100	FERMIUM	SE	34	SELENIUM
FR	87	FRANCIUM	SI	14	SILICON
GA	31	GALLIUM	SM	62	SAMARIUM
GD	64	GADOLINIUM	SN	50	TIN
GE	32	GERMANIUM	SR	38	STRONTIUM
H	1	HYDROGEN	TA	73	TANTALIUM
HE	2	HELIUM	TB	65	TERBIUM
HF	72	HAFNIUM	TC	43	TECHNECIUM
HG	80	MERCURY	TE	52	TELLURIUM
HO	67	HOLMIUM	TH	90	THORIUM
I	53	IODINE	TI	22	TITANIUM
IN	49	INDIUM	TL	81	THALLIUM
IR	77	IRIDIUM	TM	69	THULIUM
K	19	POTASSIUM	U	92	URANIUM
KR	36	KRYPTON	V	23	VANADIUM
KU	104	KURCHATOVIUM	U	74	TUNGSTEN
LA	57	LANTHANUM	XE	54	XENON
LI	3	LITHIUM	Y	39	YTTRIUM
LR	103	LAWRENCIUM	YB	70	YTTERBIUM
LU	71	LUTETIUM	ZN	30	ZINC
MD	101	MENDELEVIUM	ZR	40	ZIRCONIUM
MG	12	MAGNESIUM			

Monoisotopic or effectively monoisotopic elements

**	NN001	*	O 016		CO059		PR141
	H 001		F 019		AS075		TB159
	H 002		NA023		Y 089		HO165
	H 002		AL027		NB093		TM169
*	HE004		P 031		RH103	*	TA181
	BE009		SC045		I 127		AU197
*	C 012	*	V 051		CS133		BI209
*	N 014		MN055	*	LA139		TH232

* nearly monoisotopic
** artificial code for 'neutron' as target

2. Natural elements and their isotopes

If a measurement was performed on a sample consisting of a natural isotopic mixture, but properties of some of the isotopes of that element are deduced, prepare entries for both the natural element and the appropriate isotopes.

The value of this convention is more obvious for some older works reported in CINDA. Current measuring techniques allow reactions on individual isotopes to be distinguished without necessarily accumulating comparative data for all constituents of the target. However, the convention is kept in order to preserve the consistency of the file.

3. Isotopes far from the stability line

The relation between Z and A of isotopic targets is checked on input, so as to eliminate misprint errors.

When entries are made for unusual target isotopes (multiple neutron capture, some fission products, some theoretical calculations) it is possible that these entries too will be rejected on a first check. Please repeat the designation of such targets in the right-hand margin of your entry sheet, to make it clear that the unusual isotope was not generated by a slip of the pen or a misprint error.

4. Hydrogen Isotopes

The hydrogen isotopes deuterium and tritium are entered as:

H 002
H 003

5. Neutrons

Neutrons as targets are coded as: NN001.

6. Inverse reactions

In some cases the principle of detailed balance allows the cross section of an inverse neutron-induced reaction to be calculated. However, it is not usually possible to extract useful information unless an absolute value is given of the cross-section leading directly to the ground state of a stable product nucleus. If useful information can be deduced about a neutron-induced reaction, enter the work under this reaction with the word INVERSE (or INV.) immediately after the author's name in the comment.

7. Gamma-induced reactions

Photo-neutron production (for some light nuclei) and photo-fission are an exception to the rule on coding inverse reactions. Enter the target nucleus. See Section II.2 for restrictions on this type of entry.

8. Compound nucleus properties

Entries should be coded under the target nucleus (i.e. the compound nucleus less one neutron). This is particularly important for Resonance parameters, capture gamma spectra. Level density information is an exception and should be coded under the nucleus for which the level density is given.

9. Spontaneous Fission

For spontaneous fission, enter the isotope concerned (this is an exception to the convention on entering targets).

10. Mixed fission products as a target

The cross-sections of many important fission products are known with very poor accuracy, such that it has been preferable in some cases to measure or calculate an aggregate cross-section for the fission products produced in the environment similar to that of the reactor for which results are required.

Work of this type is entered under the target code FPROD. This code refers to an aggregate target NOT a measured yield.

11. Systematic trends over a range of nuclei

Work on systematic trends over a range of values of Z or A should be entered with a target code MANY in addition to separate entries for individual nuclei for which values are given.

12. Chemical compounds

Properties of chemical compounds are entered under the principal element (columns 1 - 2) followed by either a specific chemical code or the code CMP (columns 3 - 5) for compounds not in the following list.

CODE	INTERNAL	COMPOUND
H BNZ	401	Benzene (C6H6)
H CXX	403	Organic compounds other than BNZ, MTH, PFN, PHL, PLE
H MTH	405	Methane (CH4)
H PFN	407	Paraffin (= kerosene)
H PHL	409	Phenyl (all, ter- poly-)
H PLE	411	Polyethylene
H WTR	413	Water (H2O), ice, steam
H DXX	435	Deuterium compounds except D2O and Zr-deuteride. Includes mixed H-D compounds.
H D2O	437	Heavy water, D2O and HDO
H TXX	445	Tritium compounds except Zr-tritide. Includes mixed H-T and D-T compounds.
BEOXI	417	Beryllium oxide
N AIR	419	Air
N AMM	421	Ammonia compounds
SIOXI	417	Silicon oxide (glass, mica)
ZRHYD	423	Zirconium hydride (+ deuteride and tritide)
U OXI	417	Uranium oxide

For compounds not in this list, the choice of principal element should be the element of greatest interest to reactor or solid-state physicists, or that responsible for the major component of the measured quantity. If important information is lost in making such a choice, separate entries can be made for each important element, but such multiple entries should be avoided.

The name or formula of the compound should always be given as fully as possible in the comment field (in parentheses).

Metal alloys should be coded under the most abundant element and CMP with the characteristics in the comment field. Brass should be coded under both CUCMP and ZNCMP.

STEEL should be coded under natural iron with a specification in the comment field.

Single element compounds; GRAPHITE, MOLECULAR HYDROGEN, etc., should NOT be coded as compounds.

If information is also deduced for the constituent elements of a compound, entries should also be made for these elements.

2 - REACTION QUANTITY

Format

Columns 6 - 8 code for reaction quantity measured or calculated. Left adjusted for two letter codes. The internal sortcode defines the order in which reactions are listed in the CINDA book.

Neutron nuclear scattering

SEL	5	Elastic
DEL	7	Differential elastic
POL	9	Polarization
POT	11	Potential
SIN	13	Total inelastic
DIN	15	Differential inelastic
SCT	19	Elastic + inelastic

Neutron production

N2N	39	(n,2n)
NXN	41	(n,3n)(n,4n)...
NEM	43	Neutron emission

Gamma ray production

NG	29	(n, γ)
RIG	31	Capture res. integral
SNG	33	(n,γ) gamma spectrum
DNG	35	Inelastic γ
NEG	37	Nonelastic γ

Charged particle production

NP	45	(n,p)
NNP	47	(n,np)
PEM	48	
ND	49	
NND	51	
DEM	52	
NT	53	
NNT	55	
TEM	56	
NHE	57	
NA	59	
NNA	61	
AEM	62	

Fission

NF	63	Fission
RIF	65	Fission resonance integral
ALF	67	Alpha
ETA	69	Eta
NU	71	Nu
NUD	73	Delayed neutrons
NUF	73	Fragment neutrons
SFN	77	Fission neutron spectrum
SFG	79	Fission γ spectrum
FPG	81	Fission product γ
FPB	82	Fission product β
NFY	83	Fragment yield
FRS	85	Fragment energy and/or
	87	angular distribution
CHG		Fragment charge distribution

Aggregate cross sections

TOT	3	Total
SNE	21	Nonelastic
NX	44	Nuclide production
ABS	23	Absorption
RIA	25	Absorption resonance integral

Resonance parameters

RES	89	Resonance parameters
STF	91	Strength function
LDL	93	Level Density

Gamma-induced reactions

GN	95	(γ,n)
GF	97	Photo fission

Special quantities

EVL	1	Evaluation (used in addition to other specific quantities)
TSL	17	Thermal scattering

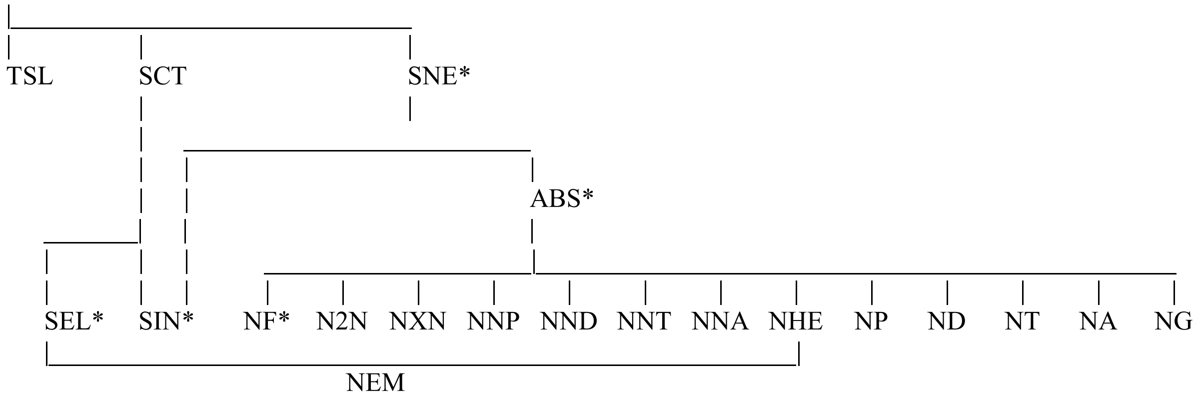
CINDA quantities are of necessity rather broad in scope so that the file can be kept manageably small. Further subdivision of most quantity categories is available in the EXFOR system for numerical data exchange. Where possible any further necessary information on measured or calculated reaction quantities should be mentioned in the CINDA comment field. For example, the CINDA quantity NP covers all measured properties of the (n,p) reaction.

Examples:

$\sigma_{n,p}(E_n)$	comment	INTEGRAL SIG or SIG(E)
$\sigma_{n\,p}(E_{n;}\,\theta)$	comment	ANG DIST or similar
$\sigma_{n\,p}(E_n;E_p)$	comment	E DIST, P SPECT, etc.
$\sigma_{n,p}(E_{n;}E_{p,}\theta)$	comment	E + ANG DIST. etc.

$$\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,p}(E)}{E}\, dE$$ Resonance integral

CINDA CROSS SECTION QUANTITY SCHEMES



* In contrast to the unmarked quantities, these reactions have separate codes for partial cross-sections (SEL/POL, SIN/DIN), differential data (SEL/DEL, SIN/DIN), gamma-emission data (DIN/DNG, SNE/NEG, NG/SNG) or resonance integrals (ABS/RIA, NF/RIF, NO/RIG or RIA).

<u>Note</u>: the following quantities include or are deduced from (measurements of) (several) other quantities: EVL, POL, RES, STF, LDL, NX.

Associated fission quantities

ALF, ETA, NU, SFG, SFN, NUD, NUF, NFY, FRS, FPB, FPG

Charged particle emission quantities

PEM, DEM, TEM, AEM

These are sums of processes from which emergent charged particles can be detected, weighted for the number of charged particles produced. The code PEM, representing proton emission, may include the summed quantities NP and NNP; similarly for the other three charged particle emission codes given above.

The Convention of least Z

Particularly for light element reactions, some quantities can legitimately be expressed in several ways. To get uniformity a general rule covers this possibility : the quantity listed refers to the lightest (one or two) particles emerging, and for equal atomic number A to the particle with least Z.

Examples :

1. Break-up of deuterons by neutrons is listed as d(n,2n) (coded as H002 N2N)

2. Li-6+n $\rightarrow$ T+α is listed as Li-6(n,t) and not as Li-6(n,α). Even if the experiment concerns the energy spectrum of emergent alphas it is listed as : Li-6(n,t) but with a comment such as ALPHA E SPECT.

The following table lists all possible light nuclei reactions, together with their thresholds (taken from URCL-1400 - May, 1964, R.J. Howerton et al. "Thresholds of Nuclear Reactions"). The list is adapted from the EXFOR MANUAL (EXFOR is the format in which numerical neutron data are exchanged between Centres). According to the "convention of least Z" these reactions shall be described by the one or two lightest out-going particles. However, there are some exceptions to this rule.

For example:

Li-7(n,2ndα) is coded as NND to avoid confusion with
Li-7(n,2n)Li-6 coded as N2N

C-12(n,npt2α) is coded as NNT because NNP means
C-12(n,np)B-11

	Reaction	Threshold (MeV)	CINDA Entry 1 2 3 4 5 6 7 8
Z=1	H-l(n,γ)H-2	0	H 0 0 1 N G
	H-2(n,γ)H-3	0	H 0 0 2 N G
	H-2(n,2n p)	3.34	H 0 0 2 N 2 N
	H-3(n,2n d)	8.35	H 0 0 3 N 2 N
	H-3(n,3n p)	11.31	H 0 0 3 N X N

Where NG is permitted, SNG and RIA are of course accepted too.

Z=2	He-3(n,γ)He-4	0	H E 0 0 3 N G
	He-3(n,p t)	0	H E 0 0 3 N P
	He-3(n,2d)	4.35	H E 0 0 3 N D
	He-3(n,n p d)	7.32	H E 0 0 3 N N P
	He-3(n,2n 2p)	14	H E 0 0 3 N 2 N
	He-4(n,d t)	21.97	H E 0 0 4 N D
	He-4(n,n p t)	24.76	H E 0 0 4 N N P
	He-4(n,2n)He-3	25.72	H E 0 0 4 N 2 N
	He-4(n,n 2d)	29.80	H E 0 0 4 N N D

Z=3	Li-6(n,γ)Li-7	O	L I 0 0 6 N G
	Li-6(n,tα)	0	L I 0 0 6 N T
	Li-6(n,n dα)	1.71	L I 0 0 6 N N D
	Li-6(n,p)He-6	3.19	L I 0 0 6 N P
	Li-6(n,2n pα)	5.43	L I 0 0 6 N 2 N
	Li-6(n,n t)He-3	18.42	L I 0 0 6 N N T
	Li-7(n,γ)Li-8	0	L I 0 0 7 N G
	Li-7(n,n tα)	2.81	L I 0 0 7 N N T
	Li-7(n,2n)Li-6	8.29	L I 0 0 7 N 2 N
	Li-7(n,d)He-6	8.87	L I 0 0 7 N D
	Li-7(n,2n da)	11.06	L I 0 0 7 N 2 N
	Li-7(n,n p)He-6	11.41	L I 0 0 7 N N P
	Li-7(n,3n pa)	14.76	L I 0 0 7 N X N

For LI006NT, usually the alpha particle is observed, if so, it should be mentioned in the comments field.

	Reaction	Threshold (MeV)	CINDA Entry 1 2 3 4 5 6 7 8
Z=4	Be-9(n,y)Be-10	0	B E 0 0 9 N G
	8e-9(n,a)He-6	0.67	B E 0 0 8 N A
	Be-9(n,2n 2a)	1.85	B E 0 0 9 N 2 N
	Be-9(n,t)Li-7	11.59	B E 0 0 9 N T
	Be-9(n,p)Li-9	14.74	B E 0 0 9 N P
	Be-9(n,d)Li-8	16.28	B E 0 0 9 N D
	Be-9(n,n d)Li-7	18.54	B E 0 0 9 N N D
	Be-9(n,n p)Li-8	18.76	B E 0 0 9 N N P
	Be-9(n,n t)Li-6	19.66	B E 0 0 9 N N T
	Be-9(n,3 n)Be-7	22.85	B E 0 0 9 N X N
	Be-9(n,n He-3)He-6	23.54	B E 0 0 9 N H E

For BE009NHE no separate quantity exists for n,n,He.

	Reaction	Threshold (MeV)	CINDA Entry 1 2 3 4 5 6 7 8
Z=5	B-10(n,y)B-11	0	B 0 1 0 N G
	B-10(n,p)Be-10	0	B 0 1 0 N P
	B-10(n,t 2a)	0	B 0 1 0 N T
	B-10(n,a)Li-7	0	B 0 1 0 N A
	B-10(n,d)Be-9	4.79	B 0 1 0 N D
	B-l0(n,na)Li-6	4.90	B 0 1 0 N N A
	B-10(n,n d 2a)	6.62	B 0 1 0 N N D
	B-10(n,n p)Be-9	7.24	B 0 1 0 N N P
	B-10(n,2n p 2a)	9.28	B 0 1 0 N 9 N
	B-10(n,He-3)Li-8	17.32	B 0 1 0 N H E
	B-10(n,n He-3)Li-7	19.56	B 0 1 0 N H E
	B-10(n,n t)Be-7	20.54	B 0 1 0 N N T
	B-10(n,3n)B-8	29.72	B 0 1 0 N X N
	B-ll(n,a)Li-8	7.23	B 0 1 1 N A
	B-ll(n,na)Li-7	9.44	B 0 1 1 N N A
	B-ll(n,d)Be-10	9.82	B 0 1 1 N D
	B-ll(n,t)Be-9	10.42	B 0 1 1 N T
	B-ll(n,p)Be-11	11.70	B 0 1 1 N P
	B-ll(n,n p)Be-10	12.25	B 0 1 1 N N P
	B-ll(n,n t 2a)	12.25	B 0 1 1 N N T
	B-ll(n,2n)B-10	12.50	B 0 1 1 N 2 N
	B-ll(n,n d)Be-9	17.25	B 0 1 1 N N D
	B-ll(n,3n p 2a)	21.70	B 0 1 1 N X N
	B-ll(n,He-3)Li-9	25.73	B 0 1 1 N H E
	B-ll(n,n He-3)Li-8	29.68	B 0 1 1 N H E

For B 010NT is via Be-8, Li-7** three particle break-up to the ground state and the 1st excited state. The 2nd excited state decays to t+a.

For B 010NHE and B 011NHE no separate quantity exists for n,n,He.

	Reaction	Threshold (MeV)	CINDA Entry 1 2 3 4 5 6 7 8
Z=6	C-12(n,y)C-13	0	C 0 1 2 N G
	C-12(n,a)Be-9	6.17	C 0 1 2 N A
	C-12(n,n 3a)	7.98	C 0 1 2 N N A
	C-12(n,p)B-12	13.63	C 0 1 2 N P
	C-12(n,d)B-11	14.87	C 0 1 2 N D
	C-12(n,n p)B-11	17.29	C 0 1 2 N N P
	C-12(n,t)B-10	20.50	C 0 1 2 N T
	C-12(n,2n)C-11	20.28	C 0 1 2 N 2 N
	C-12(n,He-3)Be-10	21.09	C 0 1 2 N H E
	C-12(n,n He-3)Be-9	28.47	C 0 1 2 N H E
	C-12(n,n d)B-10	27.28	C 0 1 2 N N D
	C-12(n,n p t 2a)	29.65	C 0 1 2 N N T
	C-12(n,3n)C-10	34.47	C 0 1 2 N X N

Carbon is a "nearly mono-isotopic" element, input programs will not accept as a natural target.

For C 012NHE no separate quantity exists for n,n,He.

For the reaction C-12(n,n p t 2a) C 012NNT is coded, NOT C 012NNP.

Note At one time, reactions with incident neutron energies > 20 MeV were excluded from CINDA. This arbitrary limit has now been dropped, but there are still very few entries for neutron energies above 15 MeV.

Forbidden ZAQ Combinations

In addition to fission quantities and RIG, the following combinations are forbidden for Z < 6:

```
H 001 ABS
      AEM
      DEM
      DIN
      DNG
      GN
      NA
      ND
      NEG
      NEM
      NHE
      NNA
      NND
      NNP
      NNT
      NP
      NT
      NXN
      N2N
      PEM
      SCT
      SIN
      SNE
      TEM

H 002 AEM
      DEM
      DIN
      NA
      ND
      NHE
      NNA
      NND
      NNP
      NNT
      NP
      NT
      NXN
      SIN
      TEM
      PEM

H 003 AEM
      NA
      ND
      NHE
      NNA
      NND
      NNP
      NNT
      NP
      NT
      TEM

HE 003AEM
      NA
      NHE
      NNA
      NND
      NNT
      NT
      NXN

HE 004AEM
      NA
      NHE
      NNA
      NNT
      NP
      NT
      NXN

LI    NA
      ND
      NHE
      NNA
      NND
      NT

LI 006NA
      ND
      NHE
      NNA
      NNP
      NXN

LI 007NA
      NHE
      NNA
      NND
      NP
      NT

BE 009 NNA
```

Indirectly deduced values

If a value has been obtained simply by subtraction or addition of the quantity measured with a value taken from other work or a compilation such as BNL 325, enter only the measured quantity.

Inverse reactions

Charged-particle reactions from which useful information can be deduced about an inverse neutron-induced reaction should be entered under the target and cross-section of the neutron-induced reaction. However, only a small proportion of measurements do give enough information to apply the principle of detailed balance. If such an entry is made, the energy range for the reaction must be converted, at least approximately.

(d,p) and (d,pf) reactions

Useful information can be deduced about the equivalent (n,γ) and (n,f) reactions; entries should be made under NG or NF with an appropriate note in the comments.

DEFINITION OF QUANTITY CODES IN CINDA

Reaction (Goldstein notation)	Code	Expansion in CINDA book	Neutron nuclear scattering
$\sigma_{n,n}(E)$	SEL	Elastic	Definition : The total elastic scattering cross-section, integrated over all angles. Scattering amplitude measurements are entered under Elastic, with a note in the comment. Associated quantities : DEL, POL, POT.
$\sigma_{n,n}(E,\theta)$	DEL	Diff Elastic	Definition : Angular distribution (not normalized) or differential scattering cross-section (normalized) for elastically scattered neutrons. Where the author has integrated a distribution already normalized at one angle to give the total elastic scattering cross-section enter also under Elastic. Associated quantities : SEL, POL, POT.
	POL	Polarization	Definition : All polarization measurements for neutrons in the exit channel, following scattering or any other reaction. Associated quantities : DEL. In entries for work published before 1970, polarisation measurements are likely to be entered only as DEL. Where readers notice such cases, they should make a POL entry for that target.
	POT	Potntal Scat	Definition : A theoretical construction : that part of the scattering cross-section which corresponds physically to scattering by a hard sphere. Use : For the non-resonant part of scattering cross-section in resonance region. This quantity currently not much found in literature.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
$\sigma_{n,n'}(E)$	SIN	Tot Inelastc	Definition : Total cross-section for neutron inelastic scattering, i.e. for neutron excitation of levels in the target nucleus above the ground state. Use : Only for the cross-section integral over all levels excited and all angles. Angular distributions of inelastic neutrons and cross-sections for excitation of specific levels are entered under DIN. Inelastic slow neutron scattering, where energy is lost to or gained molecular excitations, should entered under TSL = Thermal Scat. Note : Some literature uses the term "inelastic" where "nonelastic" is meant in the sense of these definitions. Associated quantities : DIN, DNG.
$\sigma_{n,n'}(E,\theta)$ $\sigma_{n,n'}(E;E')$ $\sigma_{n,n'}(E;E',\theta)$	DIN	Diff Inelast	Definition : Angular distributions or energy spectra of inelastically scattered neutrons. Examples of use : 1) cross-sections for scattering to the 6.14 MeV level in 0-16, the reaction 0-16(n,n')0-16; 2) the angular distribution of inelastically scattered 14 MeV neutrons from Ca-40; 3) the energy spectrum recorded at 90 scattering angle for inelastically scattered neutrons Note: As for Tot Inelastic. the category covers only nuclear scattering. Associated quantities : SIN, DNG.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
$\sigma_{nS}(E)$ $\sigma_{nS}(E,\theta)$	SCT	Scattering	Definition : Information on the total scattering cross section, ($\sigma_{nS} = \sigma_{n,n}(E) + \sigma_{n,n'}(E)$) Use : for experiments at neutron energies above threshold for inelastic scattering, below the (n,2n) threshold, and in which neutron energy groups are not resolved. Remember, "n-p scattering" is SEL or DEL. This quantity includes both the integrated cross section and neutron angular distributions.Give extra information in the comment if necessary : ANGDIST or DIFF SIG. Associated quantities : DNG. Note : Where neutron scattering crosssections are strongly affected by the molecular or crystalline structure of the material (for neutron energies below about 1 eV) then the quantity TSL should be entered ("Thermal Scattering"). Scattering lengths are a parameterisation of (nuclear) elastic scattering, extrapolated to zero energy, but are derived from measurements made at higher energies.
$\sigma_{n,2n}(E)$ $\sigma_{n,2n}(E;E')$ $\sigma_{n,2n}(E;E',\theta)$	N2N	(N,2N)	Definition : Information on (n,2n) and (n,2nC) reactions (C =charged par ticle). Use : For cross sections, angular and energy distributions of neutrons in reactions where two neutrons, with or without other particles, are emitted. Obviously, (n,f) and (n,3n) are not included. Examples : 1) cross section for 0-16(n,2n)N-15; 2) spectrum of protons from the d(n,2n)p reaction (convention of least Z). Note : If not a plain (n,2n) cross section explain further in the comment

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
$\sigma_{x,n}(E;E',\theta)$	NXN	(N,XN)	Definition : Information on (n,xn) and (n,xnC) reactions (C =charged particle) where x>2. Use : Primarily (n,3n) and (n,4n) reactions. Give further specifications of the number of emitted neutrons inthe comment.
$\sigma_{nM}(E)$ $\sigma_{nM}(E',\theta)$ $\sigma_{nM}(E;E',\theta)$	NEM	n Emission	Definition : The sum cross-section for all processes resulting in neutron emission, weighted for the number of neutrons produced : $\sigma_{nM} = \sigma_{n,n} + \sigma_{n,n'} + 2\,\sigma_{n,2n} + x\,\sigma_{n,xn} + \nu\sigma_{n,f} + \sigma_{n,np} + ...$
$\sigma_{n,g}(E)$	NG	(n,γ)	Definition : Radiative capture cross section $\sigma_{n\,\gamma}$
	SNG	Spect (n,γ)	Definition : Spectrum of gamma rays following neutron capture. Note 1 : The term 'gamma decay' includes the competing processes of internal conversion and pair production, so that conversion electron spectra from neutron capture would be entered under 'Specs Ngamma' with an appropriate comment. Note 2 : Do not make entries for the gamma spectrum observed following the beta decay of the product nucleus. SNG is limited to the prompt gammas following neutron capture. Note 3 : Heasurements of gamma polarisation following capture of polarised neutrons are entered under SNG, with an appropriate comment. Enter the target nucleus. Associated quantities : RIG, NG, NEG.
$\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,\gamma}(E)}{E}\, dE$	RIG	Res Int Capt	Definition : Resonance integral for radiative capture for fissionable elements only. Use : Measurements by capture and activation; calculations from NG resonance parameters. With or without the 1/v part. The lower energy limit should be entered. Associated quantities : NG, SNG.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
$\sigma_{n,n'}(E;E_\gamma)$ $\sigma_{n,n'}(E;E_\gamma,\theta)$	DNG	Inelastic γ	Definition : Information on production cross-section, angular distributions or energy spectra for gamma rays following the inelastic scattering of neutrons. This code is used in the case of hydrogen only when Bremsstrahlung production is involved. Note 1 : The comment Bremsstrahlung production should be included in the comment field. Note 2 : Many inelastic scattering experiments measure the production cross-section for a specific gamma ray. This cross-section will in general differ from the cross-section for excitation of its state of origin, but will be equal if gamma-ray cascades to and from the level can be excluded. In this case, prepare a second entry for DIN = Diff Inelast. Associated quantities : SIN, DIN.
$\sigma_{nG}(E)$ $\sigma_{nG}(E;E_\gamma)$ $\sigma_{nG}(E;E_\gamma,\theta)$	NEG	Nonelastic γ	Definition : Information on gamma rays from unseparated nonelastic processes. Use : Covers production cross sections distributions and energy spectra. Do not use for gamma rays which can be assigned to one of the definite processes a) Inelastic scattering (use DNG) b) Fission or fission fragments (use SFG or RPG) c) Radiative capture (use SNG) d) Gamma rays following (n,p) or other charged-particle reactions (use NP, etc.). Associated quantities : SNE, DNG, SFG, FPG. SNG.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
			Charged-particle production
$\sigma_{n,p}(E)$ $\sigma_{n,p}(E,\theta)$ etc ..... $\sigma_{n,np}(E)$ $\sigma_{n,np}(E,\theta)$ etc	NP NNP ND NND NT NNT NHE NA NNA	(n,p) (n,np) (n,d) (n,nd) (n,t) (n,nt) (n,He3) (n,α) (n,nα)	These quantities cover all total and partial cross-sections, angular and energy distributions, prompt gamma rays following these reactions, etc. It is important to specify more exactly in the comment what was measured, even if it is simply the total cross section for that reaction. Note 1 : If two or more neutrons are emitted, use N2N or NXN. Note 2 : Production of a given charged particle may be due to, say, (n,p)+(n,np). In this case, make entries for both quantities, or, better, for PEM, with an appropriate comment. Note 3 : If observed, (n,nHe-3) is coded as (n,He3) Note 4 : Resonance integrals for charged particle production are coded under the appropriate reaction and not under resonance integrals.
$\sigma_{n,p}(E)$ $\sigma_{n,p}(E,\theta)$ etc	PEM DEM TEM AEM	p emission d emission t emission α emission	These quantities refer to the sum of processes from which emergent charged particles can be detected weighted for the number of charged particles produced.
$\sigma_{n,f}(E)$	NF	Fission	Fission quantities Definition : The cross section for neutron induced fission. Note : A number of quantities below cover associated measurements. Unless a value is given for σ(n,f), one of these other quantities will be more appropriate.
$\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,f}(E)}{E}\, dE$	RIF	Res int Fiss	Definition : The resonance integral for fission. The limits of integration should be entered in the neutron ENERGY field.
$\alpha = \frac{\sigma_{n,\gamma}}{\sigma_{n,f}}$	ALF	Alpha	Definition : The ratio of capture and fission cross sections.
$\eta = \frac{\nu\sigma_{n,\gamma}}{\sigma_{n,\gamma} + \sigma_{n,f}}$	ETA	Eta	Definition : The mean number of fission neutrons emitted per neutron absorbed. Eta is used only for fissionable elements.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
	NU	Nu	Definition : ν, the number of prompt neutrons emitted per fission. Use : Information covered includes ν (the average number of fission neutrons), the probability distribution of ν per individual fission and angular distribution of fission neutrons. Note : Information on neutrons from a given fragment is entered under Frag Neuts = NUF, and on delayed neutrons in general under Delayd Neuts = NUD. Total ν (prompt + delayed) is entered under NU.
	NUD	Delayd Neuts	Definitions : Information on yields, energies, etc., of delayed neutrons from fission
	NUF	Frag Neuts	Definition : Information on neutrons emitted by a given fission fragment. Note : Distribution of ν versus fragment mass is entered under this quantity.
	SFN	Spect Fiss n	Definition : Spectrum of neutrons emitted in fission. Use : For spectra, mean energies, etc. Associated quantities : NU, NUF.
	SFG	Spect Fiss γ	Definition : Spectrum of prompt gamma rays emitted in fission. Do not confuse this quantity with Fiss Prod γ (FPG).

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
	NFY	Fiss Yield	Definition : Yields of fission products or fission fragments. Including : independent cumulative, fractional or chain yields of fission products (identified by Z,A). Including : direct or total mass yields of fission fragments; Including : ternary fission probabilities. Excluding : yield data correlated with kinetic energy or emission angles of fragments or prompt neutrons: see FRS or NUF. Excluding : yield of fragments of a given charge (Z) but unspecified mass; see CHG. Note : Charge dispersions, i.e. (fractional) independent yields for constant A, and charge distributions for constant Z should be entered under NFY and CHG, if the fission products measured are identified by Z and A. Note : Some old NFY entries need correcting to FRS.
	CHG	Frag Charge	Definition : Information on the charge distribution of fission fragments, charge dispersion, most probably charge Zp (A), fractional yields for constant A, etc.
	FRS	Frag Spectra	Definition : The energy or angular distribution of fission fragments, or partial yields correlated with other fragment parameters. Including : kinetic energy dependent fragment data. Excluding : fragment-energy dependent prompt neutron emission, see NUF. Note : Some older data of this type have been coded under NFY.
	FPG	Fiss Prod γ	Definition : Gamma rays from unseparated fission products originating from a given fissioning nucleus. Use : Spectra, mean energies, yields, etc. Note : K, L, H X-rays from fission products are entered here. The quantities 'Fiss Prod r' and 'Specs Fiss r' are not always separable.
	FPB	Fiss Prod β	Definition : Betas from unseparated fission products originating from a given fissioning nucleus. Use : Spectra, mean energies,yields, etc.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	**Aggregate cross-sections**
$\sigma_{nT}(E)$	TOT	Total	Definition : The total neutron cross section oT. Entries are often made for transmission experiments carried out in order to measure resonance parameters; even if such measurements are not analysed to give values for σ_T, entries for TOT should be made; such cases should appear clearly in the comments.
$\sigma_{nNuc}(E)$ $\sigma_{nNuc}(\theta)$ $\sigma_{nNuc}(E;E',\theta)$	NX	Nucl Product	Definition : This quantity refers to tne sum of processes occurring in a given target from which a given nuclide is produced, if these processes are not specified individually. The product nuclide must be given in the "Comments" field, following the author name. Use : For sum cross-sections of reactions in a given target leading to the same product nucleus. At higher energies the target can be a natural element or an isotope; example: Z-S-A ((n,α)+(n,2d)+(n,2n+2p)+...)Z'-S'-A. At lower energies the target must be a natural element; example: the target has isotopes Z-A and Z-(A+2); the reactions Z-A (n,r) and Z-(A+2) (n,2n) both lead to the product nuclide z-(A+l). Both cases: If the partial crosssections leading to the product nuclide are not given, the sum cross section (n,x) is coded as "NX" with the product nuclide specified in the "Comments" field
$\sigma_{nX}(E)$ $\sigma_{nX}(\theta)$ $\sigma_{nX}(E;E',\theta)$ etc...	SNE	Nonelastic	Definition : The sum cross section for all nonelastic processes, $\sigma_{nX} = \sigma_{nT} - \sigma_{n,n} = \sigma_{n,n'} + \sigma_{n,2n} + \sigma_{n,Xn}$ $+ \sigma_{n,f} + \sigma_{n,p} + \sigma_{n,d} + \sigma_{n,\gamma}$
$\sigma_{nA}(E)$	ABS	Absorption	Definition : The absorption cross section, $\sigma_{nA} = \sigma_{nT} - \sigma_{nS}$, i.e. the sum of all partial cross sections except for elastic and inelastic scattering. Use : Do not use if σ_{nA} is equal to $\sigma_{n,\gamma}$ (at low energies for many targets). Note : "Absorption" is frequently given different meanings in the literature, and readers should check that the author's definition corresponds to this one.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
$\int_{E_{min}}^{E_{max}} \frac{\sigma_{n,A}(E)}{E}\, dE$	RIA	Res Int Abs	<u>Definition</u> : The resonance integral for absorption, activation or capture. <u>Use</u> : Should not be used for fissionable nuclei except to represent the sum of RIG + RIF + other contributions <u>Note 1</u> : The energy limits of the integral should be entered under E_{min} and E_{max} <u>Note 2</u> : Charged particle production resonance integrals should be coded under the charged particle reaction and not under RTA.
	RES	Reson Params	<u>Definition</u> :All resonance parameter information. <u>Use</u> : For total width, partial widths (neutron, fission or gamma widths), spins of resonances, level spacings, etc. Enter the <u>target</u> nucleus in Cols.1-5 (not the compound nucleus), the lowest and highest <u>resonance</u> energies covered in the E_{min} , E_{max} columns (not the energy range of experiment). Specify in the comment the parameters covered. The comprehensive scope of RES makes it difficult to compress into the comment all the parameters measured : list only the two or three most important. A list of standard abbreviations for such information in <u>the comment</u> field is given below : WA Alpha width WG Gamma width WF Fission width WN Neutron width WT Total width TBL RESPARS Table of resonance parameters <u>Associated quantities</u> : STF, LDL, TOT, and all resonance integrals.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	
	STF	Strnth Fnctn	Definition : The strength function $\frac{<\Gamma>}{D} = \frac{\Sigma_i \Gamma_i}{\Delta E}$ where Γ_i is the reduced neutron width, D the mean level spacing, and $E = E_{max} - E_{min}$ Use : Show in comment whether the entry refers to S or P wave resonances As with resonance parameters, enter the target nucleus and the highest and lowest resonance energies included. State how many levels are included in the average. Note : This quantity can also be obtained from the values of σ_T in the unresolved region; in this case, enter the corresponding values of E_{min} and E_{max} Associated quantities : RES, LDL, resonance integrals.
	LDL	Lvl Density	Definition : Level density parameters (spin cut-off factor, parameter "a", nuclear temperature); level density obtained from cross sections in unresolved resonance regions should also be entered under this quantity. Use : Code entries under the nucleus for which the level density is given NOT the target nucleus. Note : For the quantity LDL the incident neutron energy is meaningless. In this case a slash "/" may be entered in column 19 of the E_{min} field

Reaction (Goldstein notation)	Code	Expansion in CINDA book	**Gamma induced reactions**
$\sigma_{\gamma,n}(E_\gamma)$	GN	(γ,n)	Definition : Information on (γ,n) reactions. Use : Restricted to Er <15 MeV. Note : Contrary to normal practice for inverse reactions, the gamma energy should be entered in the ENERGY field
	GF	Photo-Fissn	Definition : Information on gamma (E_γ < 15 MeV) induced fission. Use : Cross section, yields and of neutrons and fragments, spectra etc. Note : The fissioning nucleus is the same as the target nucleus. To avoid confusion, articles on this subject are entered only under GF, even if they contain information about fission yields, etc.

Reaction (Goldstein notation)	Code	Expansion in CINDA book	**Special quantities**
	EVL	Evaluation	Definition : A complete and consistent set of cross sections in some energy ranges. Use : Only for complete sets, of evaluated data : a separate entry may be prepared for each quantity given in the evaluation. Note : An "evaluation" can be distinguished either by use of the worktype 'D' with a normal quantity code. For example, a "best value" derived from comparing different ν measurements would be entered under "NU" only, with "D" in column 18. The quantity 'EVL' implies that a (near) complete set of cross sections has been evaluated.
	TSL	Thermal Scat	Definition : Information on the energy and angular dependence of the elastic and inelastic scattering of slow neutrons from molecules in gases, liquids, crystals, etc., especially as expressed in the Egelstaff S(α,β) formalism. Use : This quantity should only be used when the nuclear environment influences neutron scattering. When nuclear scattering is distinguished from effects of the environment the quantity codes SEL, DEL, or SCT should be used. Coherent scattering amplitudes of compounds and bound atoms should be coded under TSL. Neutron diffraction measurements are not usually coded in CINDA, unless nuclear scattering information is given.

3 - LABORATORY

Format

Columns 9 - 11 Two- or three-character code for laboratory where the measurement was performed. Left adjusted.

Some exceptions can be made to this general rule at the discretion of the coder, e.g. :

1. Work done by an itinerant group using facilities of another institution can be coded under the 'home' laboratory of the group. This allows the work to be blocked with other references, lab. reports, etc., of the same work originating at the 'home' laboratory.

2. If no address is given for the work, the country code may be used.

3. If two addresses are given, choose the laboratory where the work was done, or if this is not specified, the address of the first author.

4. If no code exists, write the full name of the laboratory on the entry sheet, so that a new code may be created by the CINDA Centre.

New laboratory codes should only be introduced (by CINDA centres), if the work is relevant for EXFOR, and if more EXFOR relevant work is to be expected from this laboratory. No new codes should be introduced for institutes publishing only theoretical work. In such cases the country code can be entered instead.

Note :
Sometimes separate codes exist for administratively different laboratories on the same site.

Example : GEL - BCMN Geel
DGE - Euratom Dosimetry Group, Geel.

4 - BLOCK NUMBER

Format

Columns 12 -14 A three digit number identifying particular work within the target, quantity, lab. specification.

Coding rules

This field should be left blank by Readers. Block numbers may only be assigned to entries by the CINDA Centres.

Each CINDA Centre will assign block numbers within a different range for work done in laboratories within their geographical service area.

Coding rules for groups of new entries to be blocked together submitted by external readers are given on page II.6.2.

NDS Block number assignment

New block numbers start with "4", followed by the last 2 digits of the approximate year of measurement for experiments, or the last 2 digits of the year of publication minus 70 for other work. If a block number calculated this way is already in use for a given Z-A-Q-LAB combination, the closest free blork number is used.

If an entire block is deleted the block number can be reassigned.

NEA-DB block number assignment

Block numbers are assigned by the loading program in an increasing order. For a new Z-A-Q-LAB combination the program always gives 150 as block number. For the next record with the same Z-A-Q-LAB combination but from a different experiment, the assigned block number would be 151. If an entire block is deleted, the block number cannot be reassigned.

NNDC block number assignment

Block numbers are assigned manually, usually 7 followed by 2 digits of year of first reference entered for the block.

CJD block number assignment

Block numbers are specified by readers only in CJD. New block numbers start with "4", followed by the last 2 digits of the year of measurement (or publication) minus "1" for experiments, or the last 2 digits of the year of publication minus "70" for other work. If a block number is already in use for a given Z-A-Q-LAB combination, the closest free block number is used.

5 - READER CODE

Format

Column 15 An alphabetic or numeric code identifying the reader, or group of readers preparing CINDA entries

LIST OF NEA-DB READER CODES

Code	Reader	Country
`5'	H. Bruneder	Austria
'B'	F. Poortmans	Belgium
'6'	F. Hojerup	Denmark
'E'	C. Bastian	Euratom
'F'	F. Vasastjerna	Finland
'Y'	O. Bersillon	France
'Z'	H. Behrens	Germany
'4'	A. Ventura	Italy
'N'	T. Nakagawa	Japan
	S. Chiba	
	Y. Kawarasaki	
	M. Kawai	
	H. Kitazawa	
	R. Nakasima	
	M. Sakamoto	
'('	H.A.J. Van der Kamp	Netherlands
'3'	I.L. Nitteberg	Norway
'L'	F. Manero	Spain
'9'	E. Rams trom	Sweden
'S'	K. Junker	Switzerland
'W'	M.F. James	United Kingdom
	J.S. Story	
	M. Moxon	

Notes for Readers within CINDA Centres

In order to save space within the disc files, very little explicit "history" information is carried in the CINDA records. However it may be important to separate entries made at the centres as a result of scanning new literature, and changes or other entries made in the course of file maintenance operations.

The following symbols are used in the different centres:

TYPE OF CINDA OPERATION	NEA-DB	CJD	NDS	NNDC
Coverage of new literature	2 or 7 or 8	Letter O	$	+ or &
Corrections/blocking/ deleting existing entries	2 or 7 or 8		Zero 0	+ or &
Automatic or semi-automatic generation of entries	?			

6 - OPERATION CODE

Format

Column 16 — An alphabetic code to indicate which operation is required for each entry.

Coding rules

The available operations are : -

'A' = Add a new entry

'B' = Block a new entry with existing entries in CINDA (specified by ZA, Q, LAB, Block number).

Leave blank for entries with LAB codes in areas outside that of your own centre's responsibility. (To facilitate blocking by the appropriate centre).

For use by Readers within CINDA centres only

'D' Delete an entry (specified by LAB, ZA, Q, Block number, serial number)

'M' Modify any of those fields in an entry lying between columns 15-80 on the entry form (entry to be changed specified as for deletion)

'K' Kill a whole block (specified by LAB, ZA, Q Block number, serial number of one entry in the block)

'L' Link block X to block Y (specified by LAB, ZA, Q common to the two blocks, Block numbers of X and Y and the serial number of one entry in each). Block X will be killed, and copies of the entries in it added to block Y with new serial numbers.

Readers outside the CINDA centres should leave a blank or use only the operations 'A' or 'B'. If a reader feels that a particular entry should be deleted or corrected, or that two blocks should be LINKed, he should enclose a note asking for this when he sends in his next batch of entries.

Operation 'A'

This code is used to add a new entry or group of entries as a new block in CINDA.

The block number (columns 12 - 14) should be left blank by external readers. Readers in CINDA Centres may specify block numbers with defined ranges (see Section II.4).

For groups of new entries intended to be blocked together in CINDA, outside readers should use operation 'A', and the code 'B02'

'B03',...'BOn', etc., in columns 12 - 14 for 2, 3 and n entries respectively, when submitting entries for two or more references which they know to refer to the same work; these entries must be grouped together, but entries for different blocks with the same Z, A, Q and LAB should be entered separately.

Example

Inelastic gammas from scattering in O-16, measurement by Lundberg et al. Suppose the reader had only known of the journal publication of this work in Physica Scripta, then he would enter the information :

O   O16   DNG   FOA   B01

or blank with reference PS 2 273, operation 'A'. However, if he does know that this article has already circulated as a laboratory report, he would submit two grouped entries, of the form:

O   O16   DNG   FOA   B02,   reference PS 2 273, operation A
O   O16   DNG   FOA   B02,   reference F0A4-D4171-22, operation A.

Operation 'B'

Entries are being added to an existing block, known to exist in the CINDA master file. Enter the reader code in column 15, 'B' in column 16.

- If the block number is known, enter it in columns 12 - 14. Before using this operation, readers must be fully certain (by personal knowledge of the work, or by checking the earlier references given in the block) that the new entry does belong with the block to which it is being added. Wrong attribution of two different references as belonging to the same experimental block is almost undetectable without reading the two articles concerned.

- If the block number is not known, but a corresponding block does exist, external readers ONLY may leave columns 12 - 14 blank, but must indicate one or more of the references in this block in the margin of the coding sheet sent in to their CINDA centre.

Operation 'D' (CINDA Centres only)

A deletion command must specify the 'KEY' of the entry, the reader symbol of the person making the deletion, operation 'D' and the serial number. The KEY may seem to be redundant (the entry could logically be specified by its serial number only) but in the case of a typing error the operation will be rejected automatically, instead of deleting the wrong entry.

Format for deletion of entries

Columns 1 - 5	Z and A, or compound code	KEY
6 - 8	Quantity code	KEY
9 - 11	Laboratory code	KEY
12 - 14	Block number	
15	Symbol of reader making the deletion	
16	Operation code 'D'	
19 - 26	Serial number, with leading zeros, in the form '00576928'	

Operation 'K' (CINDA Centres only)

Format for deletion of blocks

Columns 1 - 14	Block KEY (Z, A, Q, LAB, Block No. as above)
15	Reader symbol
16	Operation code 'K'
19 - 26	Serial No. of first entry in the block. Another serial number from the block may be used, but if so a warning message will be printed after the CINDA update
28 -31	'KILL'

All entries with that block key will be deleted.

Operation 'L' (CINDA Centres only)

The block number assigned to a particular CINDA entry can be changed only by deletion of the entry, followed by addition of a similar entry with the new block number. It is possible to save the reader from the need to transcribe a number of entries in order to carry out this operation, if the necessary "dummy" operations on individual entries are generated by the input program.

The result of the LINK operation is to merge block X into block Y. Block X disappears (is 'KILLED') and copies of the entries within it are added to block Y, by a succession of operations 'B' on these individual copy entries. If block X contains any entry with hierarchy '1' = 'Main', this value will be set to '2' in Y.

Format for Linking Two Blocks

Columns l - ll	Z, A, Q, LAB common to both blocks
12 - 14	Block No. of X (block to be deleted)
15 - 16	Reader symbol, code 'L' for 'LINK'
19 - 26	Serial No. of the first entry in block X
28 - 31	The word 'LINK'
42 - 44	Block No. of Y (block to be enlarged) in the Reference 'DATA' field
73 - 80	Serial No. of the first entry in block Y

Interference between 'K' and 'L' and operations on individual entries

Obviously, no other operations are possible for blocks that are killed or entries that are deleted. However, it may be desirable to modify and/or delete entries within blocks which are to be linked. Since KILL and LINK operations are not exchanged between CINDA centres, the centres themselves have to provide computer programs to ensure that forbidden combinations of operation codes are detected and possible combinations are executed successfully.

NDS Solution :

In case of the combination of operation K or D with any other operation code on the same block or entry the master file update program in CHECK-mode will give an error message.

In case of a LINK operation, deletions, modifications or additions of entries to the old blocks can be done before the LINK operation, or to the new (combined) block after the link operation. Any D, M, or B operation on entries of the killed block after the LINK operation will cause an error message. Any such operations on the old block, which is retained after the LINK operation, are effectively identical to those on the new (combined) block, as the serial numbers are retained.

Operation 'M' (CINDA Centres only)

Unless a mistake has been made in LAB, ZAQ or in assigning a given entry to a particular pre-existing block, or a paper has been withdrawn by the author, there is normally no need to delete entries. Most changes should be made by modifying the existing entries.

Any or all of the following parameters may be changed in a simple operation without deleting the entry (detailed rules are given further below):

Hierarchy	(subject to restrictions on the use of Hierarchy Codes 'D' and 'M');
Worktype	
Energy	(both E_{min} and E_{max} must be entered);
Reference and Publication Date	(the whole reference, including the ref. Date, must be entered together from columns 27-44 on the entry form);
Comments	(a whole new comment must be entered).

Of course the modifications made to any of these parameters must follow the same rules and conventions as for new entries.

Format for modification entries

Columns 1-14	ZA or compound, Quantity, Lab code, Block number of the entry to be changed;
15	Symbol of reader making the change;
16	Operation code 'M';
19-26 or 73-80	The serial number of the entry is written with leading zeros in columns 19-26, or in columns 73-80 if the energy is to be changed.

These parameters must be present in a modification entry. Columns 1-14 must be identical to the original entry which is to be modified.

Rules for Modification Operations

1. With some important exceptions, the new form of any parameter to be modified is written in the same field and in the same way as for new entries.

2. Where a parameter is not to be changed, the corresponding field on the entry form must remain blank.

3. Where ambiguity could arise, any part of a field, which is to be modified to blanks, should be indicated by underscores (_).

4. The whole of a field must be modified: e.g. a wrong page number cannot be corrected without entering the correct version of the reference in full.

Changes to individual parameters

Column 17: Hierarchy

Either the new hierarchy code or the internal numeric equivalent may be written in, with the following exceptions:

- Data index entries (hierachy 'D' = 6) may not be assigned another hierarchy, nor may any other entry be assigned hierarchy 'D'.

- An entry with hierarchy '1' = 'Main' may not be assigned a different hierarchy.

Column 18: Worktype

An existing worktype may be changed to any of the other permitted codes.

Columns 19-26: Energy

The NEA-DB input program tests Emin and Emax together : both values must be entered in the energy field even if only one of them is changed. Any blanks in the field must be filled with underscore characters (_). Modifications to the energy will be rejected if the energy field contains blank spaces.

Note : If the energy is to be modified, the serial number of the entry is written in columns 73-80. If the energy is not modified, the serial number is written in the energy field, columns 19-26.

Rules for Modification Operations (cont/d)

Columns 27-44: Reference + Refdate

The revised reference, with reference type, is entered as for a new entry (but if the month is not known, enter an underscore ( ) in column 42).

Columns 45-80: Comment

The revised comment is entered as for a new entry. However, there is no need to fill in blanks with underscore characters. There are two minor points limiting revised comments:

a) If the energy as well as the comment is being modified then columns 73-80 are taken up by the serial number. These columns are reset to blank by the input program but eight characters of comment space is lost. Alternatively, two successive modifier entries can be made, one changing the energy, the other one the comment.

b) For revised comments to entries where no author name is entered, readers must enter a stop (.) in column 45. This is because the input program cannot discover that the modifier entry refers to a data index line for which no author name is needed.

7 - HIERARCHY CODE

Format

Column 17 An alphabetic or numeric code.

The hierarchy code governs the order in which entries in a block are printed in the CINDA book, and is used to some extent as a measure of the importance of a particular reference. Entries are printed within a block in order of hierarchy ('Main' first). For entries with the same hierarchy, the more recent publications are listed first.

The internal value of the hierarchy goes from 1 to 6, and the input program accepts either this number or a mnemonic code. External readers should in general use only hierarchy 'blank', or 'N'.

Hierarchy codes

(blank) 'unspecified', internal sorting value '3'. Hierarchy should be left blank by readers unless there is a good reason to do otherwise

'M' = 'main publication', internal sorting value '1'. This hierarchy should only be assigned to a publication known to be the definitive publication. In most cases there is no need to assign this value to the hierarchy since the most recent publication, which will normally appear first in a printout, is usually the most important.

Where the internal sorting value '1' has already once been assigned within a particular block, any later entries with hierarchy 'M' will receive the sorting value '2'.

'T' = 'translation', internal sorting value '4'. This value is necessary in order to prevent translation entries, which are published after the original article, from appearing at the head of printed blocks in the CINDA book.

Hierarchy codes (cont/d)

'N' = 'No Book Flag'. Entries should be given hierarchy 5 when the article contains an incomplete account of the work (Abstracts, some progress reports) and does not give any numerical or graphical data which is not available from another source.

An entry with hierarchy 5 is only included in CINDA publications if it is an unblocked single line, or blocked together with one or more data index entries; or if a block consists only of hierarchy 5 and 6 entries, then the hierarchy 5 entry with the most recent publication date is included. Readers should assign no-book flags whenever appropriate, as this helps to slow down the growth of CINDA accumulations.

'D' = 'data index entry'. Such entries are made by data centres to give more precise information about the numerical and evaluated data they are able to supply on request; especially data exchanged between centres in EXFOR format, and standard evaluated files. Internal value '6'. Because file names and accession numbers have a special structure, the format of the reference field is specialised; hierarchy 6 may not be modified to another value, nor may an existing entry have its hierarchy changed to 6.

8 - WORKTYPE

Format

Column 18 Alphabetic code to identify the type of work coded.

Code	Expansion in CINDA book	
E	Expt	Experimental measurement
T	Theo	Theoretical work. or calculation based on theory (as distinct from some evaluations in which models are used for interpolation between experimental points).
M	ExTh	Experimental measurement plus theoretical work extensive enough to have merited publication on its own (a comparison of an elastic angular distribution with an optical model calculation is not regarded as fulfilling this criterion).
C	Comp	Compilation of experimental (or theoretical) data.
D	Eval	Evaluation (critical examination of data) eventually producing a "best" or "recommended" value or set of values, even if only a single quantity is covered. Where an evaluation covers a complete set of cross-sections (cross checked for consistency) in some energy range, a further global entry (Quantity EVL, worktype D) should be made for the target referred to.
R	Revw	Review (summary of experimental or theoretical information). More biased towards comparison of experiment and theory than either 'Comp' or 'Eval', but such references may be of interest as containing data which could be fitted into one of these categories.

'Data' tags

The '+' signs in the right-hand margins of the CINDA book show that numerical data corresponding to that reference is on file in one of the regional data centres; the bulk of these data tags were added to the file in a semi-automatic comparison of CINDA with the CCDN[*] NEUDADA file in 1969. However, since mid-1970 experimental data has been exchanged between centres in EXFOR, and the function of these tags is filled for the newer data by 'data index entries'.

Therefore, data tags were removed from the file and are now created only at the time of book production: a data tag is added to the first line of a block which contains a line with reference type 3 or 4. In this way, data tags are suppressed for reference type 0 (zero) entries.

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[*] Nuclear Data Compilation Centre, Saclay, amalgamated in 1978 with the Computer Program Library, Ispra, to form the NEA-Data Bank.

9 - NEUTRON ENERGY

Format

Columns 19-26 Minimum (columns 19-22: "E-MIN" field) and maximum (columns 23-26: "E-MAX" field) neutron energy in electron volt.

Numerical values in floating point form : mantissa n.m., exponent + x. The decimal point is included implicitly between columns 19 and 20 (minimum), and 23 and 24 (maximum energy). Enter only the sign of the exponent in columns 21 and 25. If the exponent is zero, use the '+' sign.

Alphabetic codes are also used to describe quantities averaged over typical neutron spectra.

A blank E-MIN field is forbidden.

Coding Rules

a) General rule for numerical values

Both minimum and maximum incident neutron energies should be given, where E-MIN<E-MAX must always be observed. If the incident neutrons are monochromatic, enter the energy in the minimum energy field only.

Examples of coding :

Energy	Code
34 keV	34+4
0.025 eV (2200 m/s)	25-2
14 MeV	14+7

b) Negative resonance energies

Column 19 contains a negative sign. The decimal point is unchanged between columns 19 and 20. A single digit value is entered in column 20 with exponent in columns 21 and 22.

-3 eV (-0.3 x 101 eV) is coded as -3+1

c) <u>Approximate values</u>

If only approximate order of magnitude energies are given, the mantissa fields can be left blank (columns 19, 20, 23, 24) and only the exponents entered.

For example, "in the keV range" should be coded

```
|19|20|21|22|23|24|25|26|
|  |  | +| 3|  |  | +| 5|
```

In the minimum energy field such "exponent only" entries have an energy sorting value of 1.0 x 10^n and in the maximum energy field 9.9 x 10^n.

d) Upper limit only given

The minimum energy field should not be left blank. The appropriate minimum energy deduced from the context of the work should be entered. If this is zero the code for zero energy in the minimum energy field is 00+0. Such a zero limit is appropriate in a limited number of cases:

– theoretical calculations with a zero lower energy limit.

– integrations of experimental or theoretical quantities.

– quantities implying integration or aggregation between the limits zero and E-MAX (e.g. strength function, elastic scattering expressed as a scattering amplitude). While it is clear that most measurements cannot be carried to zero energy, the assumption made in aggregation of the results is that values below the limit of measurement will not affect the result.

d) Separated Energy Ranges

If an article covers two or more distinct energy ranges with separate discussions of the deduced quantities, separate entries should be made for CINDA.

For example, a measurement at thermal energy and a separate measurement between 5 keV and 400 keV should be entered twice with energy codes:

Energy	Code
0.025 eV (thermal)	25-2
5 keV to 400 keV	50+3 40+5

This philosophy should not be taken to the extreme to make separate entries for each of a range of monochromatic incident neutron energies.

e) No information given

The alphabetic code NDG (columns 19-21) should be used only if it is impossible to give even an order of magnitude estimate of the neutron energy range.

For the quantity LDL, for which an incident neutron energy is meaningless, a slash "/" may be entered in column 19 of the E-MIN field.

f) Useful formulae

$$E_{eV} = 0.5 \text{ x } 1012(V \text{ cm/s})^2$$

$$EeV = 81.8 \text{ x } 10\text{-}3/(\lambda/A)^2$$

$$2200 \text{ m/s} = 0.025 \text{ eV} = 1.8 \text{ A}$$

For Inverse Reactions

$$E_n = E_a + Q - ((M_B - M_A)/M_B)E_a$$

where the reaction is A(a,n)B

E_a is the energy of a in the laboratory frame
M_A,M_B are the masses of A and B
Q is the Q value for aA $\rightarrow$ Bn

g) Alphabetic Energy Codes for Spectrum Averages

These codes are intended to describe quantities averaged over typical neutron spectra. They may occasionally be combined with numerical codes or with other alphabetic codes to indicate that both values are given. For instance, a code MAXW 25-2 should be used when both a maxwellian spectrum average and a value for monochromatic neutrons are given.

Code (left adjusted)	Expansion in CINDA Book	Description
COLD	Cold	Subthermal neutron spectrum
MAXW	Maxwl	Maxwellian neutron spectrum at a temperature of 293°K or reactor temperature
PILE	Pile	A reactor spectrum with a non-Maxwellian energy distribution.
FAST	Fast	A Fast-reactor spectrum
FISS	Fiss	An unmoderated fission neutron spectrum

Non spectrum codes

NDG	None	No data given
SPON	Spont	Spontaneous fission (use only for quantities NU, NUD, NUF, SFN, SFG, FPG, FPB, NFY, FRS, CHG)
TR	Thrsh	Threshold Energy (if possible a numerical value should be given instead), together with a numerical value for E-MAX, or :
TR UP	Thrsh up	if no upper limit is specified above the threshold (if possible, a numerical limit should be given or estimated). Note: 'TR' is placed in columns 19-20 of the E-MIN field and 'UP' in columns 23-24 of the E-MAX field.

For other neutron spectra, when none of the alphabetic codes applies, a numeric energy value is entered corresponding to the kT value of the spectrum, with an explanation in the free text (e.g. MAXW, KT=30KEV). Such entries should, however, not be combined with or blocked to entries for mono-energetic neutrons.

Energy equivalence for sorting

For internal sorting processes, the alphabetic energy codes are assigned numerical energy equivalents:

SPON	zero
COLD	0.001 eV
MAXW	0.025 eV
PILE	0.05 eV
FAST	0.5 MeV
FISS	1 MeV
TR	0.5 MeV → 5 MeV
TR UP	0.5 MeV → 10 MeV

h) Combination of codes

Combination of alphabetic codes

Any combination of alphabetic codes is permitted as long as E-MIN<E-MAX is observed, with the following exceptions:

"NDG" must be entered in the E-MIN field and should not be combined with any other code.

"TR" must be entered in the E-MIN field and can only be combined with a numeric code or "UP" (no blank!) in the E-MAX field.

Combinations of alphabetic with numeric codes

Any combination of alphabetic with numeric codes is permitted as long as E-MIN<=E-MAX is observed, with the following restriction:

If E-MIN=E-MAX, then the alphabetic code has to be entered in the E-MIN field.

If in a paper both a spectrum average, as well as a range of monochromatic neutron values are given, two separate entries should be made

Examples of combinations of codes

MAXW25-2	Maxwl 2.5-2	Maxwellian spectrum and 0.025 eV monochromatic neutrons
MAXW PILE	Maxwl Pile	
MAXW FISS	Maxwl Fiss	Both indicated spectrum averages
MAXW FAST	Maxwl Fast	are given
SPON MAXW	Spont Maxwl	

10 - REFERENCE

Format

Column 27	Reference type	-	Alphabetic code
Columns 28-41	Reference code	-	An alphabetic key followed by numerical values for volume No., issue No. and page No., or report No.
Columns 42-44	Reference date	-	Month (1-0 (Zero = 0ctober), N = November, D = December) Year (e.g. :November 1986=N86)

Coding Rules

1. Reference Type

Code	Expansion	
J	Jour	Journal
*	Abst	Abstract in journal or conference
C	Conf	Conference published proceedings or separate papers
S	Conf	Conference proceedings published as a laboratory report
R	Rept	Laboratory report
P	Prog	Progress report, usually contains short notes on many different projects
B	Book	Book. Rarely used
T	Diss	Thesis
W	Priv	Private Communication
(zero)0	Data	EXFOR entry exists but numerical data are not (yet) available, or superseded
4	Data	Numerical data exchanged in EXFOR format
3	Data	Other tape files available (at present, only evaluations)

Journals

Enter Reference Type J followed by an alphabetic code limited to a maximum of four characters, left adjusted, in columns 28-31. All codes are given in EXFOR dictionary 5.

Many journals have now split into sections, according to subject, which are denoted by series letters. The general form for these journal abbreviations is 'PL/A', 'PR/B', 'NP/A', etc., corresponding to EXFOR practice. The very few EXFOR journal codes with more than four characters will be compressed (e.g. JNE/A becomes JNEA for CINDA).

Volume number should be entered as a numerical value in columns 32-35, right adjusted.

Issue number, columns 36-37, should be left blank except for the journals where pages are not numbered consecutively throughout each volume.

Page number, columns 38-41, should always be numbers, right adjusted.

Abstracts

The reference type '*' implies that the publication referred to does not include a full account of the work.

a) This reference type applies particularly to some abstract journals, BAPS, DA or DA/B, ANS PA, NSA and BSI. Further journals may be added to this list when necessary.

b) This reference type should also be used when the information is obtained from abstracts of papers given at a national physical society or other meeting or conference. If papers are printed in full, use reference type 'J'. Abstracts often appear in PR, HPA and NAT. The * code should be used for conferences, when the material available in the document cited is an abstract only. The source abbreviation for the conference itself should be used so as to avoid confusion when the 'Abstract' entries are later replaced as the full versions of papers are made available.

Reference type '*' should not be used in conjunction with report codes: in practice abstracts found in laboratory reports refer either to work in progress at that laboratory or group of laboratories (reference type 'P') or to a conference held at that laboratory, when reference type 'S' should be used.

The reference codes are the same as for journals. For BAP the abstract number may be entered in parentheses in the comment field, after the author's name.

Conference Proceedings

Usually, preliminary CINDA entries are made from papers ("pre-prints") available at the conference; these will be replaced with final entries as soon as the proceedings are published. For the coding, the following cases must be distinguished:

Pre-print entries:

Usually: Reference type 'C' with conference code and paper numbers as described below. If the pre-print carries a report code, use reference type 'R' with the report code and number.

Proceedings:

Usually: Reference type 'C' with conference code and page number as described below. If the proceedings carry a report code, use reference type 'S' with the report code and number.

1) Reference type C

For valid conference codes see EXFOR dictionary 7. The codes consist of 2 digits for the year of the conference plus up to 6 letters for the location. If a code in the dictionary is longer than 8 characters, it is truncated in CINDA to the first 8 characters.

For "new" conferences CINDA indexers are invited to propose a new code.

Note that the conference codes as given in the CINDA book must not be used in CINDA entries. The book editing program creates expansions that differ from the codes used for CINDA entries and in the CINDA computer file.

Format

Columns 28-35 Conference code

for pre-prints:

Column 36	# (sign indicating that the following is a paper number and not a page)	or blank if paper number is not available
Columns 37-41	Paper number, right adjusted	

for proceedings:

Columns 36-37 Volume number, right adjusted, or blank, if only 1 volume

Columns 38-41 Page number, right adjusted in both cases :

Columns 42-44 Date of Conference (coded as for journals)
(Note that for proceedings the date of the conference is entered and not the date of issue of the proceedings.)

2) Reference type S

If the conference proceedings are to be entered with a report code, reference type 'S' (not 'R') should be used, but otherwise the reference should be coded in exactly the same format as other reports in the same series. The date given in columns 42-44 should be that of the report.

Sometimes conference pre-prints are assigned laboratory report numbers (this is the case for many contributions from Karlsruhe, which are numbered in the KFK-series). Entries should be made for both the conference paper number and the report (but with reference type 'R'!) where one of them should have the comment 'SAME AS...'.

Laboratory Reports

1. Reference type P	Progress reports - usually abstracts of work done, and brief reports of work in progress and planned
2. Reference type R	Laboratory reports giving a full account of completed work or a detailed description of a method
3. Reference type S	Conference proceedings published in a laboratory report series - compare page II.10.4

Format

Columns 28-41

Left adjusted the report code according to EXFOR Dictionary 6, including the hyphen, followed by the report number. If sufficient space is available, a page number may be entered, right adjusted, separated by at least one space from the report number.

Note: In the case of short report codes, the report number must not start before col 32.

Example : AE-123 (wrong)
AE- 123 (correct)

The coding of reports should be the same as that printed on the cover or as close as space for coding permits. However, distribution and other insignificant codes following the report number should be omitted.

Columns 42-44 Date of publication as for journals.

Private Communications

Reference type W

This reference type covers information not yet circulated in any official manner. Common examples are:

a) Unpublished data sent to data centres

b) Pre-prints of articles not numbered as lab. reports

c) Information sent to readers about work in progress or preliminary results

Format

Columns 28-41		Name of the author of the communication left adjusted
	or	
		A journal code followed by 'TO BE PUBL' in columns 32-41

Books

Reference type B

An abbreviated code is assigned to each book, up to 10 characters long and preferably unique in the first four characters. This is entered left adjusted in columns 28-37 and followed by the page number, right adjusted.

Columns 42-44	Publication date

If work by other authors, cited in the book, is indexed, then the laboratory and author names entered (Lab. in columns 9-11, author at the beginning of the comment field) should be those of the people who did the work.

Theses and Dissertations

Reference type T

Columns 29-37	Name of the author or report code under which the thesis is published
Columns 38-41	Page number appropriate to each ZAQ entry
Columns 42-44	Date of publication or date of submission of thesis

CINDA Centres only:

DATA INDEX REFERENCES

These entries serve two purposes: for CINDA users, they are intended to replace the data indices previously published separately by the centres, while within CINDA itself they carry the computer-readable information which constitutes its links to the numerical data files.

Most data index entries are made semi-automatically within the CINDA centres.

1. EXFOR, reference types 4 and 0 (zero)

Format

Column 27	'4' = Data exchanged in EXFOR '0' = (a) Data not available (b) (Sub)entry superseded or with drawn (c) EXFOR entry in preparation (optional)
Columns 28-32	'EXFOR'
Columns 33-37	Work number. 5 numeric digits.
Column 38	Period (full-stop) '.'
Columns 39-41	Sub-work number. Three numeric digits or blank. Blank implies that more than one sub-work number corresponds to that block.
Columns 42-44	Date of coding, or last revision of data, or the date on which the EXFOR tape was transmitted. It is less important to define the date precisely.

For a 'null' EXFOR entry, no data tag appears in the book and therefore an appropriate comment like 'no data available', ' superseded', 'in preparation' should be coded.

Evaluated data files

Reference type 3

Index entries corresponding to data available on tape in a standard format other than EXFOR. Parts of some evaluated data files are sets which are available only for limited distribution: only those data freely available should be indexed in CINDA under reference type '3'

Format

Columns 28-onwards:	Adopted file name with the first four 'key' characters being unique, followed by a version number and/or the data set identifier (coding similar to reports).

For files in the UK format (UKNDL-, BENZI-, AUSTR-) the format is 'UKNDL-DFN' in columns 28-36, followed by the DFN-number right adjusted in columns 37-40, and the version letter ('A', 'B', etc.) in Column 41. (Enter a stop '.' in column 41 if no version letter is assigned).

The VIEN-V file is coded as EXFOR. For other files, no special rules are presently required but will be added as the need arises.

Columns 42-44	Date of release or last revision of data file

Reference types '0', '1', '2' or other numerals

The use of reference type '0' was adopted at the Technical NRDC meeting, 19-21 September 1984. The use of '2', '1', or other numeral types >4 is not yet decided upon. They are reserved for further types of data link information, which may or may not appear in the CINDA book.

11 - AUTHOR NAME AND COMMENTS

Format

Columns 45-80

Author name terminated by a full stop '.' (single author) or a plus sign '+' (multiple authors)

Author names are not required for data index lines (hierarchy 6, numeric reference type).
If no author exists for any other line, enter '.' in column 45

The author name (if any) is followed by additional, abbreviated information about the work

Author flag

A non blank author flag is generated for every line with hierarchy other than 6, where the author delimiter appears in column 46-80.

Character set

Comments may only contain the following characters :

Upper case alphabetic A to Z
Numeric 0 to 9
Blank
Special characters + - .) (* / = ' , % < > : ; ! ? &

Transliteration of the Russian Alphabet

The following conventional transliterations have been adopted for CINDA. These conversions are similar to the ISO-scheme, but with some modifications for a computer character set:

Russian		English			Russian		English	
Upper	Lower	Upper	Lower		Upper	Lower	Upper	Lower
А	а	A	a		Р	р	R	r
Б	б	B	b		С	с	S	s
В	в	V	v		Т	т	T	t
Г	г	G	g		У	у	U	u
Д	д	D	d		Ф	ф	F	f
Е	е	E	e		Х	х	KH	kh
Ё	е	E	e		Ц	ц	TS	ts
Ж	ж	ZH	zh		Ч	ч	CH	ch
З	з	Z	z		Ш	ш	SH	sh

Russian		English			Russian		English	
Upper	Lower	Upper	Lower		Upper	Lower	Upper	Lower
И	и	I	i		Щ	щ	SHCH	shch
Й	й	Y	y		Ъ	Ъ	- *	- *
К	к	K	k		Ы	ы	Y	y
Л	л	L	l		Ь	Ь	- **	- **
М	м	M	m		Э	э	E	e
Н	н	N	n		Ю	ю	YU	yu
О	о	O	o		Я	я	YA	ya
П	п	P	p					

Notes:
* Denotes "hard" pronunciation, but does not denote a letter
** Denotes "soft" pronunciation, but does not denote a letter

See 1987 NRDC Meeting, INDC(NDS)-204, Page 44, No. 4.1 where a discussion on the correct transliteration to be used is noted.

Comments

Because of the limited space for free form comments only one or two important features of the work can be clearly indicated. The comment should not be considered as an 'abstract'. However, some important information supplementing the coded information must be given where appropriate, immediately after the author's name:

For the information derived from inverse reactions: INV or INVERSE;

Chemical compounds as targets: enter the formula or a more exact name;

The product nuclide, if the reaction quantity is 'NX' = 'nuclide production';

Further information on the reference (e.g.: ABST ONLY), especially if the information in coded form would exceed the reference field (e.g.: page no. or paper no. for reports).

Guide to recommended abbreviations

1. The status of the work

TBD	To be done
TBC	To be completed
TBP	To be published
ABST	Abstract
FP (ref code)	Submitted for publication in that form

2. The form of data given

NDG	No data given
GRPH(S)	Graph(s)
TBL	Table
CURV	Curve
PRELIM	Preliminary data
SUPSDD	Superseded

3. Experimental Method

LINAC	Electron linear accelerator
VDG	Van der graaff
REAC	Reactor
PILE OSC	Pile oscillator
C-W	Cockcroft-Walton
SCIN	Scintillator
SPEC(T)	Spectrometer
HASS-SPEC	Mass spectrometer
CRYSTSPEC	Crystal spectrometer
M-R DET	Moxon-Rae detector
GELI	Germanium (lithium drifted) detector
TOF	Time-of-flight
TRANS	Transmission
SCAT	Scattering
ACT	Activation

4. Theoretical treatment

ANAL(YS)	Analysis
CALC	Calculation
C-C	Coupled Channel
H-F	Hauser-Feshbach
K-N	Krieger-Nelkin
P-B	Perey-Buck
P-T	Porter-Thomas
STRUT	Strutinsky
OPTMDL	Optical model
STATHDL	Statistical model
COMPNUC	Compound nucleus
RESIDNUC	Residual nucleus
TH(EO)	Theory, theoretical

5. Further specification of reaction quantity

The coded quantity specifications in CINDA are broad, and frequently further specification is useful in the comment field. A list of some recommended abbreviations is given below.

General

EN	Neutron energy
EG	Gamma ray energy
ELAS	Elastic
INEL	Inelastic
SIG	Cross section, sigma (do not use 'CS')
ABSOL	Absolute
REL TO	Relative to
CFD	Compared with

Particle emission

ANG	Angle
ANGDIST	Angular distribution
ISOTR	Isotropic
LEG COEF	Legendre coefficients
E´	Secondary energy
A, ALF	Alpha (particle)
D	Deuteron
N	Neutron
P	Proton
G, GAM	Gamma (ray)

Final state

EXCIT	Excitation
LVL	Level
META	Metastable
GND	Ground State
ISOM	Isomeric State
T1/2, HL	Half-life

Resonance parameters

RESPARS	Resonance parameters
J	Spin
L	Orbital angular momentum
WT(OT)	Total width
WN	Neutron width
WG	Gamma width
WF	Fission width
WA(LF)	Alpha width

Comments for superseded references and translations

The block structure in CINDA is intended to show which references refer to the same work, and through the comments, some indications of the status of each reference. When older references are added to an existing block, or old entries are revised the following guidelines should be followed.

1. Repetitions of the same author name are omitted in the CINDA printing process, so the author may be replaced by a stop '. ' in column 45 when it is the same as all other entries in the block.

2. The comment may be modified to show the relation of the publication to a more recent publication in the block, e.g.

- SUPERSEDED (BY_ _ _ _)
- SAME DATA (AS _ _ _ _)
- DATA RENORMALISED (IN _ _ _ _)

The more recent publication should be identified if any ambiguity could exist between more recent publications in the same block.

Translations should specify the language of the publication and identify the original e.g.

ENGLISH TRANSL 0F AE 20 8 1/66

Comments for Data Index Lines

These comments are usually prepared at the CINDA Centres, and may be generated by computer analysis of the numerical data file concerned. These comments should include the exact quantity or quantities measured, if the EXFOR or UK format quantity is narrower than the CINDA quantity under which it is indexed.

The total number of data points in the data set(s) corresponding to that CINDA block should be given if possible.

Where a 'null' EXFOR entry is made (type '0') for data not available, the standard comment should make clear whether or not data is expected to be available in the future. Where it is used for superseded EXFOR entries, this should be stated together with the comment 'by EXFOR...', if applicable.

12 - CINDA FILE TRANSMISSIONS

CINDA entries in READER and EXCHANGE format are exchanged between the neutron data centres either on magnetic media or by electronic mail (for a list of acceptable media, see WP5 in the summary report of the meeting of the Co-ordination of the Nuclear Reaction Data Centres - INDC(NDS)-360).

For both types of transmission, the first record must be the HEADER RECORD for the batch identification. The format of this header record is:

CINDA READER a cccbbb yymmdd xxx
CINDA EXCHANGE cccbbb yymmdd xxx

where:

a	area code of the receiving centre	
ccc	batch identifier of the originating centre :	ccc = BNL for NNDC ccc = CJD for CJD ccc = NEA for NEADB ccc = WIE for NDS
bbb	assigned batch number in ascending sequence	
yymmdd	date of transmission or creation of file	
xxx	the number of records contained in this transmission	

The convention should be to keep the same batch number for READER and EXCHANGE format transmissions. If there are no records to transmit, then the transmission should consist of only a header record with xxx = 0.

CINDA EXCHANGE FORMAT SPECIFICATIONS

Records will be 100 characters in length

1. Record Format - all records must contain legal entries.

1	Operation code	A(l)
2-7	Record serial number	I(6)
8-12	Target nucleus	A(5)
13-15	Quantity code	A(3)
16-18	Laboratory code	A(3)
19-21	Block number	I(3)
22	Work type	A(l)
23-27	E-min	A(5)
28-32	E-max	A(5)
33	Hierarchy	I(1)
34	Reference type	A(l)
35-48	Reference	A(14)
49-52	Publication date	I(4)
53	Author flag	A(l)
54-89	Comments	A(36)
90	Reader code	A(l)
91	Area code	I(1)
92-94	Country code	A(3)
95-100	Date of last change	I(6)

2. Field contents

Operation code: A for add
M for modify
D for delete

Record serial number: 6 digit serial number

Target nucleus: 5 characters

a) Chemical symbol left adjusted in first 2 positions

b) Mass number right adjusted in the last 3 positions with no leading zeros

c) Special cases left adjusted: MANY for Many
FPROD for Fission products

d) Natural elements - last 3 positions blank

e) Compounds - compound symbol replaces mass number in positions 3 through 5.

f) Symbols D and T for deuterium and tritium forbidden. Use H only.

Quantity code: 3 characters
As defined in the CINDA Manual

Laboratory code: 3 characters
As defined in the CINDA Manual

Block number: 3 digits
As defined in the CINDA Manual

Work type: 1 Character
As defined in the CINDA Manua1

E-min, E-max: 2 5- character fields
The contents will be those representations allowed by the CINDA manual.

a) Numeric entries will have the following format n.n±n or -.n±n

b) Range entries will be right adjusted in each field with the format bbb-n

c) Other alphabetic codes will be left adjusted in their field.

Hierarchy: 1 digit
Only the numerical equivalent of the hierarchy code will be used.

Reference type: 1 character
As defined in the CINDA manual

Reference: 14 characters
As defined in the CINDA manual

Publication data: 4 digits
YYMM format

Author flag: 1 character
"Blank" if comment field does not contain an author delimiter
"X" if comment field does contain an author delimiter

Comments: 36 characters
As defined in the CINDA manual

Reader code: 1 character

As defined in the CINDA manual

Area code: 1 digit
As defined in the EXFOR manual

Country code: 3 characters
As defined in the EXFOR manual

Date of last change: 6 digits
Date of last change or entry if a new entry in the form YYMMDD.