

CORROSION DATA SURVEY

**Metals Section
Sixth Edition**

AN OFFICIAL
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PUBLICATION

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PREFACE TO THE SIXTH EDITION

A number of changes have been made in the Sixth Edition of this book to improve its accuracy and utility. Since the original edition of the *Corrosion Data Survey* was published some thirty years ago, new or modified alloys have been introduced and a separate survey on nonmetallic materials was published in 1975. An effort has been made in this edition to incorporate as much new data (current to 1980) as possible and to revise and update the data on existing metallic materials wherever data could be obtained.

The earlier editions reported the highest corrosion rates for a given environment-alloy combination in cases where multiple references were found for the same conditions. This was considered to be the best practice for earlier editions where many duplicate references were not found. However, where a large number of data are available, the highest reported corrosion rate may not be representative of the expected performance of the environment-alloy combination. Consequently, the editor of this Sixth Edition used his engineering judgment in reporting corrosion rates from conflicting data in the literature.

A number of alloys have evolved since the earlier editions were published. For example, alloy 20, alloy B, alloy C have been replaced, mostly by alloy 20Cb3, alloy B-2, and alloy C-276 respectively. These newer alloys can have corrosion resistance that is different from their predecessors. Whenever information was found on the new alloys, it was included in this edition. When no information was available on the newer alloys, the data on the older alloys were retained. No effort was made to verify the data carried over from previous editions.

Some format changes have also been made. Most of the data from the short tables of previous editions have been incorporated into the main tables. New categories of ferritic stainless steels (alloy 26-1 and 430) and austenitic stainless steels (20Cr-25Ni-4.5Mo) have been added. Since the corrosion rates of different copper base alloys were quite similar in most of the environments, these were grouped into fewer alloy categories. Alloys G, G-3, 20, and 825 have been grouped together into a single family where previously only data from alloy 20 and CN20 were included. A number of tables such as those for corrosion by waters, soils, atmospheric corrosion, low temperature corrosion, and stress corrosion cracking were eliminated since these were no longer considered adequate to cover the topic areas of interest. Finally, the footnotes for corrosives have been deleted from the tables. References concerning hazards of corrosives can be found at the end of the introduction.

It is believed that these changes improve and update the available information on corrosion of metals in various environments. However, neither NACE nor the editor believe that corrosion performance of alloys can be specified on the basis of data presented in this survey alone. Materials selection requires sound engineering judgment for each application. Additional information is required for making the proper choice of materials.

D. L. Graver
Editor

INTRODUCTION

In the development of new chemical processes, questions invariably arise concerning the choice of materials for certain equipment. However, since available corrosion information is scattered widely throughout the literature, these questions frequently are difficult to answer.

This survey summarizes both published and previously unpublished data in a group of tables for ready reference in determining suitability of materials for possible use. These tables should serve only as a guide, and it is to be expected that in most cases additional information will be necessary. The tables have been checked against actual plant conditions and a good correlation has been found. In cases of doubt, representatives of metal and other material suppliers often can be helpful in supplying additional information. Also, the services of a corrosion engineer, to aid in precise interpretation of the data, combined with supplemental information will be most beneficial.

Much of the data in this edition are taken from the Fourth and Fifth Editions, although numerous new data points have been added and many data points from previous editions have been changed or deleted. A list of data sources and individuals who have helped review the data from previous editions appears at the end of this introduction. Many other individuals have contributed information and materials which was carefully considered. Their help was appreciated and is gratefully acknowledged.

How to Use the Survey

Persons using the survey are reminded that the data given are indicative only and are not to be interpreted as absolutes with respect to specific applications. The primary values of the survey are that it (1) identifies materials which are manifestly unsuitable, (2) locates those which may have satisfactory performance and are candidates for further consideration, and (3) gives limited information other than corrosion rates concerning performance which may be helpful. A list of related NACE publications and other related references may be found at the end of this introduction.

Throughout this book, materials are arranged along the horizontal axis of each page of tables. Corrosives are listed alphabetically along the vertical axis. The data representing average penetration per year are plotted on a matrix of variable temperatures and concentrations in water. A key to the matrix used in the tables, a key to the data points, footnotes to the data tables, and a table identifying the metals and alloys are located on the fold-out page immediately following this introduction for convenient reference. For comparison of penetration rates, some typical rates are given in the Average Penetration Rate per Year Compared to Weight Loss table also located on the fold-out page. Penetration rates are not an unqualified indication of performance. Materials with low penetration rates in a given corrosive may be unsuitable, or failure may occur by some mode irrelevant to penetration. For example, fish liver oil may be catalyzed by some copper alloys, thus making copper unsuitable for this corrosive. Also, nickel, which has a low corrosion rate in mercury, may stress crack.

Locating Data

To find data on a particular material in a particular corrosive, refer to the subject index at the back of the book. Locate the corrosive of interest. The number following the

entry represents the page and line on which the data will be found. Many synonyms for the corrosives have been cross referenced in the index, although only one name will be given in the tables. If the corrosive of interest cannot be found in the index, locate synonyms or another similar corrosive if possible. If an alloy of interest is not among those listed, data for a similar alloy may apply.

In reading the data tables, reference should be made to the temperature/concentration matrix shown on the fold-out page. This illustrates the method by which concentration and temperature are compared against corrosion rates. The abscissa designation "Percent Concentration in Water" does not necessarily mean "percent solution," but often pertains to slurries or mixtures above saturation percentages. Data do not invariably conform to the actual boiling points of mixtures. When reactions at temperatures above boiling points are noted it is assumed that there is a pressure factor even though this is not denoted in the matrix.

How the Data Are Posted

Data taken from the literature are adjusted to fit the increments of the temperature/concentration matrix and therefore cannot be considered exact. For example, a posting at the intersection of the 40% concentration line and the 100 F (38 C) temperature line actually represents a concentration of 35 to 45% and a temperature of 50 to 150 F (10 to 66 C).

No data are posted on zero concentration lines; therefore, any posting on the shared line between data squares represents 100% concentration. Postings on the 100% lines usually refer to anhydrides but also may refer to some concentrations in which a small percentage of water is present as may be the case in everyday plant operations. In some instances, special arrays of data on anhydrides are posted. Data on mixtures of unknown proportions are posted on the 100% line. Thus, beer is posted as "100% beer."

In this edition as in earlier editions, the relative imprecision of the corrosives is acknowledged. Sometimes data are posted which are derived from exposures of materials to reagent grade corrosives. However, many of the data come from reports of actual operating systems where reagent grade corrosives are rarely, if ever, encountered.

The following comments enlarge on the means used to present the data and emphasize the importance of many additional factors in determining the corrosion resistance of a material, since these cannot always be expressed in simple, graphic form. Consequently, IT IS IMPORTANT THAT THE FOLLOWING NUMBERED SECTIONS BE READ CAREFULLY.

1. Corrosives

Although corrosives are listed alphabetically in the main tables, a series of other tables and graphs listed in the Table of Contents presents additional information on special topics and on certain generally encountered corrosives. Previous experience has revealed that grouping corrosion rates by similar compounds is helpful. When information on the particular corrosive under consideration is insufficient or lacking, there may be others in the same general group which could be expected to react with materials in a similar manner.

2. Materials of Construction

Materials of construction available at reasonable cost and in a wide variety of forms have been selected for general corrosion rating. In special cases, other materials also are

plotted. Materials have been grouped under general classification headings according to the major base metal. Within each classification are a number of materials frequently considered to have comparably similar corrosion resistances. For example:

- a. In carbon steels, carbon content up to 0.30% is not considered to alter appreciably the corrosion rate.
- b. Silicon bronze, aluminum bronze, and tin bronze are considered to have similar corrosion resistances in most media, but it is recognized they can differ markedly in specific environments.
- c. In stainless steels, Types 302, 304, 304L, 321 and 347 are expected to have similar corrosion resistance and are grouped as 18Cr-8Ni austenitic stainless in the corrosion tables.
- d. In aluminum alloys, the following types are expected to have equivalent corrosion resistance: 1100, 3003, 3004, 5052, 6061, 6062, and cast 43, B214, 356, and 406. No aluminum alloy containing over 1.0% copper should be considered to have corrosion resistance equal to these.

Thus where data on any of the above are shown in the data tables, other materials in the same group usually can be expected to perform in a like manner.

3. Concentration of Corrosives

Concentrations in all cases (except in certain solutions and gases, either desiccated or essentially so) are considered to be water dilutions of pure compounds. Although it is fully understood that small quantities of contaminants may have a profound effect on corrosion rates, this factor is not ordinarily taken into account in the tables, often because the specific contaminants are not reported in the references from which data are taken. In instances where a metal was designated as being unaffected by a chemical and no mention was made of concentration or temperature, the tables show the metal as satisfactory at the 100% line at room temperature. This indicates that the metal has a possible use and could be considered.

4. Temperature

Temperature may affect the corrosion rate through its effect on oxygen solubility and availability. As temperature rises, oxygen solubility in an aqueous solution decreases and at the boiling point most oxygen is removed. On the contrary, the diffusion rate of oxygen increases with temperature. The corrosion rate may increase with temperature to some maximum and then decreases to some low value at the boiling point.

Temperature also may affect corrosion through its effect on pH, with increasing temperature often resulting in decreasing pH.

Temperature also may affect corrosion rates through its effect on films. It may increase the solubility of protective corrosion products, as in the case of lead in hydrochloric acid. A change in temperature also may bring about changes in the physical nature or the chemical composition of corrosion products which may make them considerably more or less protective. The behavior of zinc in water is an example. Another effect of rising temperatures on films is caused by precipitation of protective coatings on metallic surfaces, as in waters containing calcium sulfate and calcium carbonate.

In solutions under pressure at temperatures above their normal boiling points, corrosion rates may increase quite rapidly with temperature, possibly because many of the factors (such as diffusion, which normally acts to limit corrosion) are no longer controlling. The limiting effect of diffusion also can be overcome by rapid movement.

The effect of heat flux on the corrosion rate must be recognized. Maintaining a liquid at a bulk temperature of 248 F (120 C) in a vessel can produce no corrosion, whereas the same temperature on the heating side of a metal surface may result in catastrophic corrosion.

Temperatures are plotted in degrees Fahrenheit from 0 to 500 (-18 to 260 Celsius) on the vertical axis of the matrix shown on the fold-out page. This matrix makes up the data tables throughout the book.

5. Corrosion Rates

An arbitrary set of corrosion rates has been established for this survey to meet the requirements of instrument, design, and maintenance engineers. (See the Key to Data Points on fold-out page.) The ideal rating (denoted in the tables by a solid circle) has been assigned when corrosion is less than 2 mils (50 μm) per year. Many materials have this property and may be used for some pieces of equipment, although they may be ruled out for others because of other failings, such as contamination of product, brittleness, temperature limitations, or unavailability in suitable form.

When this highest degree of corrosion cannot be indicated, a secondary rating (an open circle) representing less than 20 mils (508 μm) per year corrosion rate is used. In the development of this category, considerable difficulty has been encountered due to the various methods of reporting corrosion data. Materials reported as "recommended" or "completely resistant" may have corrosion rates less than 2 mils per year, but without actual figures, they have been placed in the second category (20 mils per year) rather than the ideal one. For the majority in this category, the corrosion rates probably will be below 5 mils per year. The rating of 20 mils per year indicates those materials which normally would be specified where a corrosion allowance of 60 - 120 mils is added for protection against possible mild corrosion.

A third classification (an open square) is provided to indicate a corrosion rate between 20 and 50 mils (508 and 1270 μm) per year. These materials can be used only in special cases where such a rate can be tolerated, but are not considered adequate for general plant construction.

The final rating (an X) is given where the corrosion rate is probably too high (over 50 mils per year) to merit consideration.

6. Additional Factors Influencing Corrosion Rates

There are many factors besides concentration and temperature which influence corrosion rates and, while they are often extremely important, it is impossible to list them all in a survey of this type. For example, velocity, aeration, heat flux, the presence of oxidizing agents, and other chemical contaminants can either increase or decrease the corrosion rate. The effect of galvanic coupling is also important in assessing the useful life of a piece of equipment and should be considered.

Welding is another factor which may influence service life. Aside from intergranular corrosion, which is discussed below, there are instances where as-deposited weld metal is attacked in preference to the base metal; conversely, there are occasions when the weldment is more resistant. Additionally, localized stresses due to welding often make zones adjacent to welds susceptible to stress corrosion cracking. For these reasons, selection of the correct welding material is as important as selection of the base material.

Many alloy systems show variations in corrosion resistance as a result of being heated or cooled in a certain way. It is important that fabrication and heat treatment are such that an alloy's corrosion resistance is not impaired if the fabricated part is intended for corrosive service. Generally the solution annealed condition is preferred, but the manufacturer of the alloy should be consulted for his recommendations.

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7. Effect of Stress on Corrosion Rates

Two very important instances when stress and corrosion operating simultaneously will not cause increased general attack but will produce fracture are corrosion fatigue and stress corrosion cracking. While corrosion fatigue may occur in any corrosive medium, stress corrosion cracking requires a specific combination of alloy and environment. Quite often the stress which causes stress corrosion cracking is due not only to operating conditions but also to locked-in stress due to fabrication. Welding, in particular, often induces stresses sufficient to cause failure. For this reason, post fabrication heat treatments often are specified. When stress cracking is indicated in the tables, the materials definitely should be stress relieved after fabrication, or a metal not susceptible to stress cracking should be selected. For stress relieving times and temperatures, the manufacturer of the alloy should be consulted.

Generally, stressing metals at less than their elastic limit does not markedly increase corrosion rates. Under some circumstances this may not be true. Occasionally alternating stresses result in faster corrosion rates than static stress in one direction alone. Markedly different corrosion rates have been experienced with certain metals when they were stressed after exposure in an environment rather than before. There also may be a differential in corrosion rates between that side of a material under compressive stress and the one under extension.

8. Intergranular Corrosion

Intergranular corrosion attacks grain boundaries of materials and can be particularly aggressive when certain chemical solutions are in contact with austenitic stainless steels which have precipitated carbides at grain boundaries (sensitization). This precipitation is produced when the steel has been subjected to temperatures between 800 and 1400 F (426 and 760 C) and is often present adjacent to welded areas. Various methods have been developed to eliminate this undesirable condition. However, because intergranular corrosion is not produced by all corrosive media, special heat treatments or specification of stabilized types of austenitic stainless steels often are unnecessary.

Certain other metals and alloys are subject to intergranular attack when exposed to specific media under some environmental conditions and others after an adverse heat treatment. In such cases the manufacturer should be consulted for information relating to his product.

9. Corrosion Inhibitors

Also not considered in this survey are the electrical techniques of cathodic and anodic protection, both of which have benefits under some conditions. Those who are interested in investigating these techniques may get good advice from manufacturers and consultants in these fields.

The technology of inhibition is well developed, but is not considered in this book. Consult the reference list below for sources of published information on inhibition.

Sources of Data

The majority of data for all editions of this book has been collected from the following publications:

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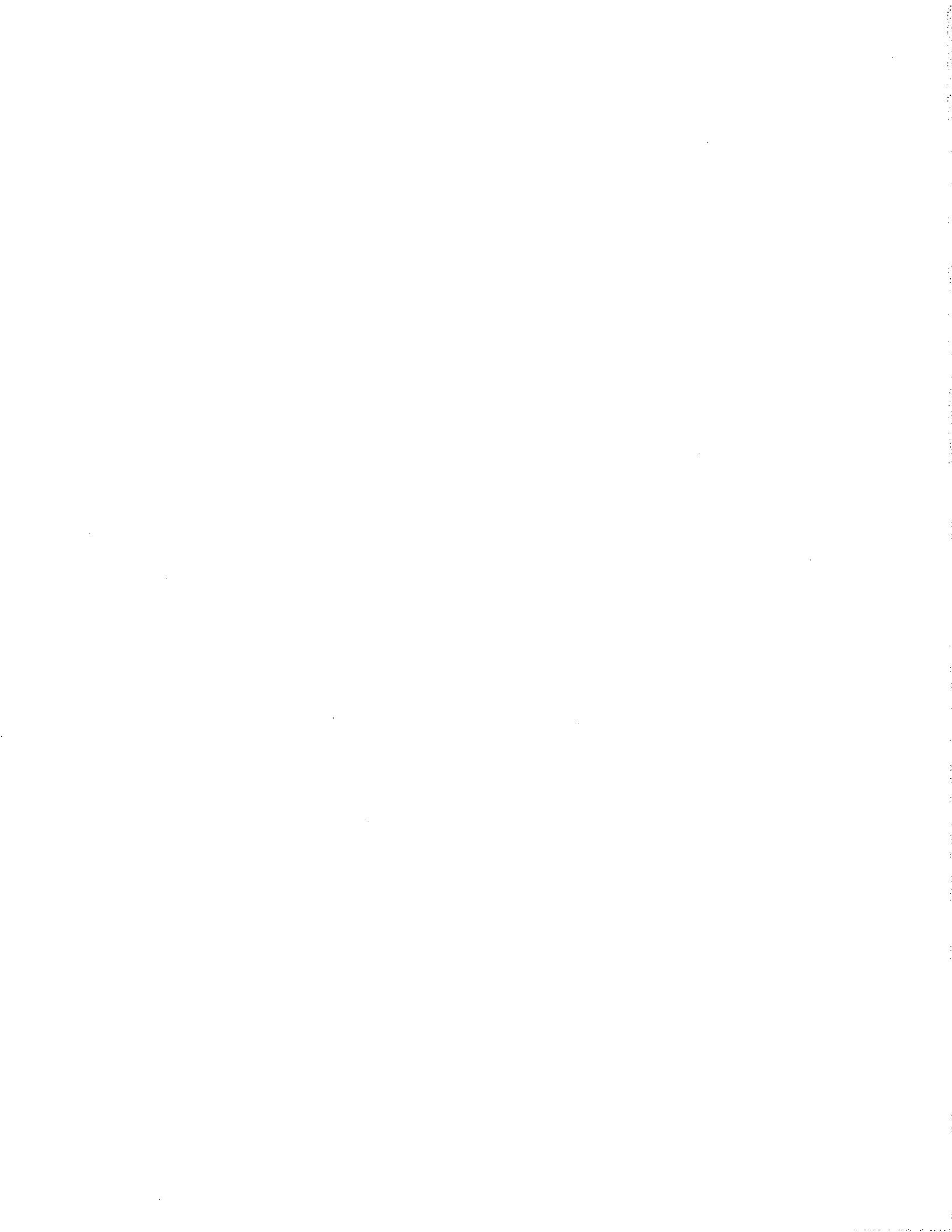
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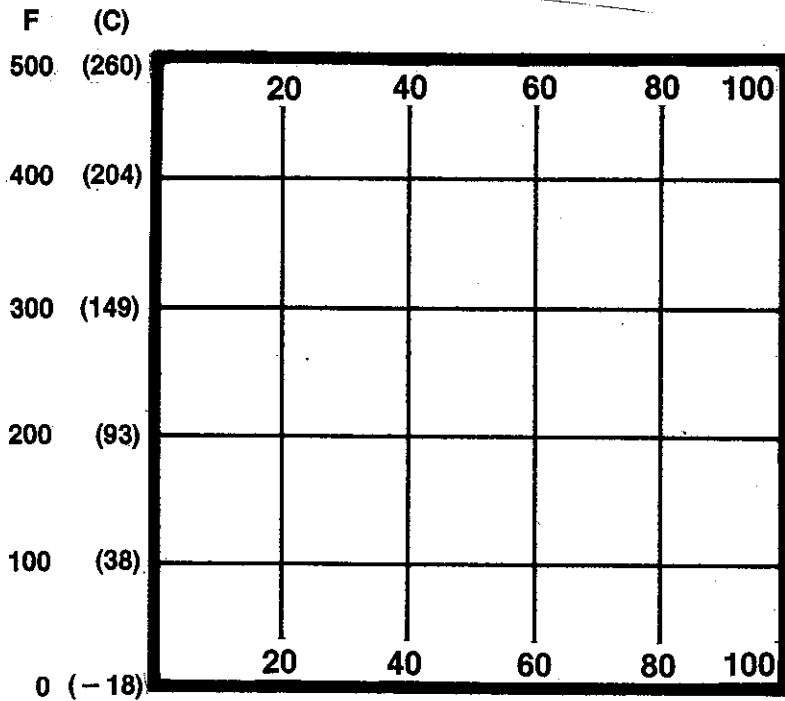
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Keys to Data Tables

(Fold out)



Keys to Data Tables



Percent Concentration in Water

Matrix Key

Throughout the data tables in this book, data points representing average penetration per year (key below) are plotted on the matrix enlarged here. The horizontal grid represents percent concentration in water and the vertical grid represents temperature. For more information on how to use this data survey, consult the preceding introduction.

Average Penetration Rate Per Year

Code	Mils	Inches	mm $\times 10^{-3}$
●	< 2	0.002	50
○	< 20	0.020	508
□	{ 20-50	0.020-0.050	508-1270
X	> 50	0.050	1270

Key to Data Points

Footnotes for Data Squares

1. Pitting
2. Stress Corrosion Cracking
3. Intergranular Attack
4. Crevice Attack

Key to Footnotes

IDENTIFICATION AND NOMINAL ANALYSES OF METALS AND ALLOYS

FERROUS ALLOYS									
Common Name or Type	Nominal Analysis (Percent)								
	Chromium	Nickel	Silicon	Iron	Carbon	Manganese	Phosphorus	Sulfur	
Steel, Carbon, Mild	<0.6	<2.25		bal		<1.75			
Iron, Gray Cast			1.1-2.8	bal	<3.80		0.15	0.10	
Iron, High Nickel Cast		14-32		bal					
STEEL, Stainless, Martensitic and Ferritic									
AISI Type ⁽¹⁾									
405	11.5-14.5			bal			<1		
410	11.5-13.5		<1	bal			<1		
STEEL, Stainless, Ferritic									
17Cr	17	0.5*	1*	bal	0.12*		1*	0.04* 0.03*	
26-1	25-27			bal	0.005			Mo = 0.75-1.5 Cu ≤ 0.20 N = 0.015 Cu + Ni ≤ 0.50	
STEEL, Stainless, Austenitic									
AISI Type									
302	17-19	8-10	<1	bal	<0.15		<2.0		
304/304L ⁽²⁾	18-20	8-12	<1	bal	<0.08		<2.0		
321	17-19	9-12		bal			<2.0		
347	17-19	9-13		bal				Ti = C × 10 Cb + Ta = C × 10	
AISI Type									
316/316L ⁽²⁾	16-19	10-14	<1	bal	<0.1		<2.0	Mo = 2-3	
317/317L ⁽²⁾	18-20	11-15	<1	bal	<0.1		<2.0	Mo = 3-4	
20-25-4.5									
904L	20	25		bal				Mo = 4.5 Cu = 1.5	
COPPER BASE ALLOYS									
CDA Number ⁽³⁾	Name	Nominal Analysis (Percent)							
		Copper	Zinc	Tin	Lead	Arsenic	Iron	Nickel	Other
100-150	Electrolytic copper	99.9							
210	Gilding metal	95.0	5						
220	Bronze, commercial	90.0	10						
230	Brass, red	85.0	15						
502-546	Bronze, phosphorus	91-99		1-8					Also phosphorus
240	Brass, low leaded	80	20						
260	Brass, cartridge	70	30						
442-445	Admiralty	70-73	28	1	Tr	Tr			Also Sb, P
268	Brass, yellow	64-68	32		Tr		Tr		
270	Brass, yellow	63-68	32		Tr		Tr		
280	Muntz metal	59-63	37				Tr		
464-467	Brass, naval	59-62	38	Tr	Tr		Tr		Al = <8
612	Brass, aluminum	92.8					Tr		
706	Cupro-nickel	68.5	1		0.05		1.3	9-11	Mn = 1
710	Cupro-nickel	76.5	1		0.05		1.0	19-23	Mn = 1
715	Cupro-nickel	66.5	1		0.05		0.4-0.7	29-33	Mn = 1
NICKEL BASE ALLOYS									
Designation	Nominal Analysis (Percent)								
	Chromium	Nickel	Copper	Molybdenum	Manganese	Iron	Silicon	Carbon	Other
200 + 200L ⁽⁴⁾		99.5	0.05			0.25	0.15	0.05	0.06 Co trace
Monel 400		66	31.5				1.4		1.1
Inconel 600	15.8	76					7.2		1.0
Ni-Cr-Fe-Mo Alloys									
Incoloy 825	21.5	bal	2.0		3.0	1.0*	29.0	0.05*	0.05* 1.0 Ti
Hastelloy G/G-3	22.0	bal	2.0		7.0		19.5	1.0*	
20 Cb-3	19-21	30-34					bal		Mo = 2-3; Cu = 3-4; Cb 1
ACI Type ⁽⁵⁾									
Alloy 20	19-20	28-30				0.75*	bal		Mo = 2; Cu = 3-4.5
CN 20	19-20	28-30					bal		Mo = 3; Cu = 1.75
Hastelloy B		62			28		6.0		
Hastelloy B-2		69			26		1.0		
Hastelloy C	16	57			16		5		0.08* 4 W
Hastelloy C-276	16	57			16		5		0.01* 4 W
MISCELLANEOUS ALLOYS									
Designation	Purity and Alloying Elements				Designation	Purity and Alloying Elements			
Aluminum	Low copper, iron				Silver	90% + Cu, Au, or Sn			
Gold	+ Ag, Ir, Pd, Pt, In				Tantalum	> 99.99 +			
Platinum	> 99% + Ni, Os, Ru, Cu, Rh				Titanium	+ Pd, Al, Sn, or V			
Lead	> 99.73% + Ag, Cu				Zirconium	+ Ta, Mo, Mn, or Al			

⁽¹⁾American Iron and Steel Institute (AISI), Washington, DC.

⁽²⁾Low carbon grade: C = 0.03 maximum.

⁽³⁾Copper Development Association (CDA), New York, NY. See also *The Corrosion of Copper, Tin, and Their Alloys*, Henry Leidheiser, Wiley & Sons, NY, NY, 1971.

⁽⁴⁾Low carbon = 0.02 C, Type 201.

⁽⁵⁾Alloy Casting Institute (ACI; now Steel Founders' Society of America), Des Plaines, IL.

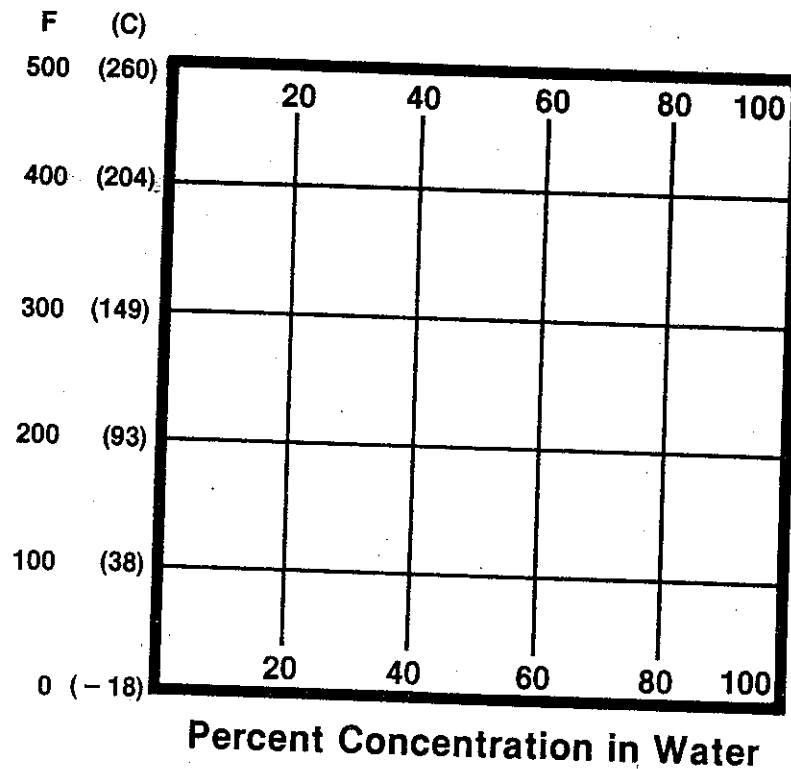
*Maximum

Section 1 Main Tables

The following tables contain the majority of data found in this volume. All data in this section pertain to the same four alloy groups (iron base, copper base, nickel base, and other) and represent exposure to corrosives in the 0 to 500 F (-18 to 260 C) temperature range. The data are of the same kind and reliability and come from the same sources as other data found in this volume.

The reader is advised to examine the following matrix upon which the tables in this section are based before attempting to use the tables. A replica of this matrix appears on the adjacent fold-out page for ready reference when reading the tables. A key to the data points (giving average penetration rates per year), a key to footnotes, and a table of identifications and nominal analyses of metals and alloys are also located on the adjacent fold-out page.

Consult the preceding introduction for further instructions on how to use this data survey.



CORROSIVE	IRON BASE											COPPER BASE									
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni									
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5												
ACETALDEHYDE 1	□	□	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ACETAMIDE 2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETANALIDE 3	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
ACETIC ACID aerated 4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ACETIC ACID non-aerated 5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ACETIC ACID vapor 6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ACETIC ANHYDRIDE 7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ACETOACETIC ACID 8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
ACETONE 9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETONE CYANOHYDRIN 10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETONITRILE 11	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETOPARA- TOLUIDINE 12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETOPHENE- TIDINE 13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETOPHENONE 14	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETOTOLUIDINE 15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
ACETYL ACETONE 16	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
ACETYL CHLORIDE							2		2					
	x	x		x			x		x	x			x	x
ACETYLENE														
													Explosion Hazard	
ACETYLENE TETRACHLORIDE					1	1			1	1				
	x	x	x	*	*		*		*	*				
ACETYL SALICYLIC ACID														
	o						o		o	o				
2-ACETYL THIOPHENE														
	*	*											*	*
ACONITIL ACID														
	.								.	.				
ACRIDINE														

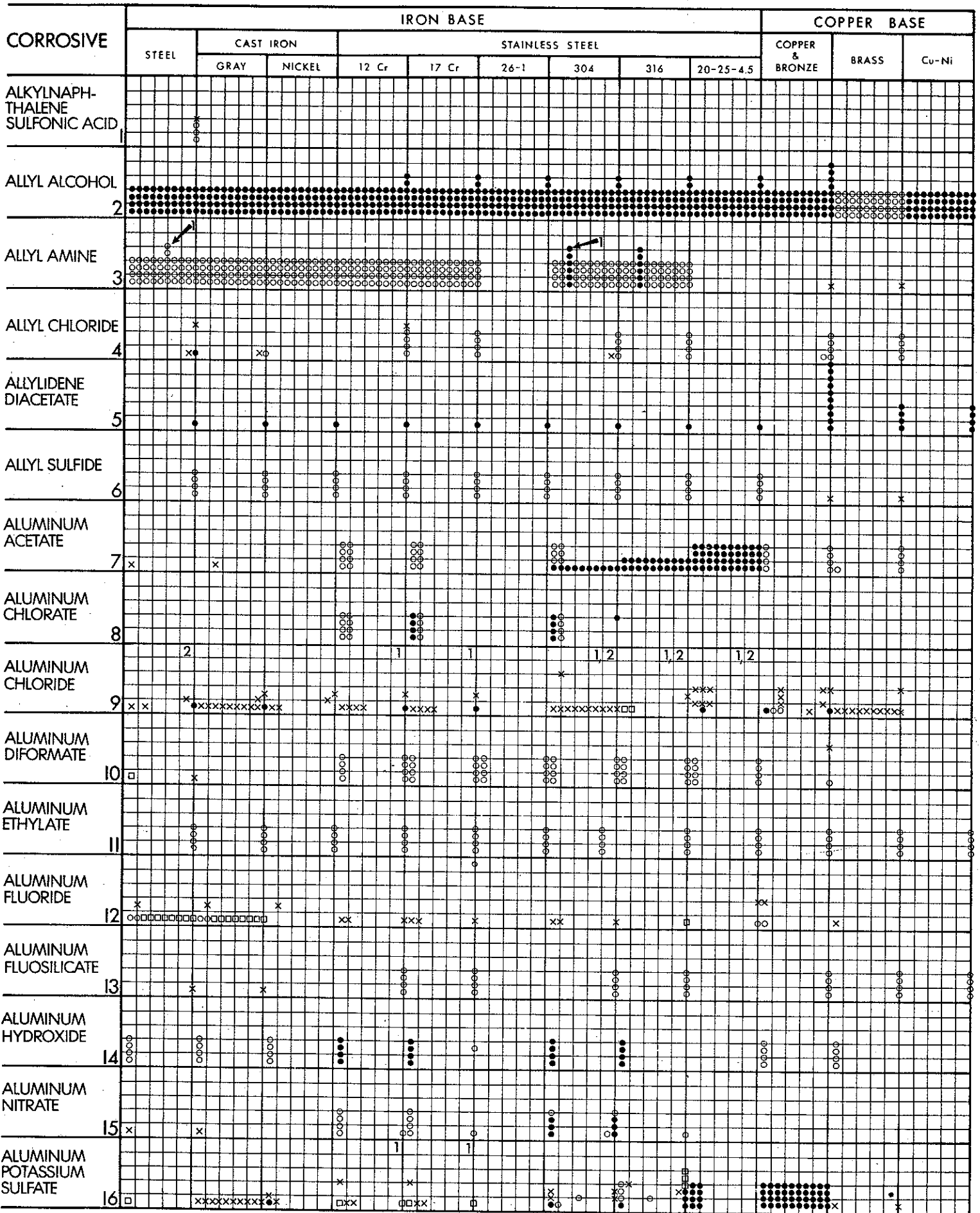
ACROLEIN														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
ACRYLIC ACID														

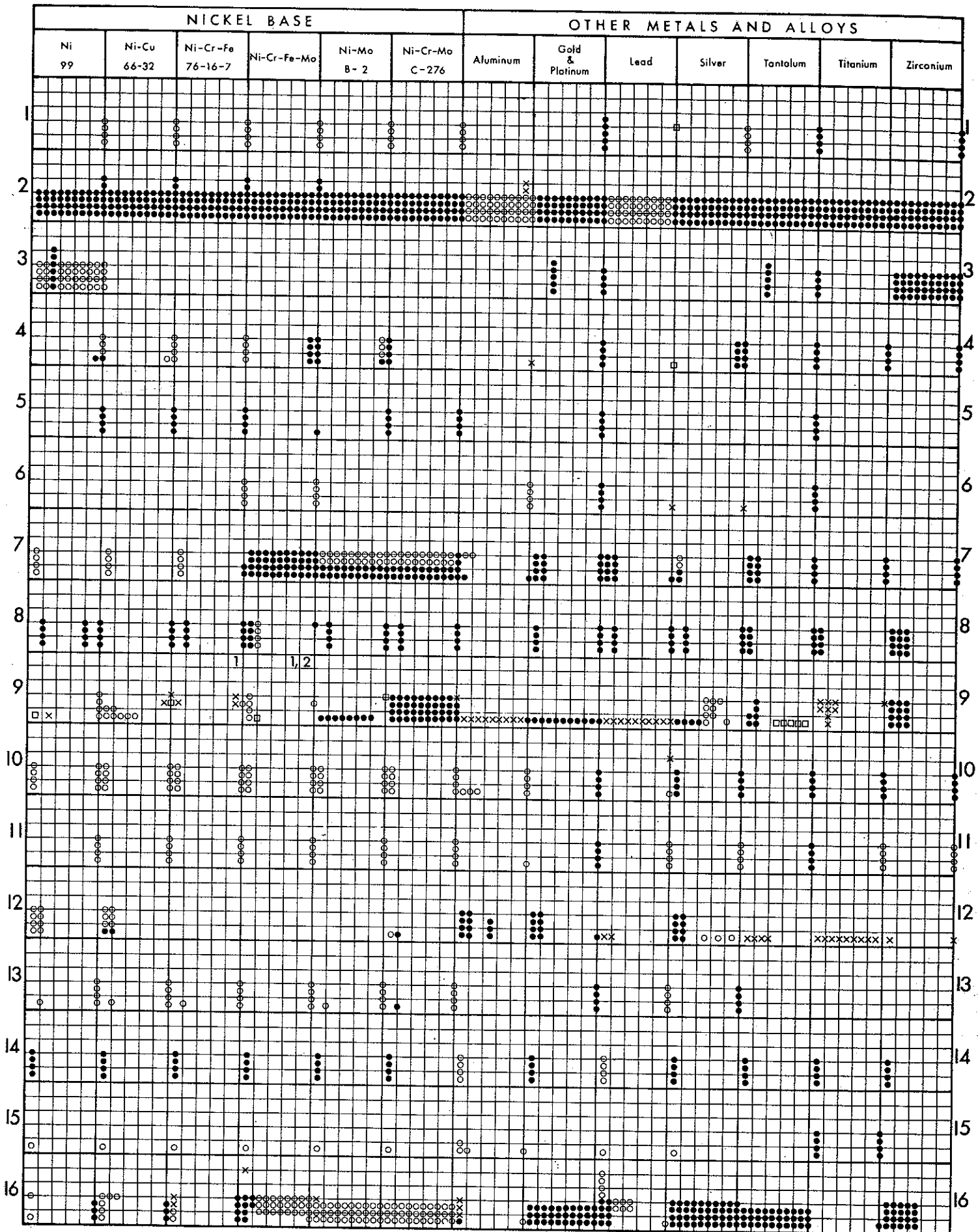
ACRYLONITRILE														

ADIPIC ACID														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
ALIPHATIC ALCOHOL SULFONATES														

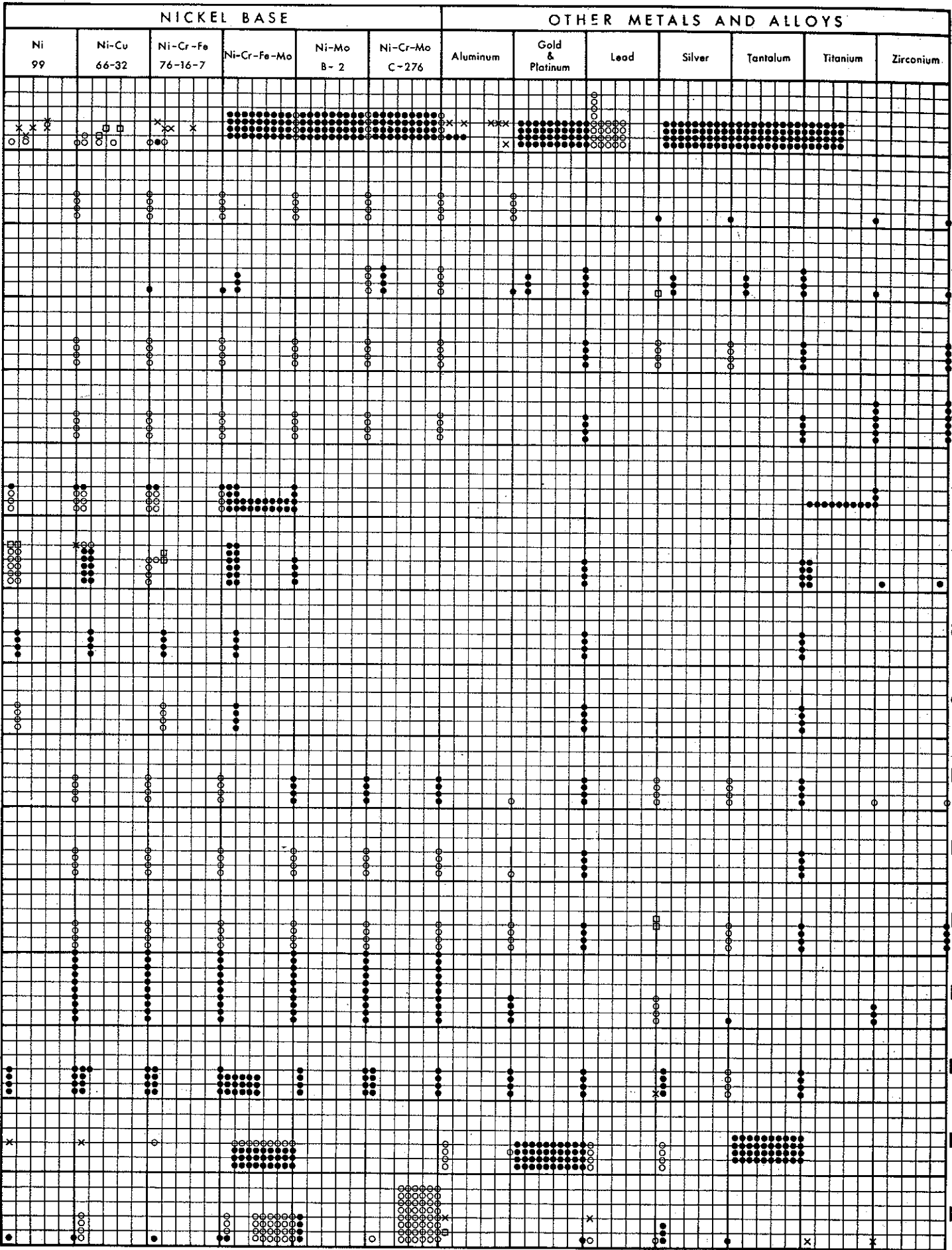
ALKANE SULFONIC ACID														
				*	*		*	*	*	*		*	*	
ALKYLARYL SULFONATES														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
ALKYL BORANES														

ALKYL PHENOL														

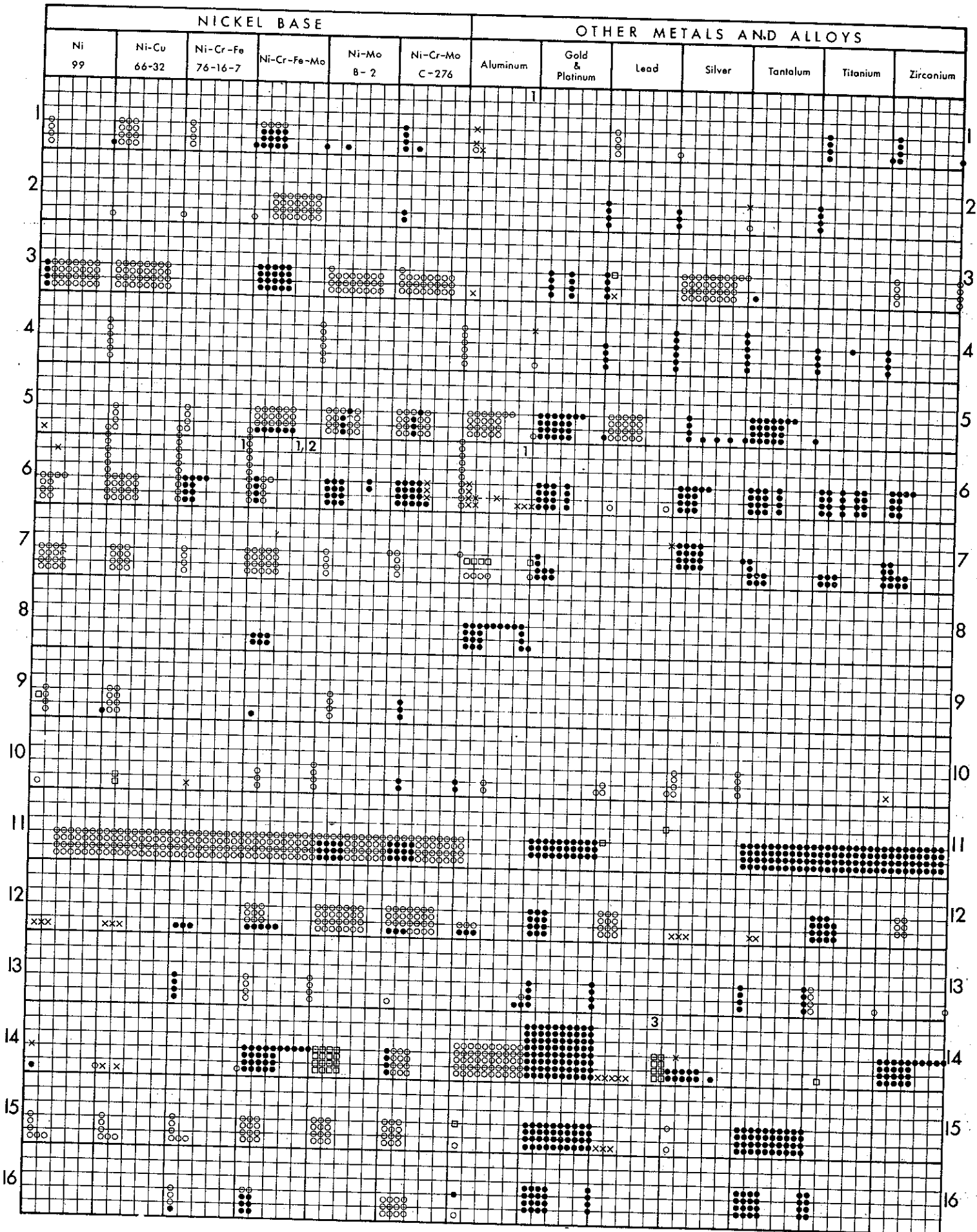




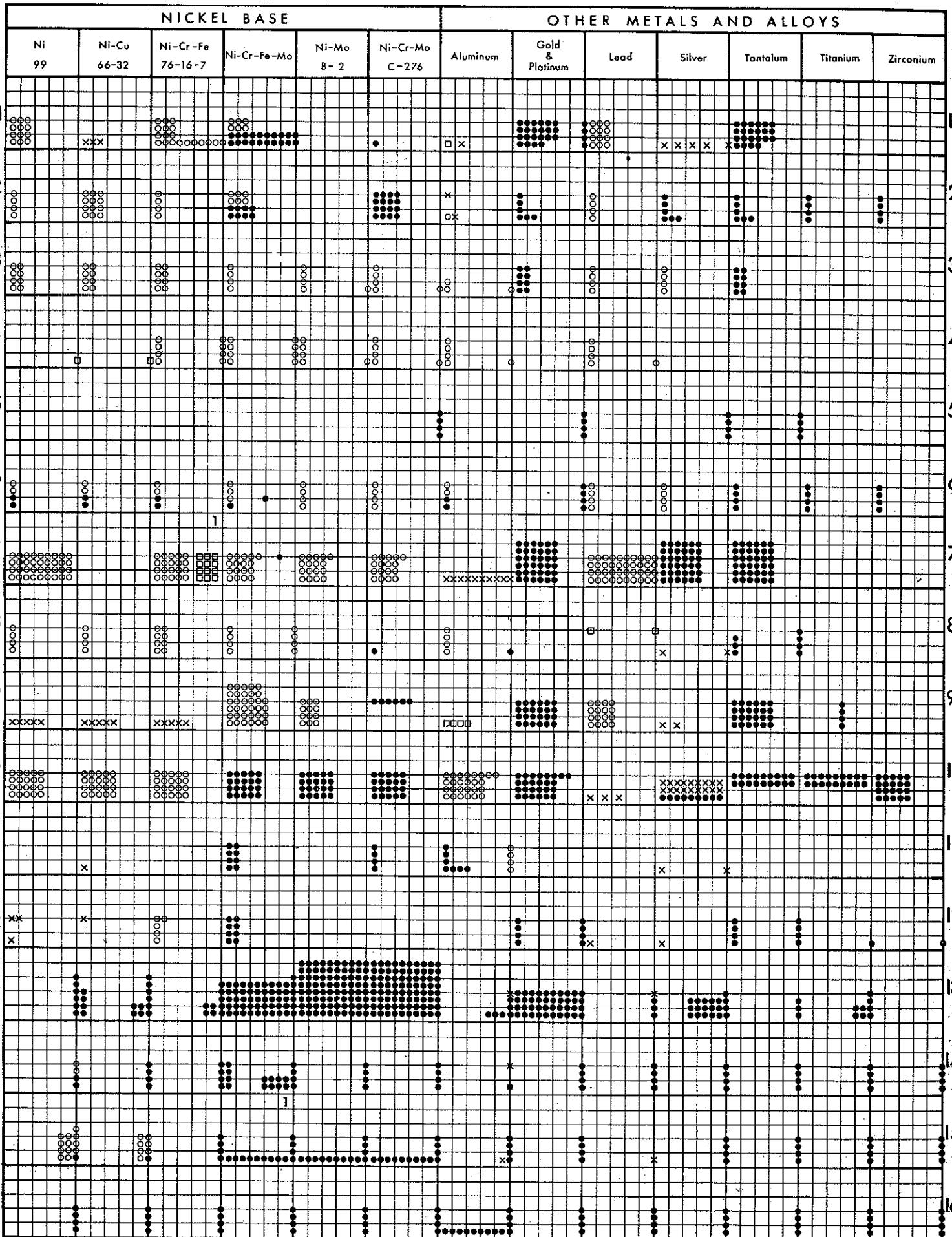
CORROSIVE	IRON BASE											COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
		5		4	4		1,2	2						
ALUMINUM SULFATE	x x x x x	x x x x x x x x x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x x x x		
AMINOANTHRAQUINONE														
AMINOAZOBENZENE														
AMINO BENZENE-SULFONIC ACID														
AMINO BENZOIC ACID														
AMINOETHYL-ETHANOLAMINE														
AMINOETHYL-ETHANOLAMINE Carbon Dioxide														
AMINOETHYL-ETHANOLAMINE Hydrogen Sulfide														
AMINOETHYL-ETHANOLAMINE + CO ₂ + H ₂ S														
AMINOPHENOLS														
AMINOPYRIDINE														
AMINO GALICIC ACID														
AMMONIA (ANHYDROUS)	2													
AMMONIUM ACETATE														
AMMONIUM BICARBONATE														
AMMONIUM BIFLUORIDE														



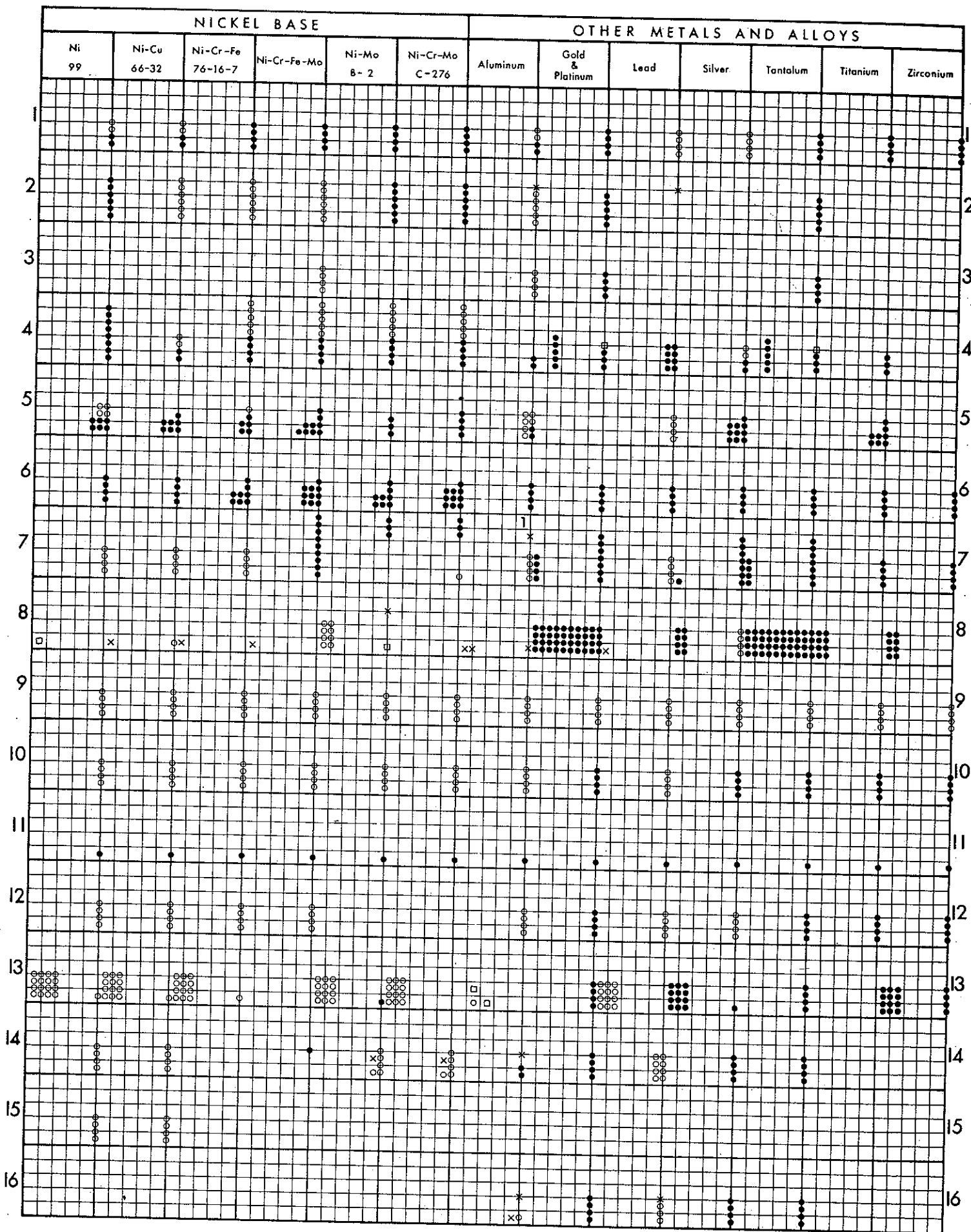
CORROSIVE	STEEL	IRON BASE								COPPER BASE					
		CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
AMMONIUM BIPHOSPHATE	1	x	x	x							o				
AMMONIUM BISULFITE	2	x	x	x											
AMMONIUM BROMIDE	3	x	x	x											
AMMONIUM CARBAMATE	4	x	x												
AMMONIUM CARBONATE	5	x	x	x											
AMMONIUM CHLORIDE	6	x	x	x											
AMMONIUM CITRATE	7	x	x	x											
AMMONIUM DICHROMATE	8	x	x	x											
AMMONIUM FLUORIDE	9	x	x	x											
AMMONIUM FLUOSILICATE	10	x	x	x											
AMMONIUM FORMATE	11	x	x	x											
AMMONIUM HYDROXIDE	12	x	x	x											
AMMONIUM MOLYBDATE	13	x	x	x											
AMMONIUM NITRATE	14	x	x	x											
AMMONIUM OXALATE	15	x	x	x											
AMMONIUM PERCHLORATE	16	x	x	x											



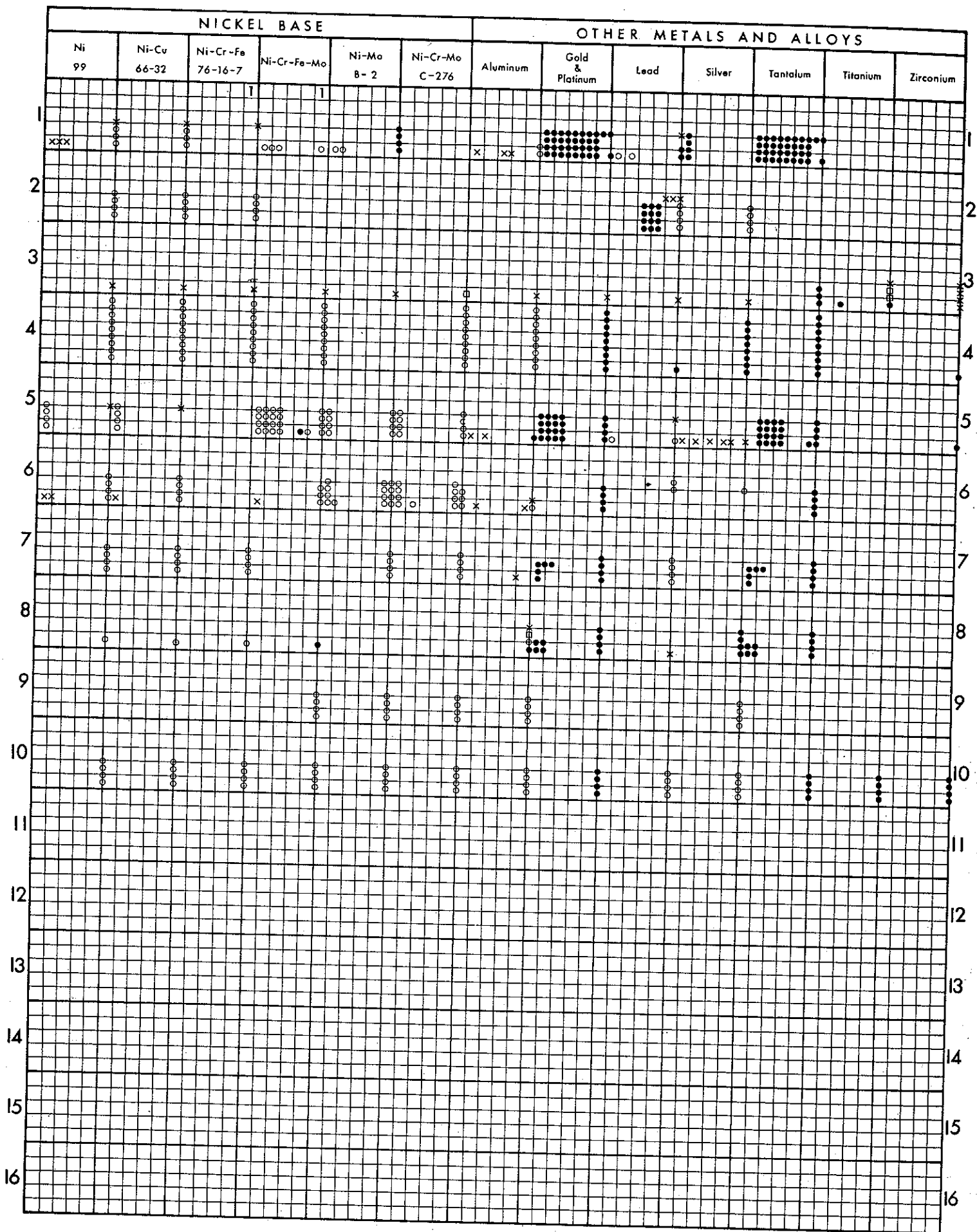
CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
AMMONIUM PERSULFATE 1	xxx	•xxxxxxx		□	□		○○○○○○ ○○○○○○ ○○○○○○	●●●●●● ●●●●●● ●●●●●●		xxx	•xxx	•xxx
AMMONIUM PHOSPHATE 2	x ○ x	x ○ ○ x	○		○○○○		○○○○ ●●●●	○○○○ ●●●●	○○○○ ●●●●	○○○○	□	○○○○
AMMONIUM PICRATE 3	x	x		○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	x	x	x
AMMONIUM POLYSULFIDE 4		□	□	○○○○	○○○○	○○○○	○○○○	○○○○	○○○○		*	*
AMMONIUM SALICYLATE 5		•	•	•	●●	●●	●●	●●	●●	●●	●●	●●
AMMONIUM SULFAMATE 6	○○○○	○○○○	•	○○○○	○○○○		●	●	●	●	○○○○	○○○○
AMMONIUM SULFATE 7	x xxx ○○○	x x x ○○○	○	x	□		x □□□□□	xxx ○○○○ ○○○○	●	*	□	□
AMMONIUM SULFIDE 8	○○○	•		○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	○○○	x	xx
AMMONIUM SULFITE 9	xxxxx	xxxxx	xxxxx	xxxxx	1	1	1	○○○○ ○○○○ ○○○○	○○○○ ○○○○ ○○○○	xxxxx	xxxxx	xxxxx
AMMONIUM THIOCYANATE 10	x ○ x	x x	○	○	○	●●	●●●●	●●●●	●●●●	xxxxx	xxxxx	
AMMONIUM THIOSULFATE 11	x	x			●●●	●●●	●●●	●●●	●●●	x	x	x
AMMONIUM TUNGSTATE 12	○○○	○○○		○○○	○○○		●●●	●●●	●●●	x	x	x
AMYL ACETATE 13	•	●●●●●●	●●●●●●	●●●●●●	●●●●●●		●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●
AMYL ALCOHOL 14		●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●		*	●●●
AMYL CHLORIDE 15	x	x	•	•	○	○	x	●●●	●●●	●●●	●●●	○
AMYL CINNAMIC ALDEHYDE 16		●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●	●●●



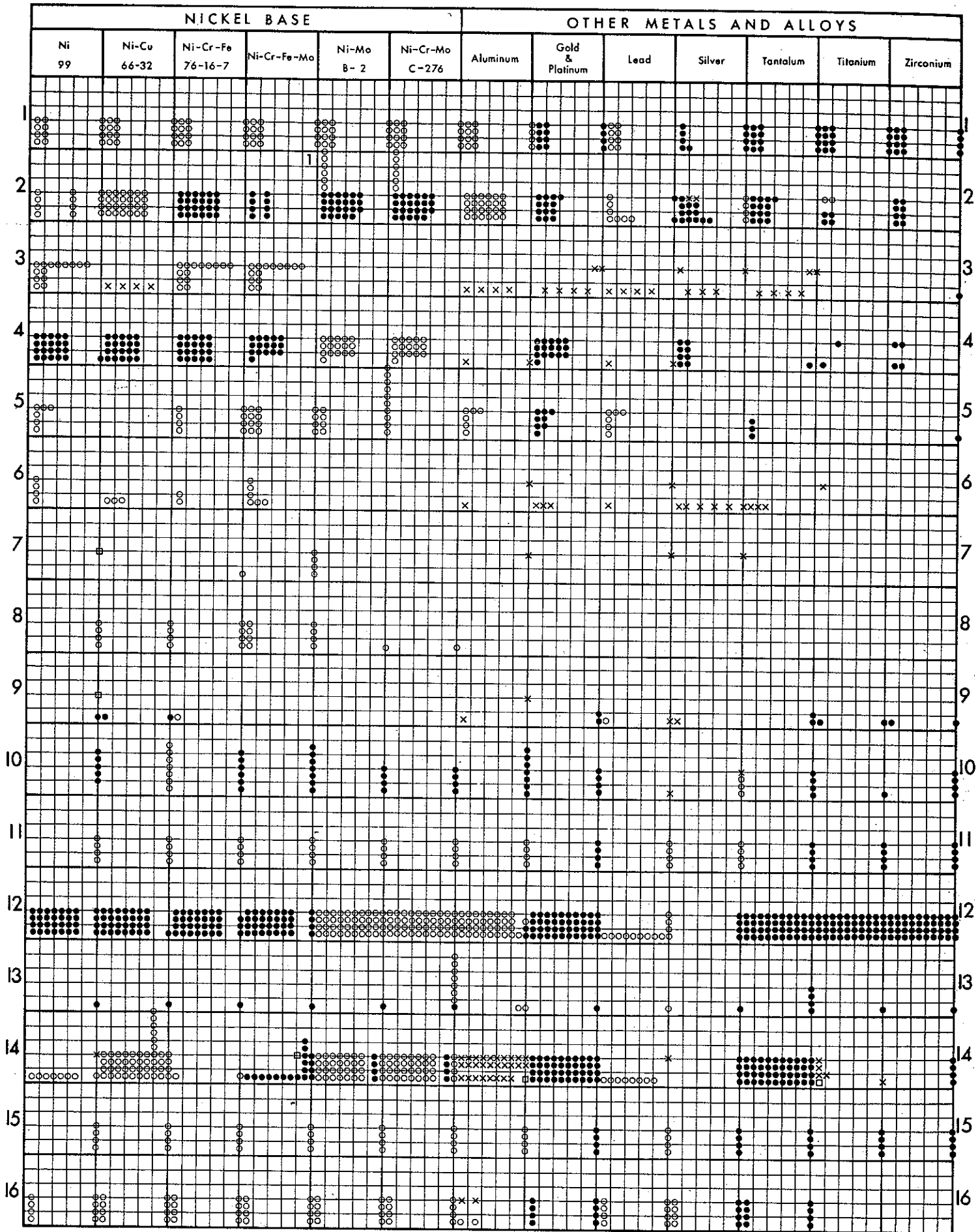
CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
1	○	○	○	○	○	○	○	○	○	○	○	○
2	x○	○	○	○	○	○	○	○	○	○	x	x
3	○	○	○	○	○	○	○	○	○	○	○	○
4	○	○	○	○	*	*	x	○	○	○	○	○
5	x○	x○	○	○	○	○	○	○	○	○	○	○
6	○	○	○	○	○	○	○	○	○	○	○	○
7	○	○	○	○	○	○	○	○	○	○	○	○
8	x	xx	xx	xx	xx	x	xxx	xxxx	x	x	x	x
9	○	○	○	○	○	○	○	○	○	○	○	○
10	○	○	○	○	○	○	○	○	○	○	○	○
11	○	○	○	○	○	○	○	○	○	○	○	○
12	○	○	○	○	○	○	○	○	○	○	○	○
13	xxx	○	○	○	xxx	○	xxx	xxx	○	○	○	○
14	*	*	○	○	○	○	○	○	○	○	○	○
15	x○	*	○	○	○	○	○	○	○	○	○	○
16	*	*	*	○	○	○	○	○	○	○	○	*

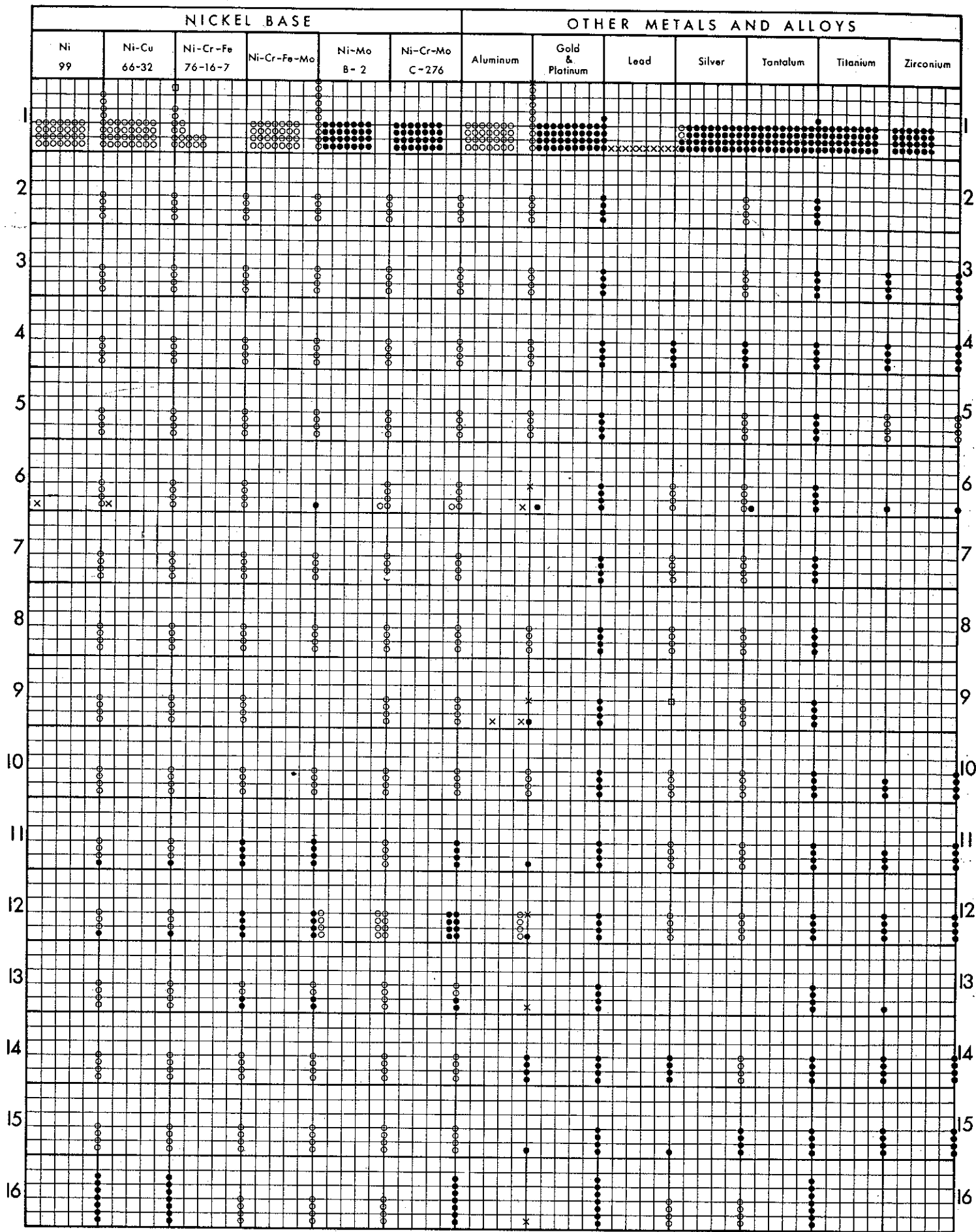


CC	CORROSIVE	IRON BASE											COPPER BASE								
		STEEL	CAST IRON		STAINLESS STEEL								COPPER & BRONZE	BRASS	Cu-Ni						
			GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5											
AA	ANTIMONY TRICHLORIDE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AA	ANTIMONY TRIFLUORIDE	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
AA	AQUA REGIA	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
AA	ARACHADIC ACID	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
AA	ARSENIC ACID	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
AA	ARSENIC TRICHLORIDE	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
AA	ARSENIC TRIOXIDE	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
AA	ASCORBIC ACID	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
AA	ASPARTIC ACID	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
AA	AZOBENZENE	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		11																			
		12																			
		13																			
		14																			
		15																			
		16																			

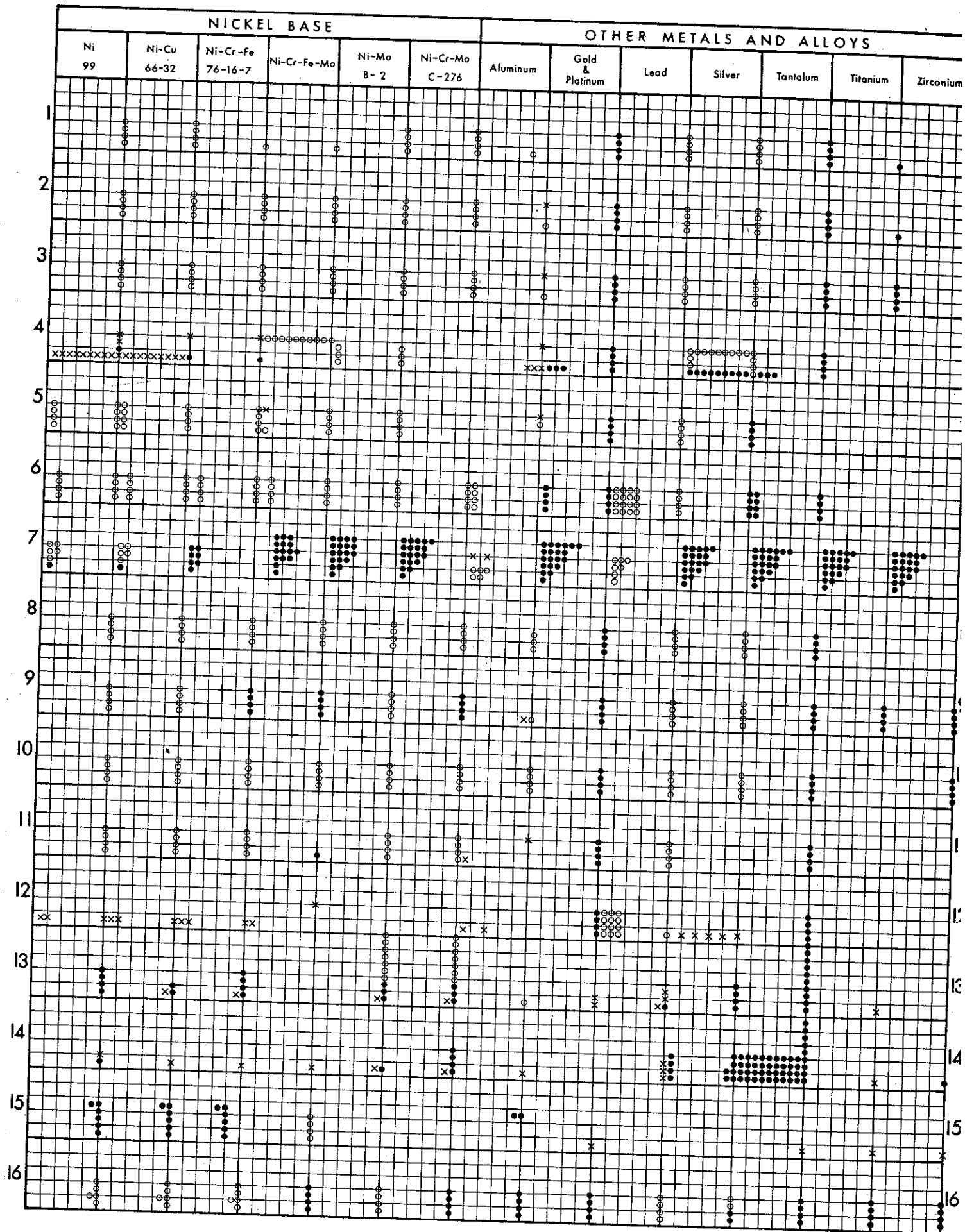


CORROSIVE	IRON BASE										COPPER BASE												
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni											
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5														
BARIUM CHLORATE 1																							
BARIUM CHLORIDE 2																							
BARIUM CYANIDE 3																							
BARIUM HYDROXIDE 4																							
BARIUM NITRATE 5																							
BARIUM PEROXIDE 6																							
BARIUM POLYSULFIDES 7																							
BARIUM SULFATE 8																							
BARIUM SULFIDE 9																							
BENZALDEHYDE 10																							
BENZAMIDE 11																							
BENZENE 12																							
BENZENE HEXACHLORIDE 13																							
BENZENE SULFONIC ACID 14																							
BENZIDENE 15																							
BENZILIC ACID 16																							

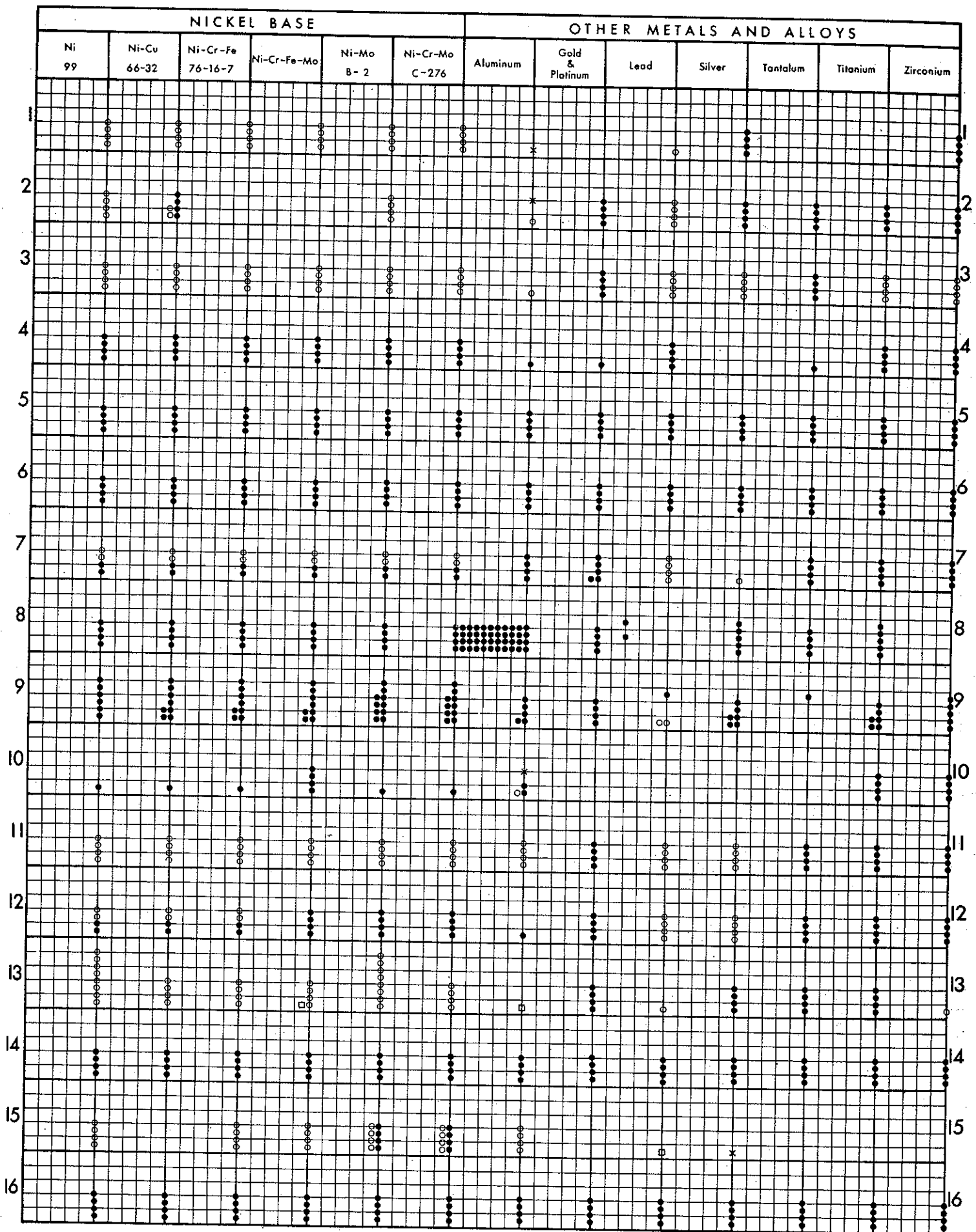




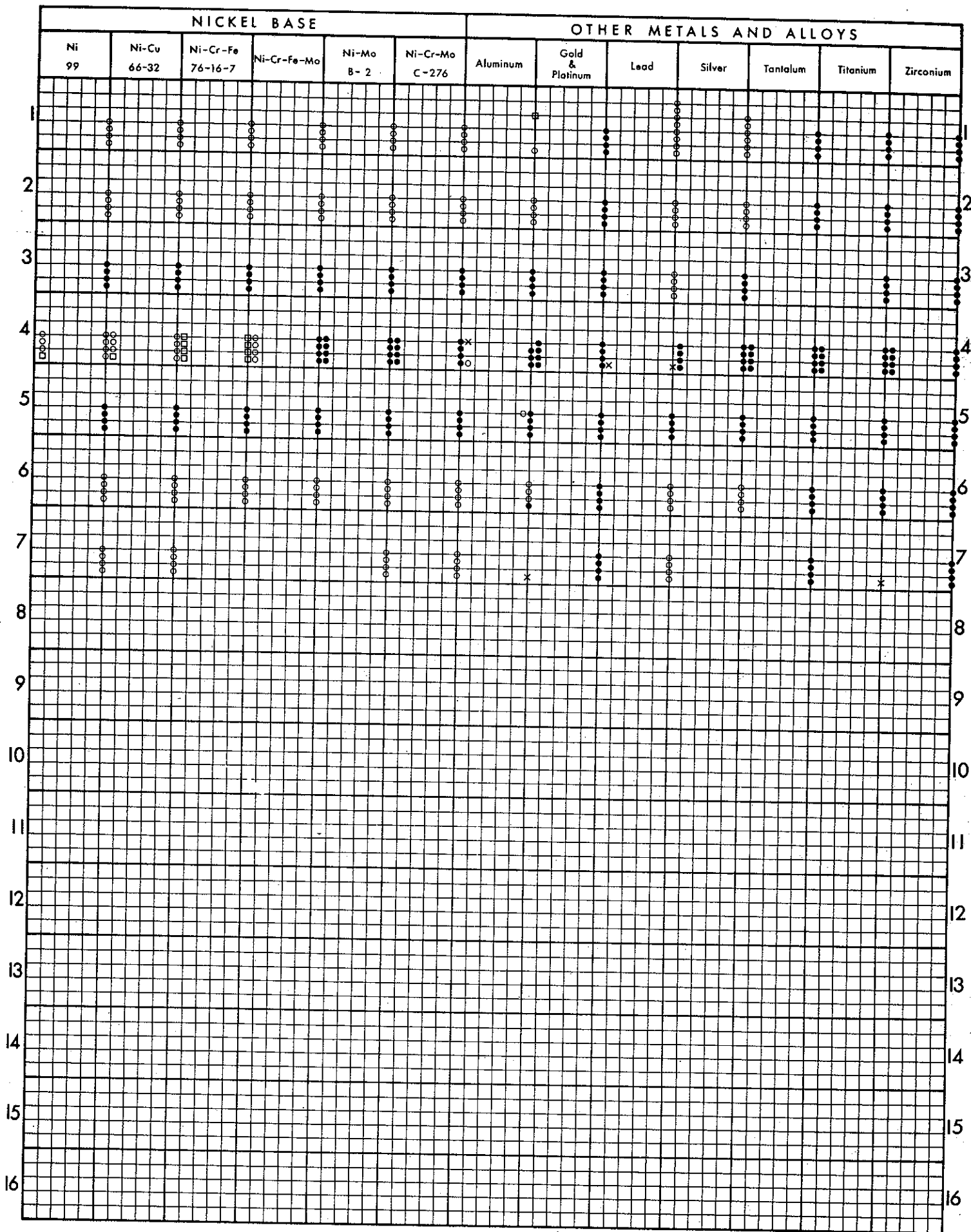
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
BENZYL DICHLORIDE 1		○	○	○	○	○	○	○	○	○		○	○	○
BENZYL PHENOL 2		*			○	○	○	○	○	○		○	○	○
BENZYL SALICYLATE 3		○	○	○	○	○	○	○	○	○		○	○	○
BERYLLIUM CHLORIDE 4		x	x	x	x	x	x	x	x	x	x	x	x	x
BERYLLIUM FLUORIDE 5		*	*											
BERYLLIUM SULFATE 6					○	○	○	○	○	○	○	○	○	○
BORIC ACID 7		*	*	○	○	○	○	○	○	○	○	○	○	○
BORNYL ACETATE 8		*	*											
BORNYL CHLORIDE 9		●	●	●	●	●	●	●	●	●	●	●	●	●
BORNYL FORMATE 10														
BORON TRICHLORIDE 11		●	●	●										
BROMIC ACID 12		x	x	x	x	x	x	x	x	x	x	x	x	x
BROMINE-DRY 13		*	*	○	*	*	*	*	*	*	*	*	*	*
BROMINE-WET 14		*	*	*	*	*	*	*	*	*	*	*	*	*
BROMINE TRIFLUORIDE 15		○			○	○	○	○	○	○	○	○	○	○
BROMOBENZENE 16		○	○	○	○	○	○	○	○	○	○	○	○	○



CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
BROMOCHLOROMETHANE 1	○	○	○	○				○	○			○	○	○
BROMOCHLOROPROPANE 2	●	●	●	●	●	●	●	●	●	○	○	○	●	●
BROMOFORM 3	○	○	○	○	○	○			○	○			○	○
BROMOTOLUENE 4	●	●	●	●				○	○			●	●	●
BUTADIENE 5	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTANE 6	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTANEDIOLS 7	○	○	○	○	○	○			○	○			○	○
BUTANOL 8	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTYL ACETATE 9	●	●	●	●				●	●	●	●	●	●	●
BUTYLAMINE 10	●	●	●	●				●	●	●	●	●	●	●
BUTYL BENZOATE 11	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYL BUTYRATE 12	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYL CHLORIDE 13	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYL LACTATE 14	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTYL MERCAPTAN 15	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYL METHACRYLATE 16	●	●	●	●	●	●	●	●	●	●	●	●	●	●



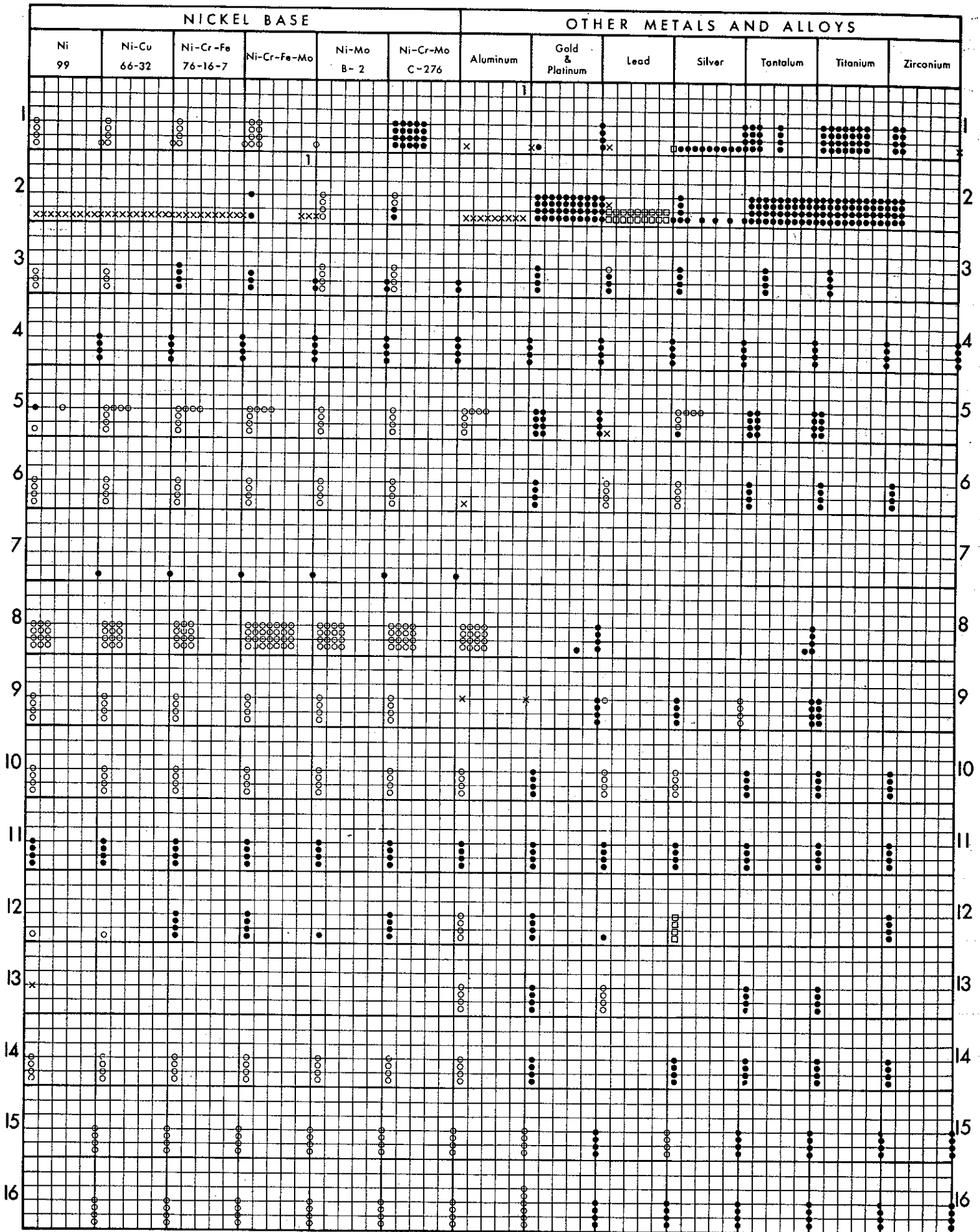
CORROSIVE	IRON BASE									COPPER BASE								
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni						
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5									
BUTYL PHENOLS 1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYL STEARATE 2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYRALDEHYDE 3	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTYRIC ACID 4	□	xx	x○	□□□□	x□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□	□□□□
BUTYRIC ANHYDRIDE 5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
BUTYROLACTONE 6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
BUTYRYL CHLORIDE 7	○	x□	x○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		

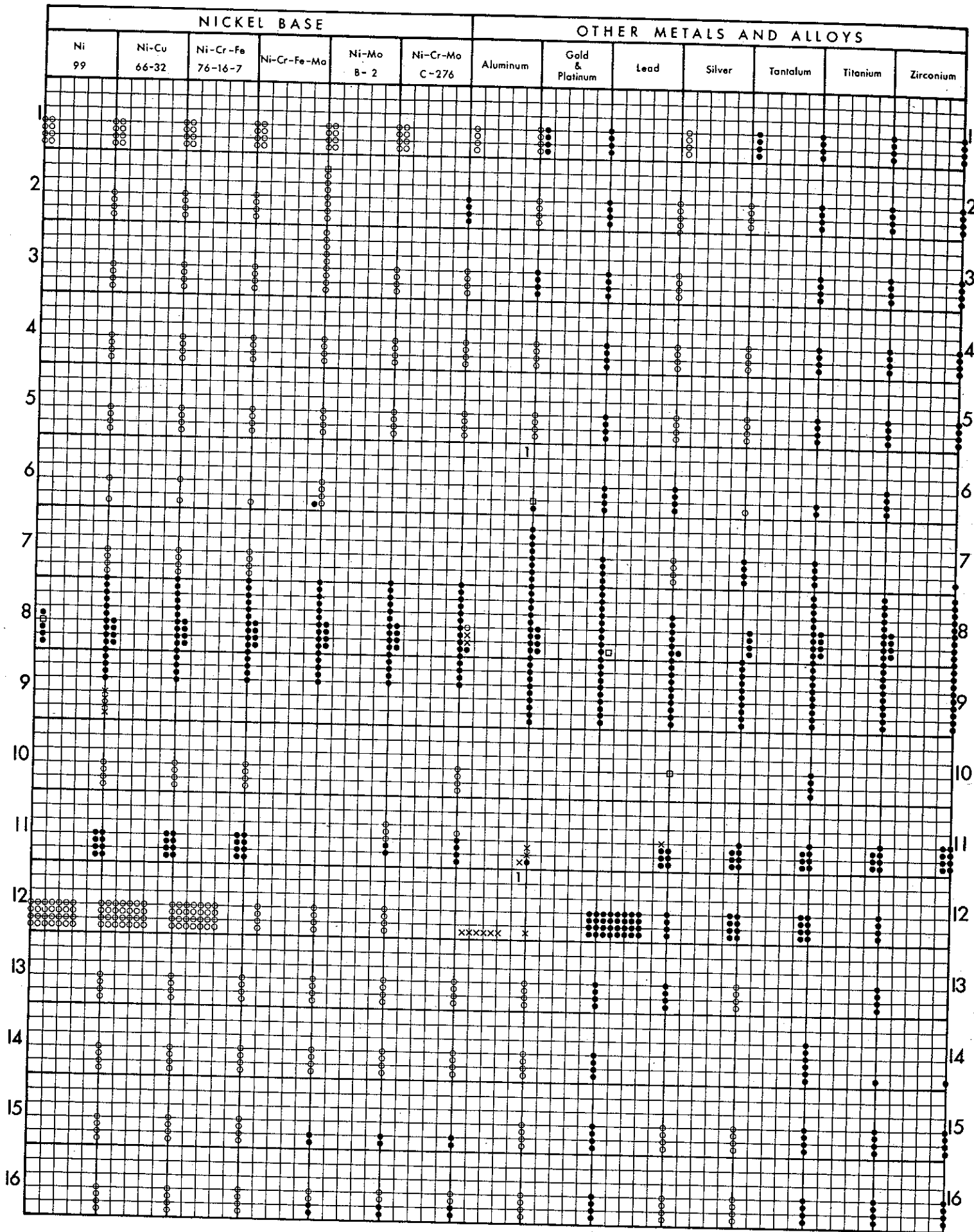


CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
CADMIUM CHLORIDE							1 2	1 2				
CADMIUM SULFATE	1	x x	x x	x x	x x	x x	x x					
CADMIUM SULFIDE	2											
CALCIUM ACETATE	3											
CALCIUM ARSENATE	4											
CALCIUM BENZOATE	5											
CALCIUM BISULFITE	6											
CALCIUM BROMIDE	7	x	x x	x x	x	x x	x					
CALCIUM CARBIDE	8											
CALCIUM CARBONATE	9											
CALCIUM CHLORATE	10											
CALCIUM CHLORIDE	11											
CALCIUM CHROMATE	12											
CALCIUM FLUORIDE	13											
CALCIUM GLUCONATE	14											
CALCIUM HYDRIDE	15											
	16											



CORROSIVE	IRON BASE										COPPER BASE						
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni					
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5								
CALCIUM HYDROXIDE 1	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM HYPOCHLORITE 2	×	×	×	○	×	×	×	×	○	○	○	○	○	○	○	○	○
CALCIUM LACTATE 3	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM NAPHTHENATE 4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CALCIUM NITRATE 5	×	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM OXALATE 6	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM OXIDE 7	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CALCIUM PERMANGANATE 8	×	×	×	○	×	×	○	○	○	○	○	○	○	○	○	○	○
CALCIUM PHOSPHATE 9	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM STEARATE 10	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM SULFATE 11	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
CALCIUM SULFIDE 12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM SULFITE 13	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CALCIUM THIOCYANATE 14	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□
CAMPHERE 15	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CAMPHOR 16	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○



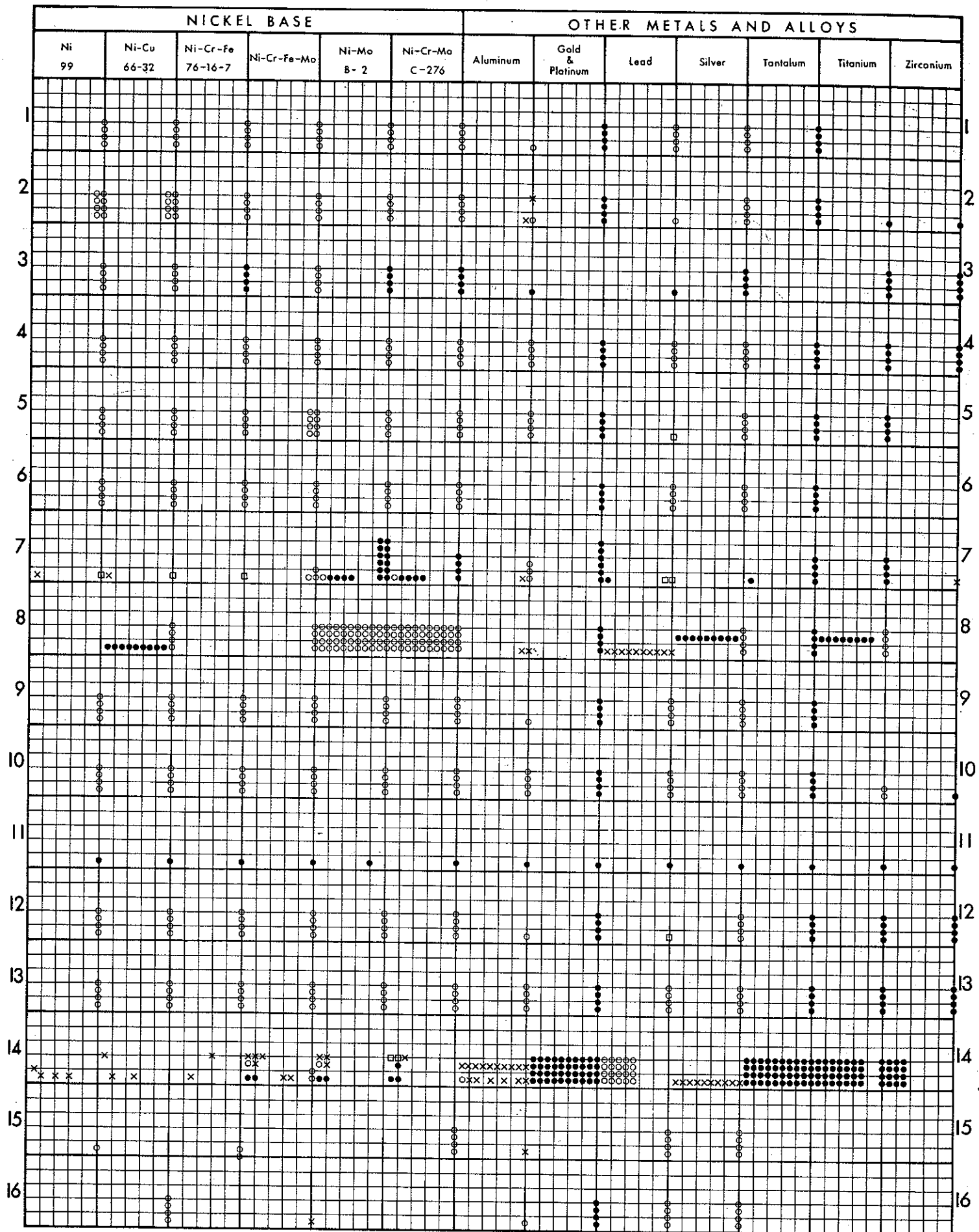


CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
CELLULOSE METHYL ETHER 1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CELLULOSE NITRATE 2	x○	x○	x○	○	○	○	○	○	○	○	○	○	○	○
CESIUM CHLORIDE 3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CESIUM HYDROXIDE 4	□	*	*	○	○	○	○	○	○	○	○	○	○	○
CETYL ALCOHOL 5	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHAULMOGRIC ACID 6	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORAL 7	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORAMINES 8	xxxxx	xxxxxxx	*	○	○	○	○	○	○	○	○	○	○	○
CHLORAMPHENICOL 9	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORANIL 10	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORDANE 11	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORIC ACID 12	xxxxxxxxx	xxxxxxxxx	*	○	○	○	○	○	○	○	○	○	○	○
CHLORINE 13	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORINE DIOXIDE 14	*	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORINE TRIFLUORIDE 15	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CHLORACETAL-DEHYDE 16	○	○	○	○	○	○	○	○	○	○	○	○	○	○

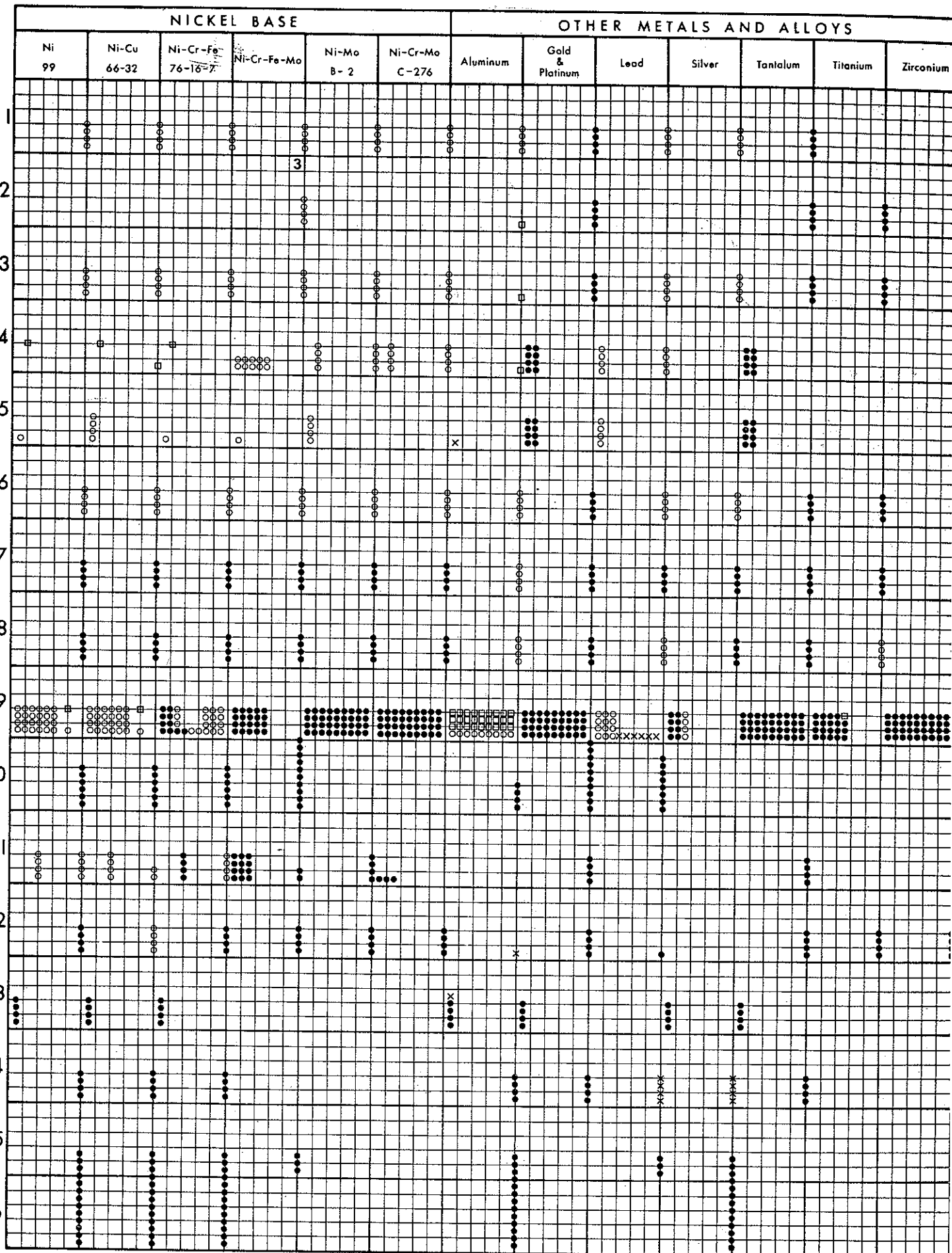


CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
CHLOROACETIC ACID (MONO)	x	x										x		x	
	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx	xxxxxx
CHLORACETONE															
2	x														
CHLORACETYL CHLORIDE															
3	x	x													
CHLOROALKYL ETHERS															
4	x	x													
CHLOROAMINO BENZOIC ACID															
5															
CHLOROANILINES															
6															
CHLOROBENZALDEHYDE															
7															
CHLOROBENZENE															
8		x													
CHLOROBENZO-TRIFLUORIDES															
9															
CHLORODI-FLUOROETHANE															
10															
CHLORODIFLUOROMETHANE															
11															
CHLOROETHYL BENZENE															
12															
CHLOROFORM															
13	x	x	x												
CHLOROHYDRIN															
14															
CHLORONAPHTHALENE															
15															
CHLORONITRO-BENZENE															
16															

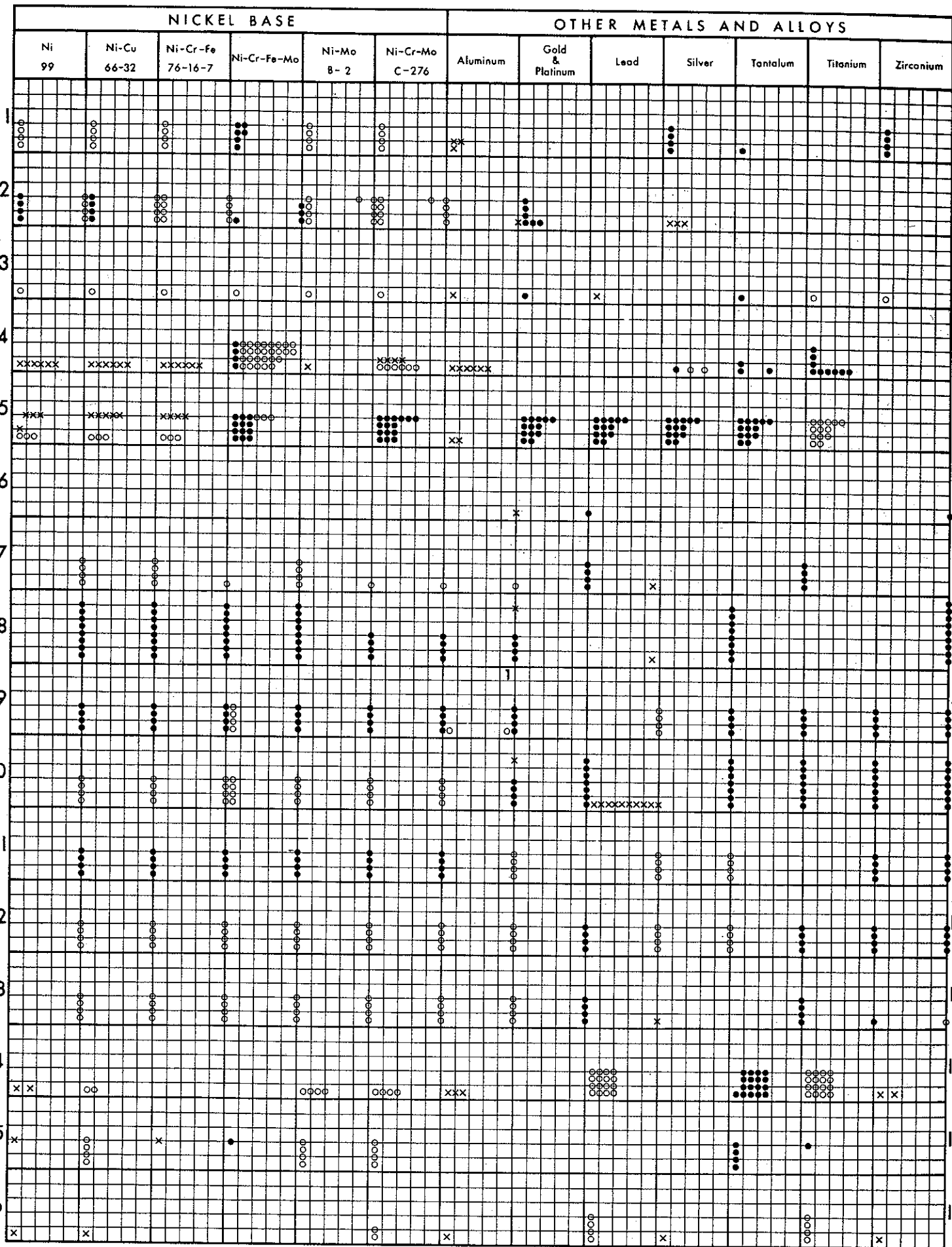
CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
CHLOROPHENO-HYDROXY ACETIC ACID 1															
CHLOROPHENOLS 2															
CHLOROPICRIN 3															
CHLOROPRENE 4															
CHLOROQUINE 5															
CHLOROSILANES 6															
CHLOROSULFONIC ACID 7															
CHLOROTOLUENE SULFONIC ACID 8															
CHLOROTOLU- IDINES 9															
CHLOROTRIFLUO- ROETHYLENE (CTFE) 10															
CHLOROTRIFLUO- ROMETHANE 11															
CHLOROXYLENOL 12															
CHOLESTEROL 13															
CHROMIC ACID 14															
CHROMIC CHLORIDE 15															
CHROMIC FLUORIDE 16															



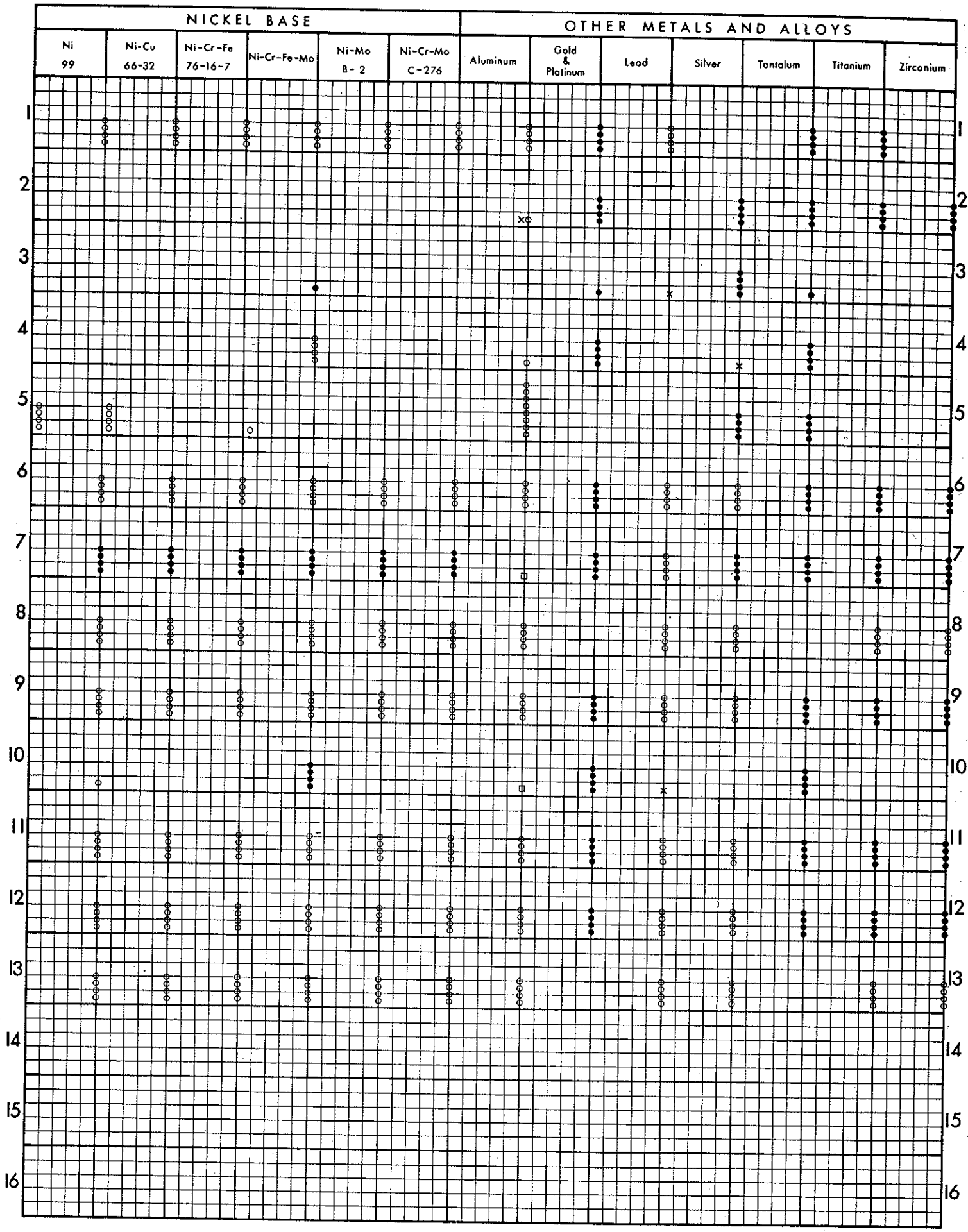
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
CHROMIC HYDROXIDE 1		o	o	o	o	o	o	o	o	o	o	o	o
CHROMIC NITRATE 2					3		3	3	3				
CHROMIC PHOSPHATE 3				o	o	o	o	o	o	o	o	o	o
CHROMIC SULFATE 4	x	x		x	xx	x	x	oo	oo	oo	oo	oo	oo
CHROMIUM POTASSIUM SULFATE 5	x	x		x	x		o	o	o		o	o	o
CHROMYL CHLORIDE 6		o		o	o	o	o	o	o	o	o	o	o
CINNAMIC ALCOHOL 7		o	o	o	o	o	o	o	o	o	o	o	o
CINNAMIC ALDEHYDE 8		o	o	o	o	o	o	o	o	o	o	o	o
CITRIC ACID 9	xxxxxxx	xxxxxxx	xxxxxxx	o	o	o	o	o	o	o	o	o	o
COAL GAS 10	o	o	o	o	o	o	o	o	o	o	o	o	o
COBALT ACETATE 11					1		o	o	o	o	o	o	o
COBALTOUS LINOLEATE 12		o	o	o	o	o	o	o	o	o	o	o	o
CODEINE SULFATE 13	o	o					o	o	o	o	o	o	o
COD LIVER OIL 14		x	x				o	o	o	o	x	x	x
CONIFERIN 15	o	o	o				o	o	o	o	o	o	o
COPAL 16	o	o	o				o	o	o	o	o	o	o



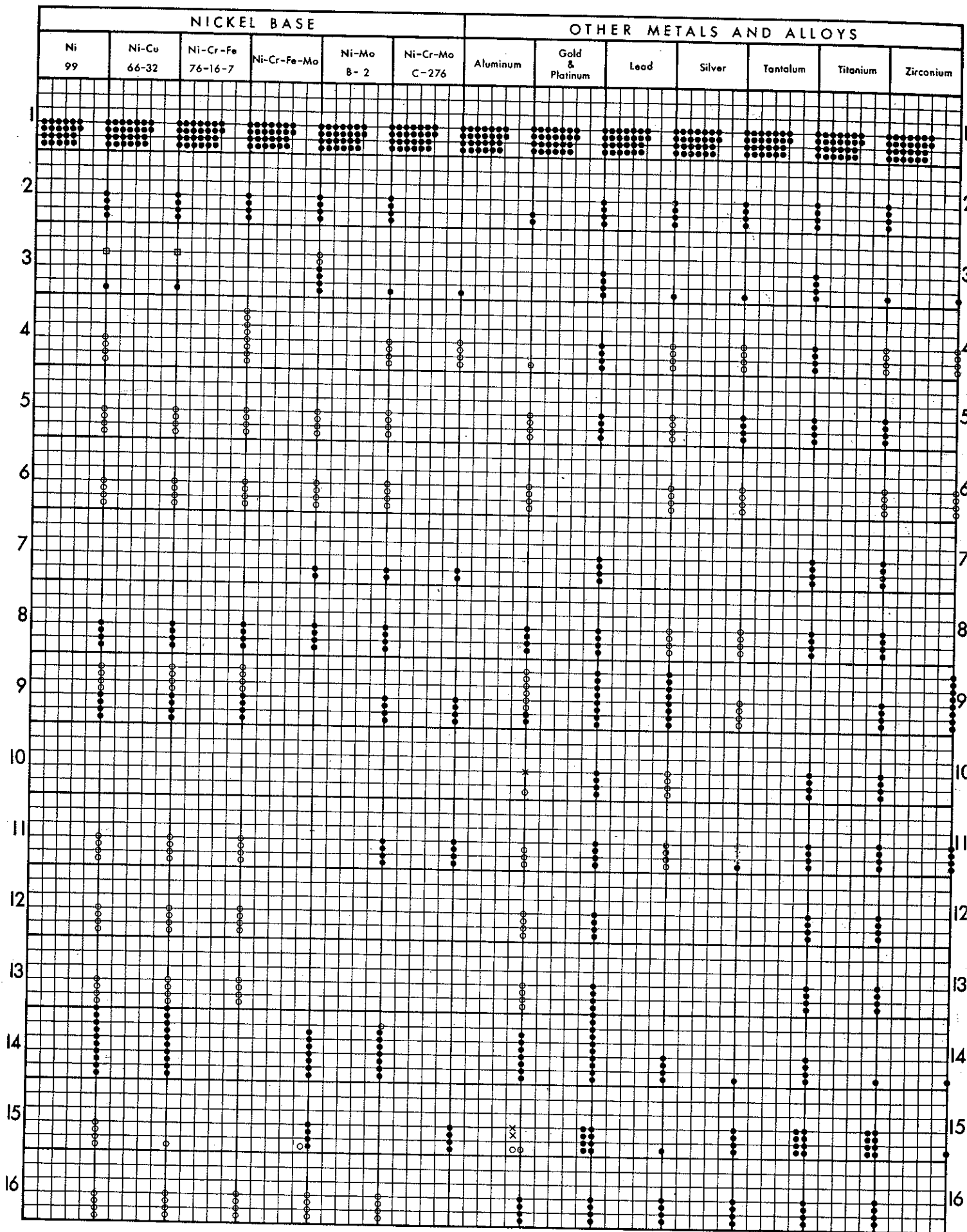
CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
COPPER ACETATE	1	□	□	○	○	○	○	○	○	○	○	○	○	○	○
COPPER AMMONIUM ACETATE	2	●	●	●	●	●	●	●	●	●	●	●	●	●	●
COPPER CARBONATE	3	○	○	○	○	○	○	○	○	○	○	○	○	○	○
COPPER NITRATE	4	xxxxxx	xxxxxx	xxxxxx	○	○	○	○	○	○	○	○	○	○	○
COPPER SULFATE	5	xx	xx	○	○	○	○	○	○	○	○	○	○	○	○
COPPER SULFATE + 5% H ₂ SO ₄	6	x	x												
CREOSOTE	7	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CRESOL	8	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CROTONALDEHYDE	9	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CROTONIC ACID	10	xxxxxx	xxxxxx												
CUMALDEHYDE	11	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CUMENE	12	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CUMENE HYDROPEROXIDE	13	○	○	○	○	○	○	○	○	○	○	○	○	○	○
CUPRIC CHLORIDE	14	xxx	x x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x	x x
CUPRIC CYANIDE	15	x	x	x	x	x	x	x	x	x	x	x	x	x	x
CUPROUS CHLORIDE	16	x	x	x	x	x	x	x	x	x	x	x	x	x	x



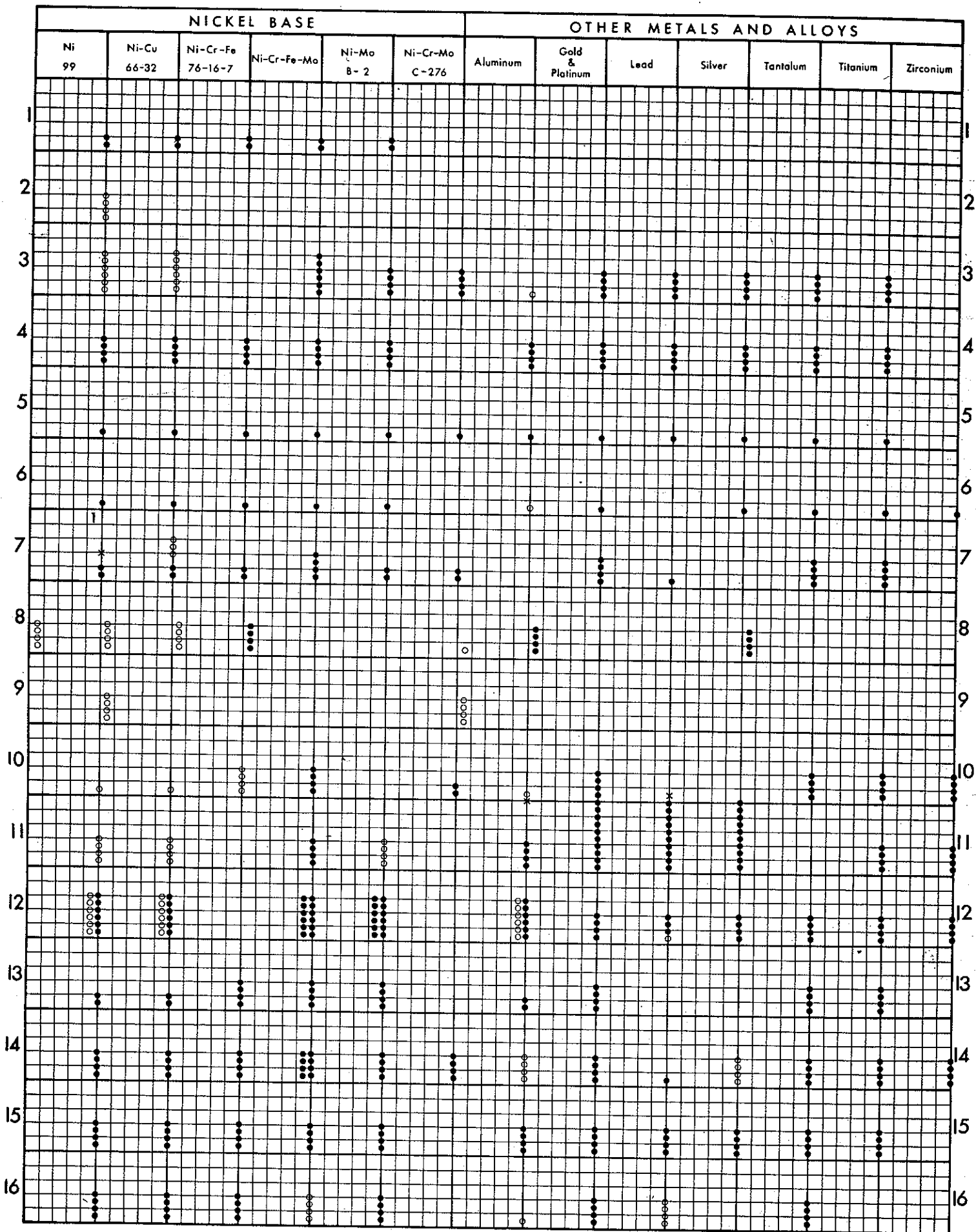
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
CYANAMIDE 1	○	○	○	○	○	○	○	○	○	○			
CYANOACETIC ACID 2	□ 2												*
CYANOGEN 3	○				●			●	●		□	●	
CYANOGEN CHLORIDE 4	○									○	○	○	
CYANURIC CHLORIDE 5	x						○			○			
CYCLOHEXANE 6	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLOHEXANOL 7	●	○	○	○	○	○	○	○	○	○	○	○	○
CYCLOHEXANONE 8	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLOHEXENE 9	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLO-HEXYLAMINE 10	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLOPENTANE 11	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLOPENTADIENE 12	○	○	○	○	○	○	○	○	○	○	○	○	○
CYCLO POLYOLEFINS 13	○	○	○	○	○	○	○	○	○	○	○	○	○
14													
15													
16													

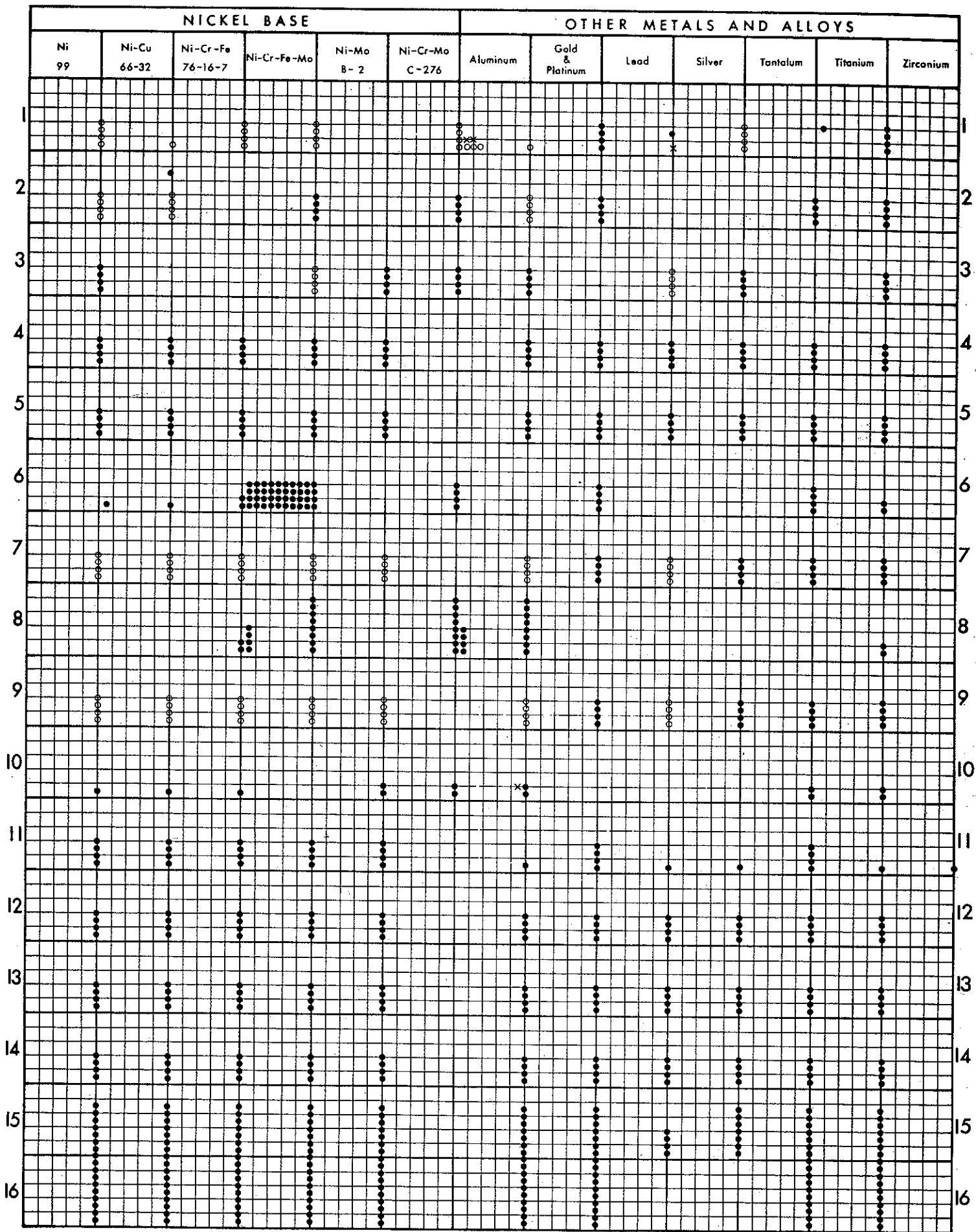


CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
DEXTROSE	1	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●	●●●●●
DIACETONE	2	●	●	●	●	●	●	●	●	●	●	●
ALCOHOL												
DIALLYL PHTHALATE	3	●	●	●	●	●	●	●	●	●	●	●
DIAMYL ETHER	4	○	○	○	○	○	○	○	○	○	○	○
DIBENZYL	5	○	○	○	○	○	○	○	○	○	○	○
DIBENZYL ETHER	6	○	○	○	○	○	○	○	○	○	○	○
DIBUTYL AMINES	7	●	●	●				●	●	●	*	*
DIBUTYL ETHER	8	○	○	○	○	○	○	○	○	○	○	○
DIBUTYL PHTHALATE	9	○	○	○	○	○	○	○	○	○	○	○
DIBUTYL THIOUREA	10	○	○	○	○	○	○	○	○	○	○	○
DICHLORO-BENZENS	11	○	○	○	○	○	○	○	○	○	○	○
DICHLORO BUTATE	12	○	○	○	○	○	○	○	○	○	○	○
DICHLORO BUTENE	13	○	○	○	○	○	○	○	○	○	○	○
DICHLORO DIFLUORO METHANE	14	●	●	●	●	●	●	●	●	●	●	●
DDT	15	x	x	●				○	○	○		*
DICHLORO-ETHYLENE	16	○	○	○	○	○	○	○	○	○	○	○

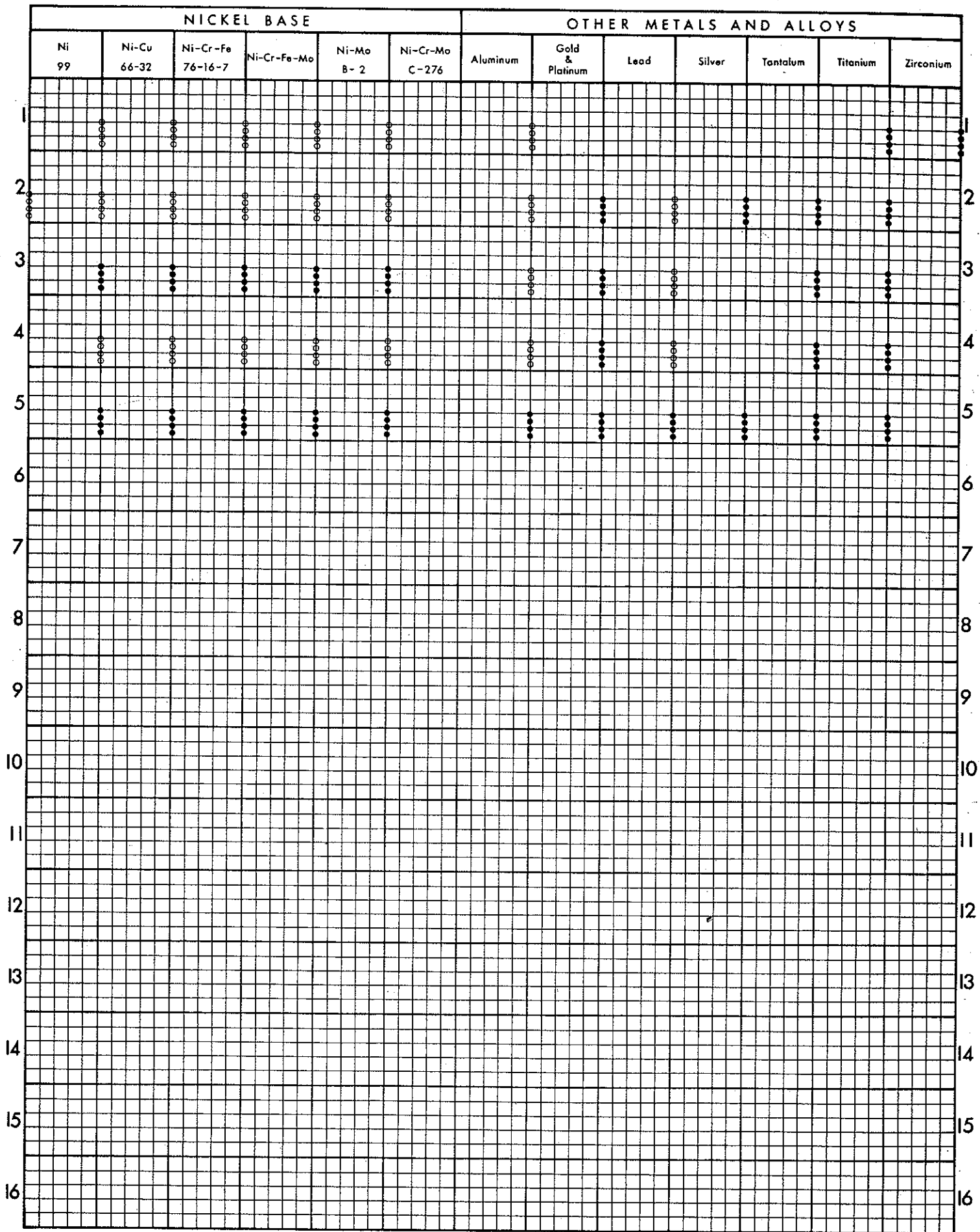


CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-N	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
DICHLORO-ETHYLETER	1	•	•	•	•	•	•	•	•			•	•
DICHLORO HYDRIN	2	•	•	•	•	•	•	•	•			•	•
DICHLORO PHENOL	3	•	•	•	•	•	•	•	•	2	2	•	•
DICHLORO-PROPENE	4	•	•	•	•	•	•	•	•			•	•
DICHLOROTETRA-FLUOROETHANE	5	•	•	•	•	•	•	•	•			•	•
DIELDRIN	6	•	•	•	•	•	•	•	•			•	•
DIETHANO LAMINE	7	•	•	•	•	•	•	•	•			•	•
DIETHANO LAMINE + H ₂ S	8	•	•	•	•	•	•	•	•	1	1	•	•
DIETHANO LAMINE + H ₂ S + CO ₂	9	•	•	•	•	•	•	•	•			•	•
DIETHYLAMINE	10	•	•	•	•	•	•	•	•			•	•
DIETHYL ANILINE DIMETHYL ANILINE	11	•	•	•	•	•	•	•	•			•	•
DIETHYLENE GLYCOL	12	•	•	•	•	•	•	•	•			•	•
DIETHYLENE TRIAMINE	13	•	•	•	•	•	•	•	•			•	•
DIETHYLETER	14	•	•	•	•	•	•	•	•			•	•
DIETHYLPHTHA-LATE	15	•	•	•	•	•	•	•	•			•	•
DIFLOURO ETHANE	16	•	•	•	•	•	•	•	•			•	•

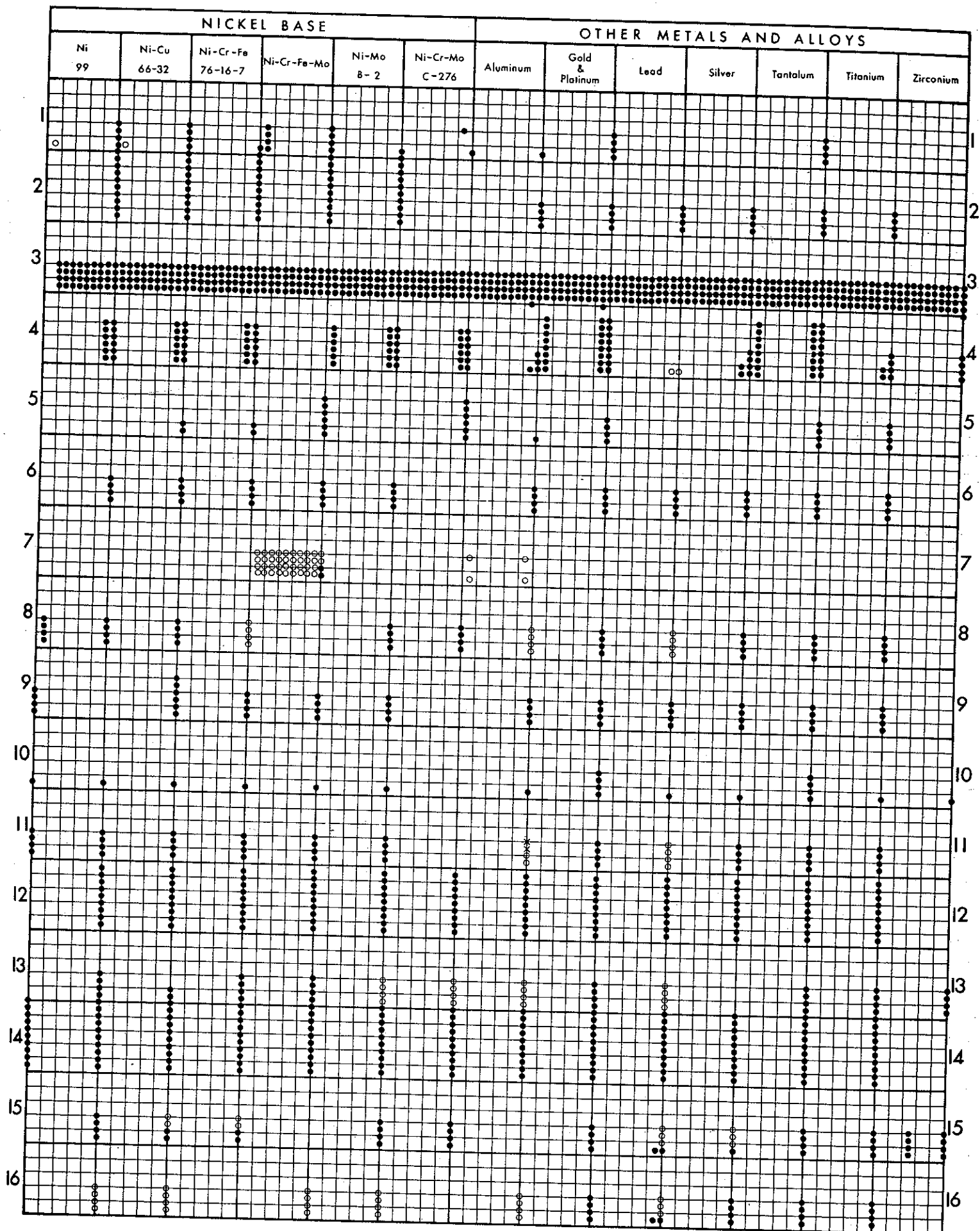




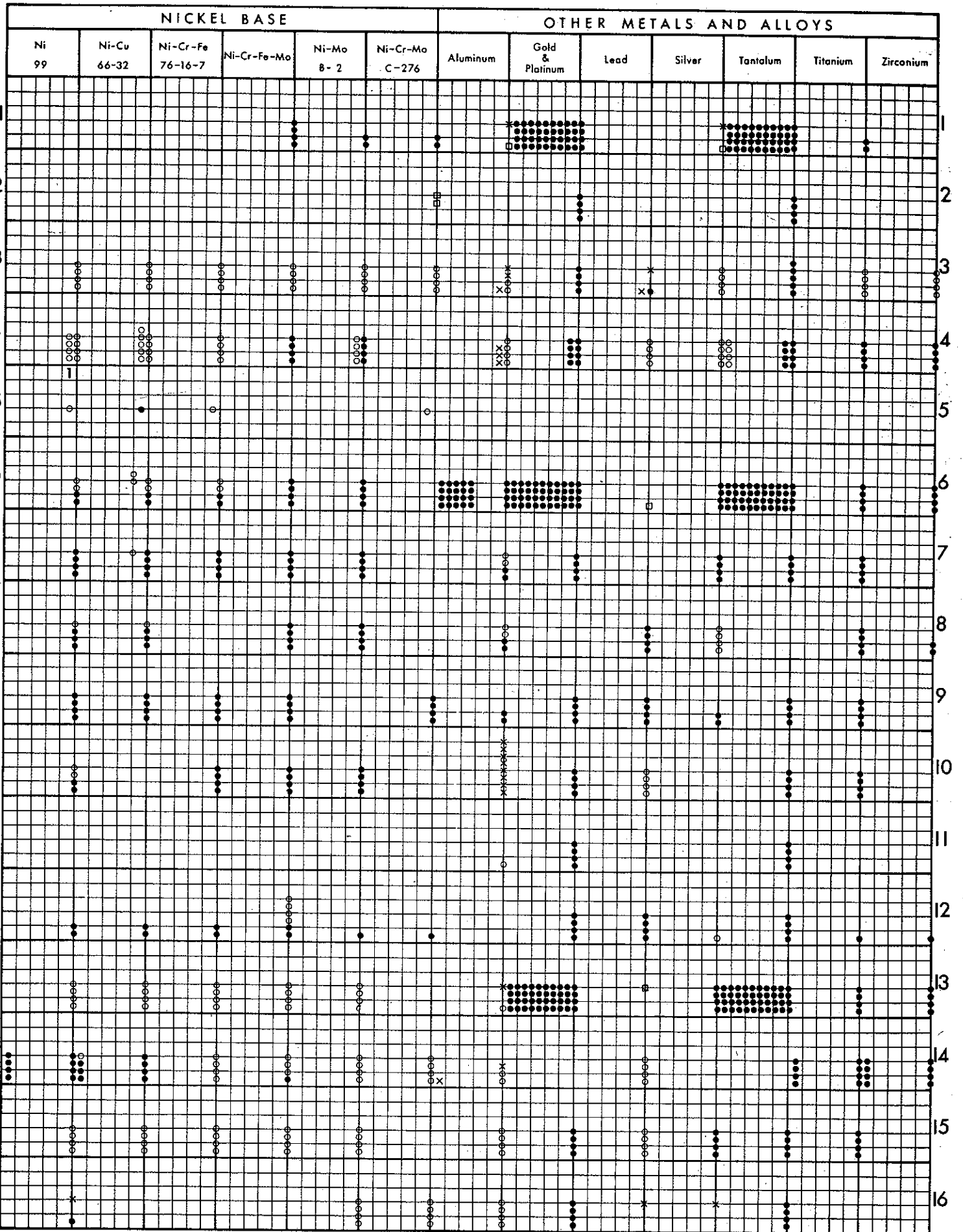
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
DIPHENYL LAMINE												2	
DIPHENYLENE OXIDE (DIBENZOFURAN)													
DIPHENYL OXIDE													
DIPHENYL PROPANE													
DODECYL BENZENE													



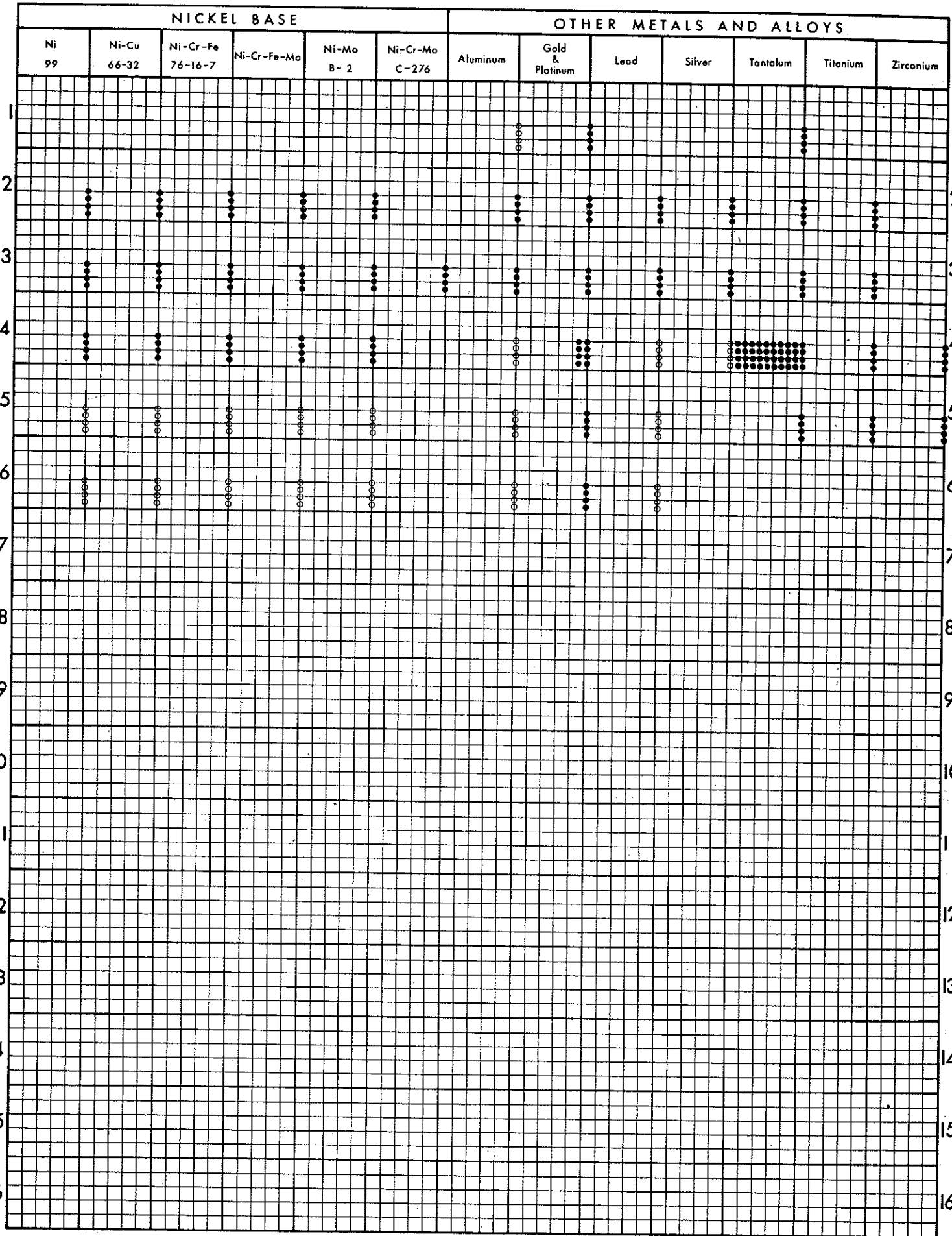
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	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
EPICHLORO-HYDRIN 1	1						1	2		1		
ETHANE 2												
ETHANOL 3												
ETHYL ACETATE 4												
ETHYL ACGTOACETATE 5												
ETHYL ACRYLATE 6												
ETHYL AMINE 7											x	x
ETHYL BENZENE 8												
ETHYL BENZOATE 9												
ETHYL BROMIDE 10												
ETHYL BUTYRATE 11												
ETHYL CHLORIDE ANHYDROUS 12												
ETHYL CHLORIDE MOIST 13												
ETHYLENE 14												
ETHYLENE CHLORO-HYDRIN 15												
ETHYLENE YCNOHYDRIN 16		x										



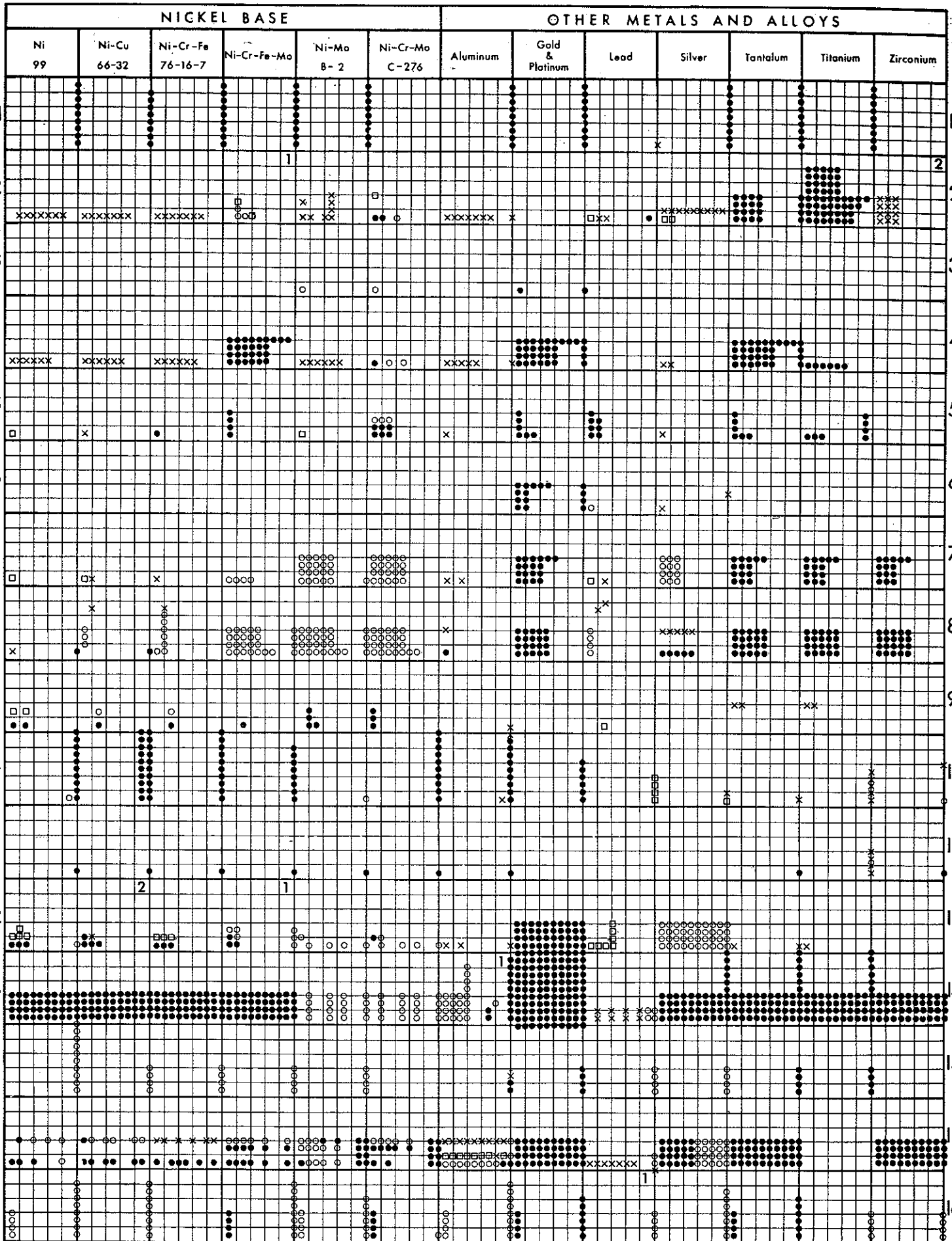
CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
ETHYLENE DIAMINE															
ETHYLENE DIAMINE HYDROCHLORINE															
ETHYLENE DIBROMIDE															
ETHYLENE DICHLORIDE															
ETHYLENE DICHLORIDE & STEAM															
ETHYLENE GLYCOL															
ETHYLENE GLYCOL DIBUTYL ETHER															
ETHYLENE GLYCOL MONOBUTYL ETHER															
ETHYLENE GLYCOL MONOMETHYL-ACETATE LETHER															
ETHYLENE GLYCOL MONO ETHYLETHER															
ETHYLENE IMINE															
ETHYLENE OXIDE															
ETHYL FORMATE															
ETHYLIDENE CHLORIDE															
ETHYL MALONATE															
ETHYL MERCAPTAN															



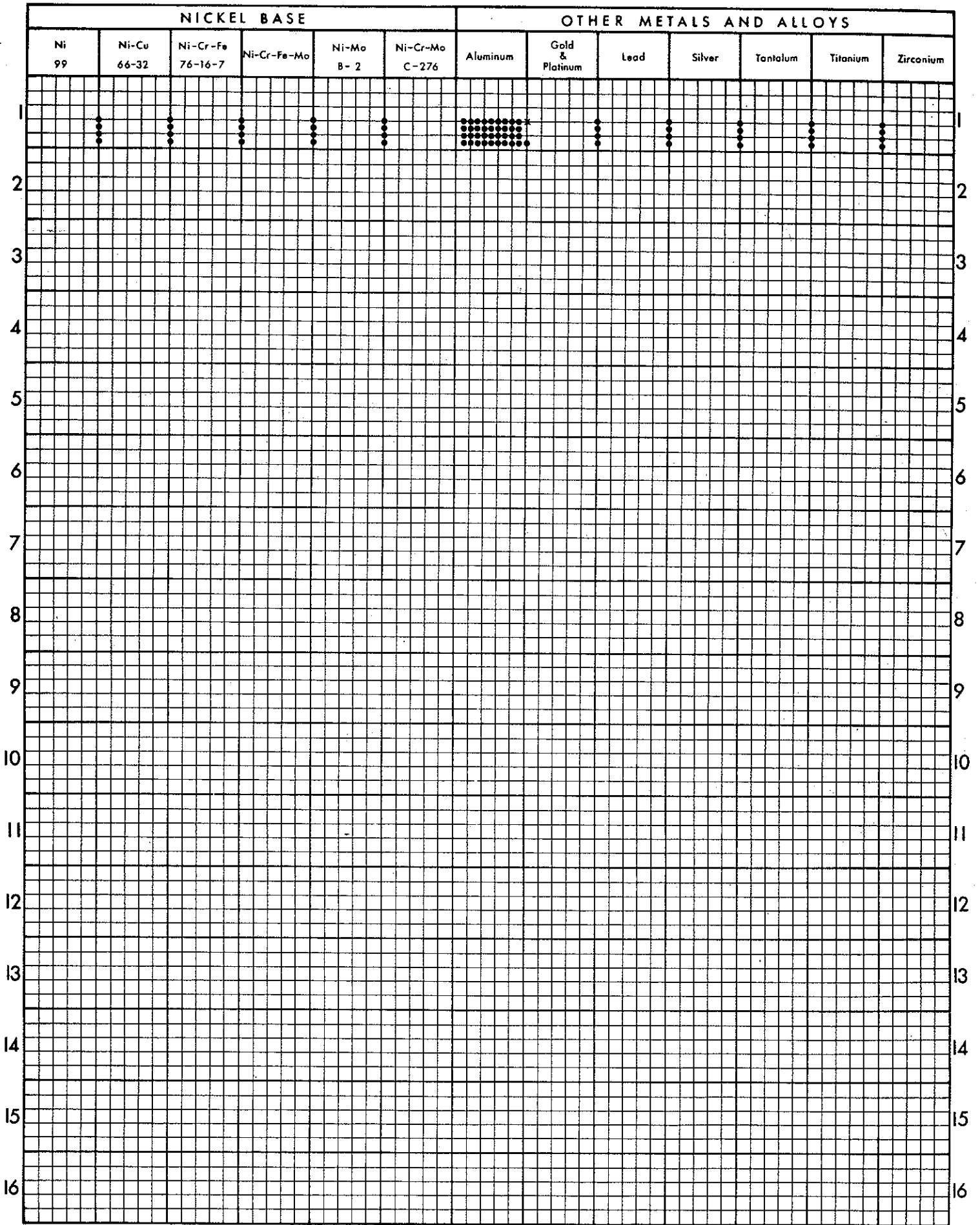
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	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
ETHYL NITRITE	1	●	●	●	●	●	●	●	●	●	●	●	●
ETHYL PELARGONITE	2	●	●	●	●	●	●	●	●	●	●	●	●
ETHYL PROPIONATE	3	●	●	●	●	●	●	●	●	●	●	●	●
ETHYL SILICATE	4	●	●	●	●	●	●	●	●	●	●	●	●
ETHYL STEARATE	5	●	●	●	●	●	●	●	●	●	●	●	●
ETHYL VALERATE	6	●	●	●	●	●	●	●	●	●	●	●	●
	7												
	8												
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												



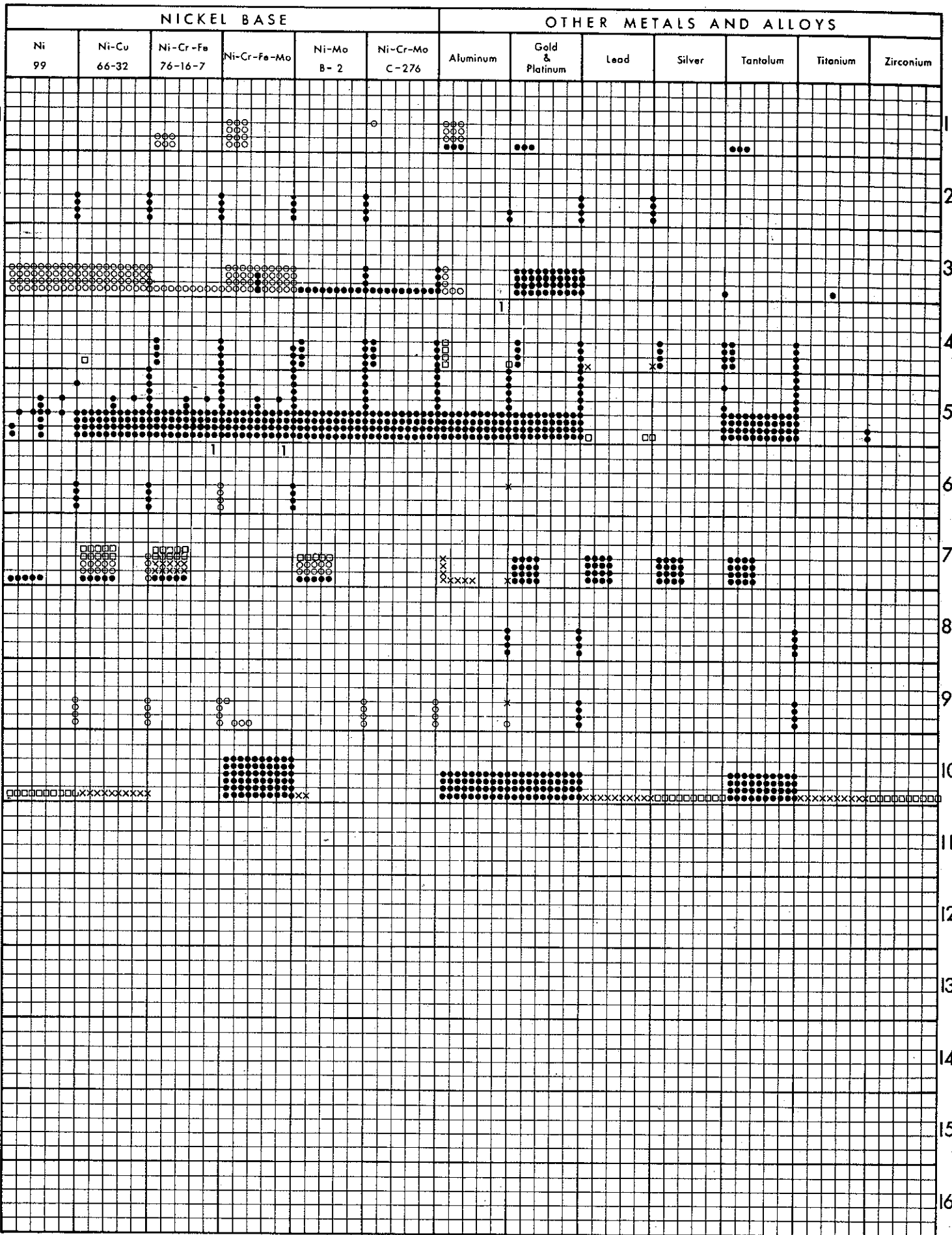
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	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
FATS, NATURAL														
FERRIC CHLORIDE														
FERRIC HYDROXIDE														
FERRIC NITRATE														
FERRIC SULFATE														
FERROUS AMMONIUM SULFATE														
FERROUS CHLORIDE														
FERROUS SULFATE														
FLUOBORIC ACID														
FLUORINE GAS														
FLUORINE LIQUID														
FLUOSILICIC ACID														
FORMALDEHYDE														
FORMANIDE														
FORMIC ACID														
FURFURAL														



CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
FURFUAL ALCOHOL												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												



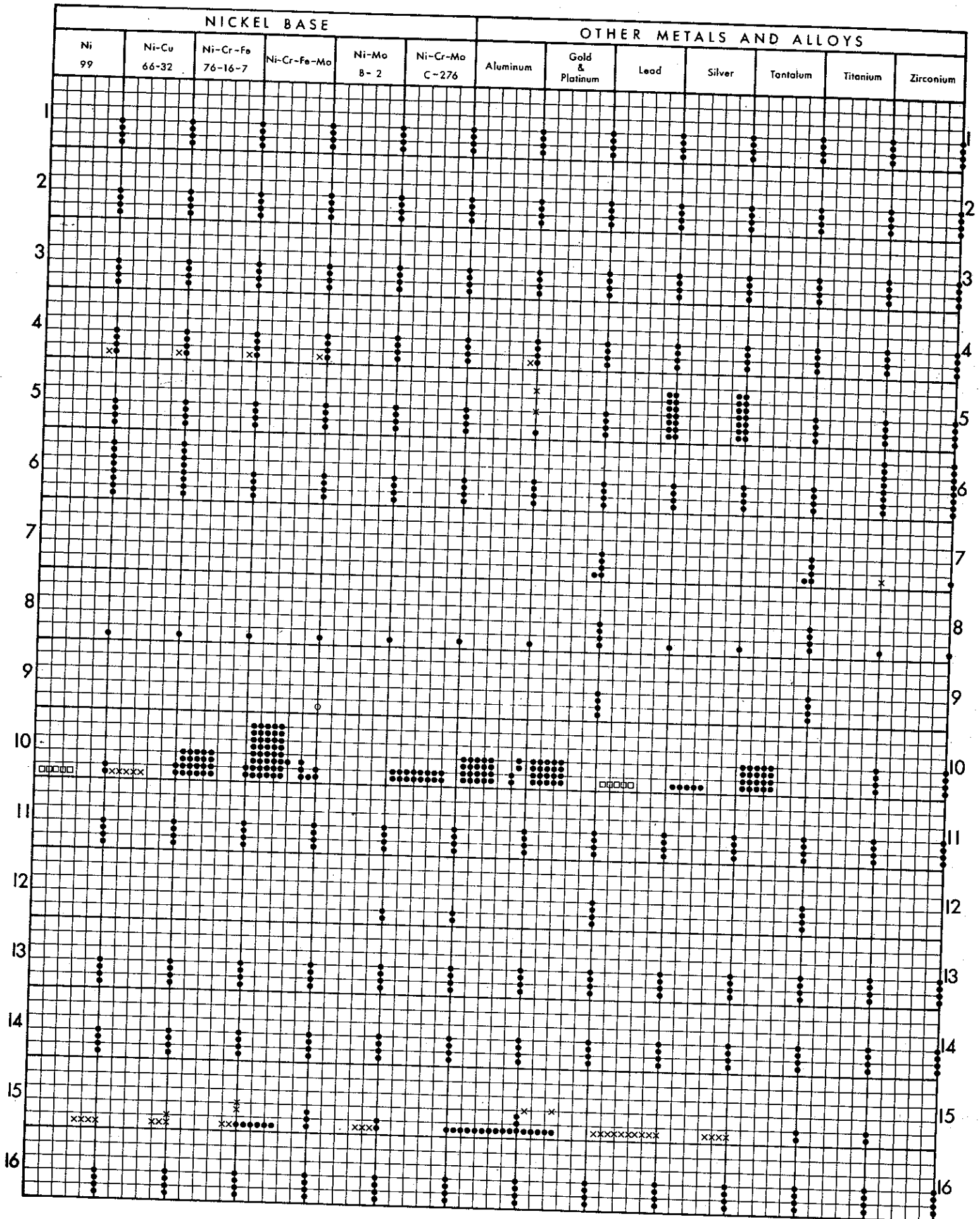
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
GALLIC ACID	1	xx	*			oo	oo	oo	oo	oo	oo			
GELATIN	2		o			o	o	o	o	o		o	o	o
GLUCONIC ACID	3	oo	oo			oo	oo	oo	oo	oo	oo	oo	oo	oo
GLUTANIC ACID	4	x	xx			o						o	o	o
GLYCEROL	5	x	o			o			oo	oo	oo	oo	oo	oo
GLYCEROL + NA CL	6		x						o	o	o	o	o	o
GLYCEROPHOSPHORIC ACID	7	x	x	xx	x			o	oo	oo	oo	oo	oo	oo
GLYCIDOL	8		o			o	o	o	o	o	o	o	o	o
GLYOXYLIC ACID	9		*	*				oo	oo	oo		oo		
GUANIDINE NITRATE	10	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo	oo
	11													
	12													
	13													
	14													
	15													
	16													



CORROSIVE	IRON BASE									COPPER BASE							
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni					
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5								
HEPTACHLOR 1																	
HEPTALDEHYDE 2																	
HEPTANE 3																	
HEXACHLORO-BUTADIENE 4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
HEXACHLORO-ETHANE 5	x x x x x x	x x x x x x		o o o o o o	o o o o o o				o o o o o o	o o o o o o							
HEXACHLORO-PENTADIENE 6																	
HEXAETHYL TETRAPHOSPHATE 7	x																
HEXAFLUOR-OXYLENE 8																	
HEXAMETHYLENE DIAMMONIUM ADIPATE 9	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	
HEXAMETHYLENE TETRAMINE 10	x x x x x x o o o o			o o o o o o o o o o	o o o o o o o o o o				o o o o o o o o o o	o o o o o o o o o o				o o o o o o o o o o	o o o o o o o o o o	o o o o o o o o o o	o o o o o o o o o o
HEXANE 11																	
HEXANETRIOL 12																	
HEXANOL 13																	
HEXYLENE GLYCOL 14																	
HYDRAZINE 15	x x x x x x	x x x x x x		o	o				o o o o o o o o o o	o o o o o o o o o o				x x x x	x x x x x x x x x x	x x x x	x
HYDROABIETYL ALCOHOL 16																	

NICKEL BASE

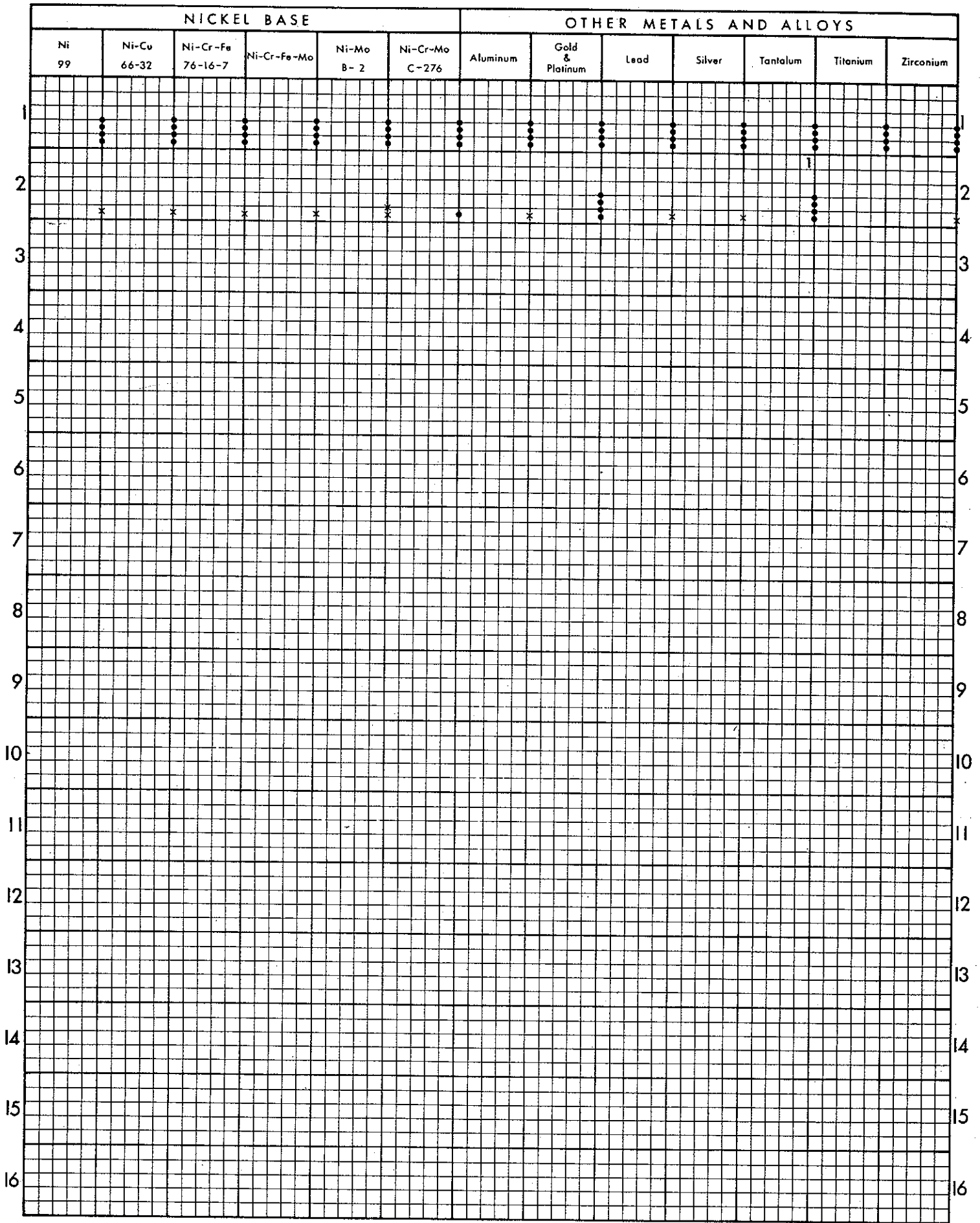
OTHER METALS AND ALLOYS



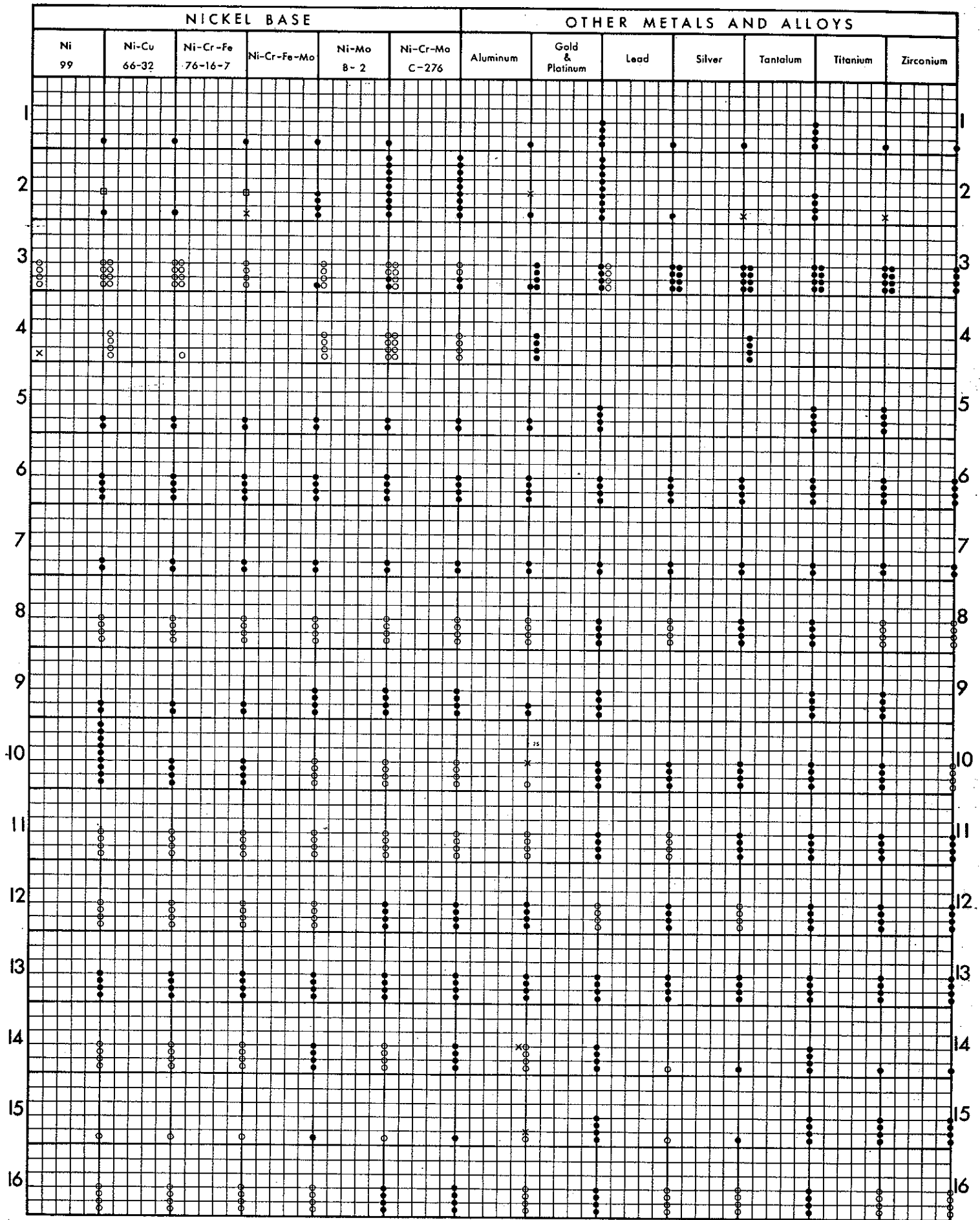
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
HYDROBROMIC ACID							1	1						
	xxxxxxx	xxxxxxx	o	x	xxxxxx	xxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx	xxxxxxx
HYDROCARBON FLUORIDES														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROCHLORIC ACID aerated							12	12		2				
	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
HYDROCHLORIC ACID not aerated														
	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
HYDROCYANIC ACID							23	23		2				
	x	x	x	x	x	x	x	x	x	x	x	x	x	x
HYDROFLUORIC ACID aerated							23	23						
	x	x	x	x	x	x	x	x	x	x	x	x	x	x
HYDROFLUORIC ACID not aerated														
	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
HYDROGEN														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROGEN CHLORIDE (ANHYDROUS)														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROGEN FLUORIDE (ANHYDROUS)														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROGEN PEROXIDE														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROGEN SULFIDE (ANHYDROUS)														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROGEN SULFIDE														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROIOTIC ACID														
	x	x	x	x	x	x	x	x	x	x	x	x	x	x
HYDROQUINONE														
	o	o	o	o	o	o	o	o	o	o	o	o	o	o
HYDROXYACETIC ACID														
	x	x	x	x	x	x	x	x	x	x	x	x	x	x



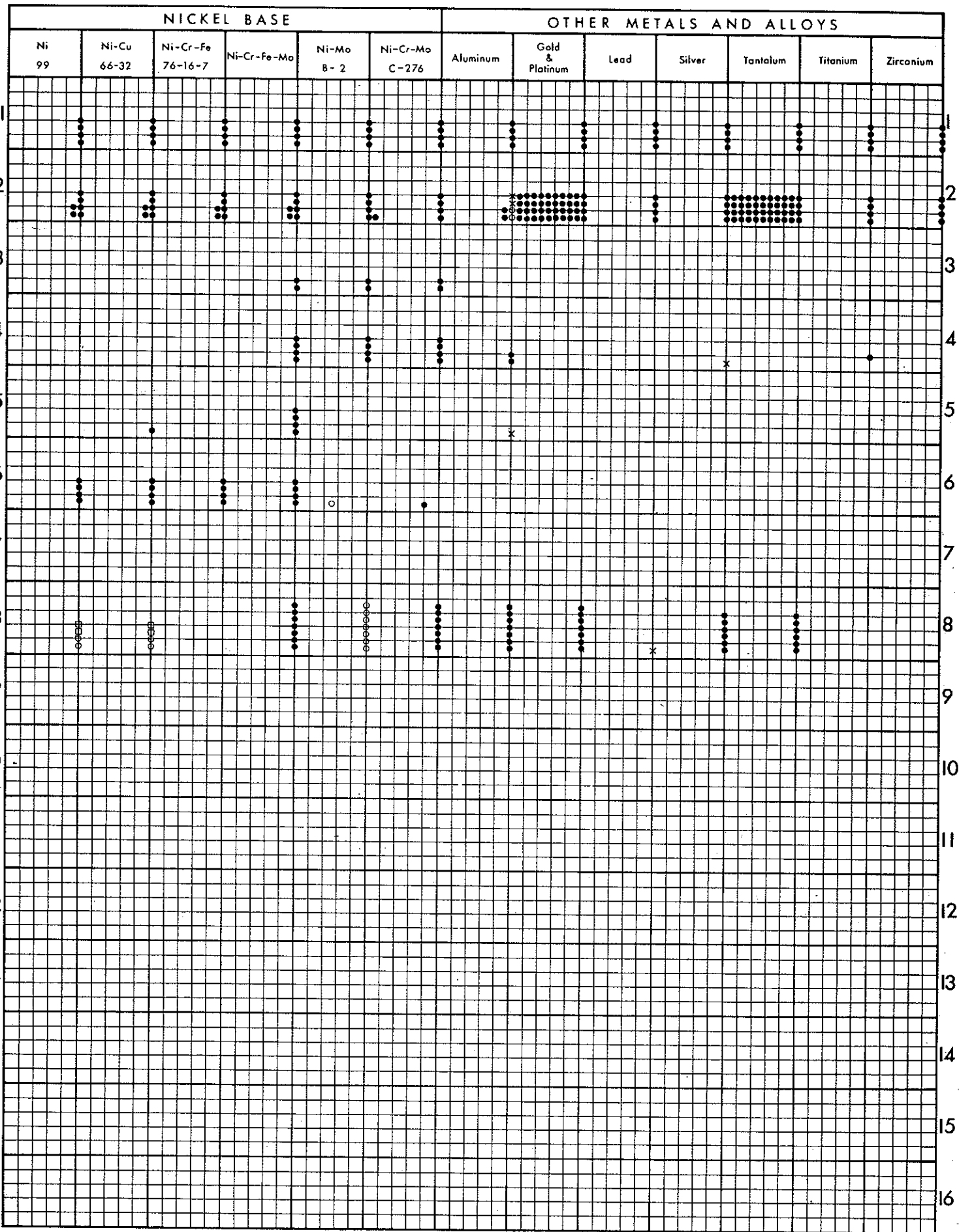
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
HYDROXYCITRONELLA	I	•	•	•	•	•	•	•	•	•	•	•	•	•
HYPOCHLOROUS ACID	2	*	*	*	*	*	*	*	*	*	*	*	*	*
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
	14													
	15													
	16													



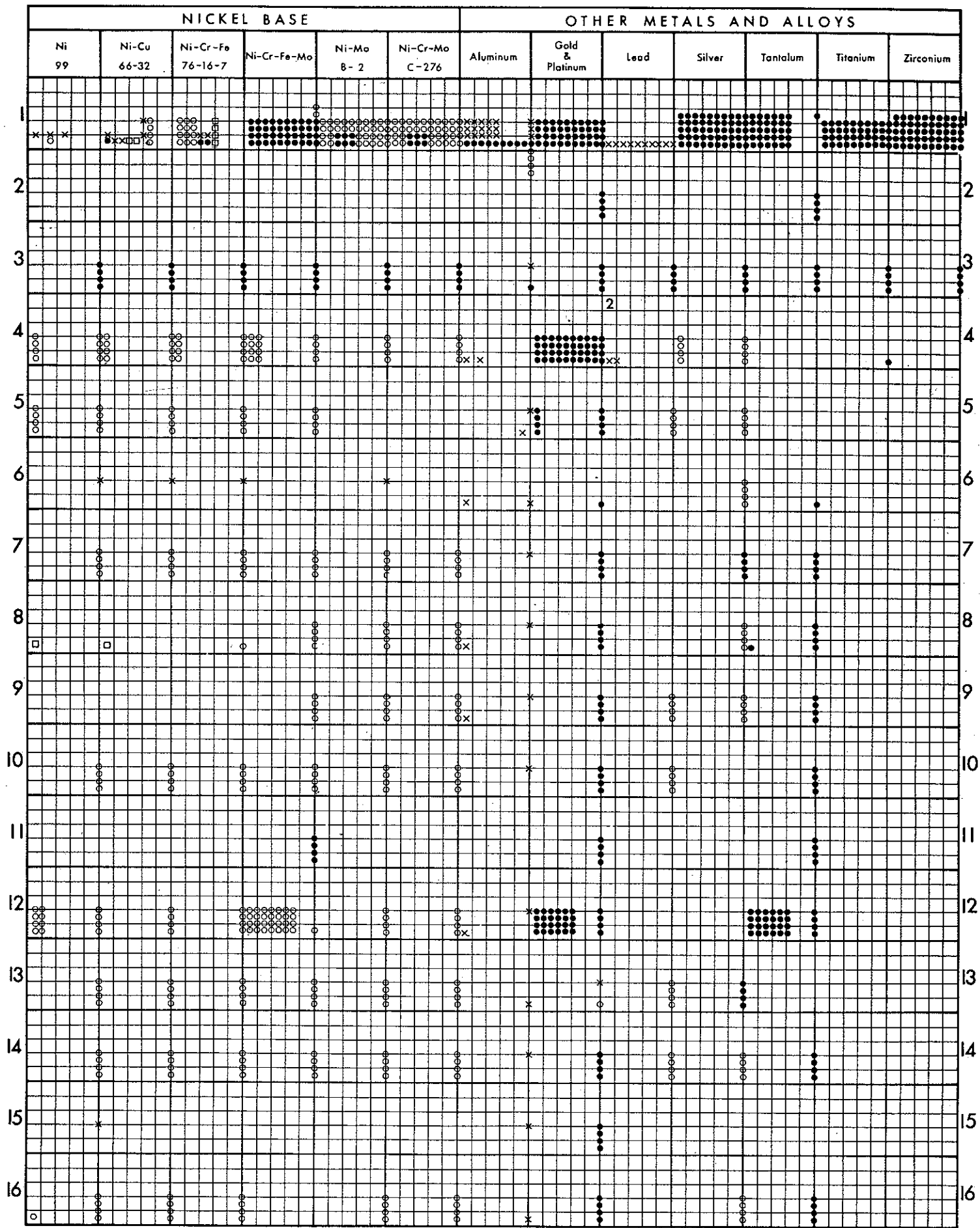
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
INDOLE														
1 IODINE		•	•	•	••	•	•	•	•	•	•	•	•	•
2 IDOFORM		•••••	•	1	1	1	1	1	1	1	•••••	•	•	•
3 IRON POTASSIUM SULFATE		•	•	•	•	•	•	•	•	•	•	•••••	•	•
4 ISOAMYL ACETATE	x	x	o	x	x	x	x	x	x	x	o	o	o	o
5 ISOAMYL BUTYRATE		•	•	•	•	•	•	•	•	•	•	•	•	•
6 ISOBORNEAL ACETATE		•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
7 ISOBORNEAL ESTER		•	•	•	•	•	•	•	•	•	•	•	•	•
8 ISOBUTYL ACETATE		•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
9 ISOBUTYL CHLORIDE		•	•	•	••	••	••	••	••	••	••	••	••	••
10 ISOBUTYL GLYCOL		•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
11 ISOBUTYL OXIDE		•••••	•••••	•••••	•••••	•••••	•••••	••~••	••~••	••~••	••~••	••~••	••~••	••~••
12 ISOBUTYL ISOLVALERATE		•••••	•••••	•••••	•••••	•••••	•••••	•••••	••~••	••~••	••~••	••~••	••~••	••~••
13 ISOBUTYL PHOSPHATE		•••••	•••••	•••••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••
14 ISOCHOTYL CHLORIDE		•••••	•••••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••
15 ISODODECANE		•••••	•	•	•	•	•	•	•	•	•	•	•	•
16		••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••	••~••



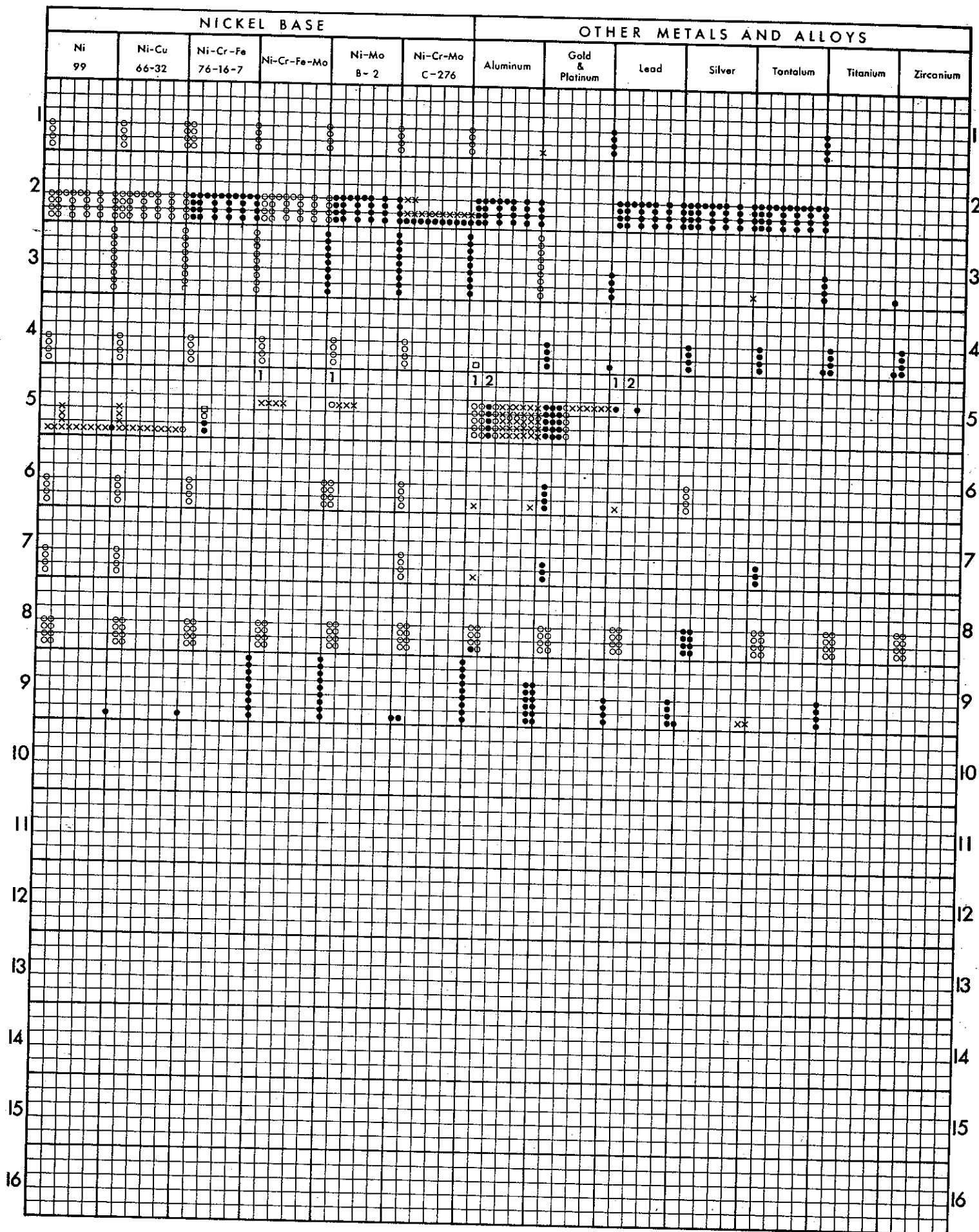
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
ISOPHORONE	1	•	•	•	•	•	•	•	•	•	•	•	•
ISOPROPANOL	2	•	•	•	•	•	•	•	•	•	•	•	•
ISOPROPANYL ACETATE	3	•			•	•	•	•	•	•	•	•	
ISOPROPYL ACETATE	4	•	•	•	•	•	•	•	•	•	•	•	•
ISOPROPYL 2 CHLORETHYL SULFITE	5	*	*			•	•	•	•	•			*
ISOPROPYL CHLORIDE	6	•	•	•	•	•	•	•	•	•	•	•	•
ISOPROPYL AMINE	7	•	•	•	•	•	•	•	•	•	•	*	*
ISOVALERIC ACID	8	•	•	•		•	•	•	•	•	•	•	•
	9												
	10												
	11												
	12												
	13												
	14												
	15												
	16												



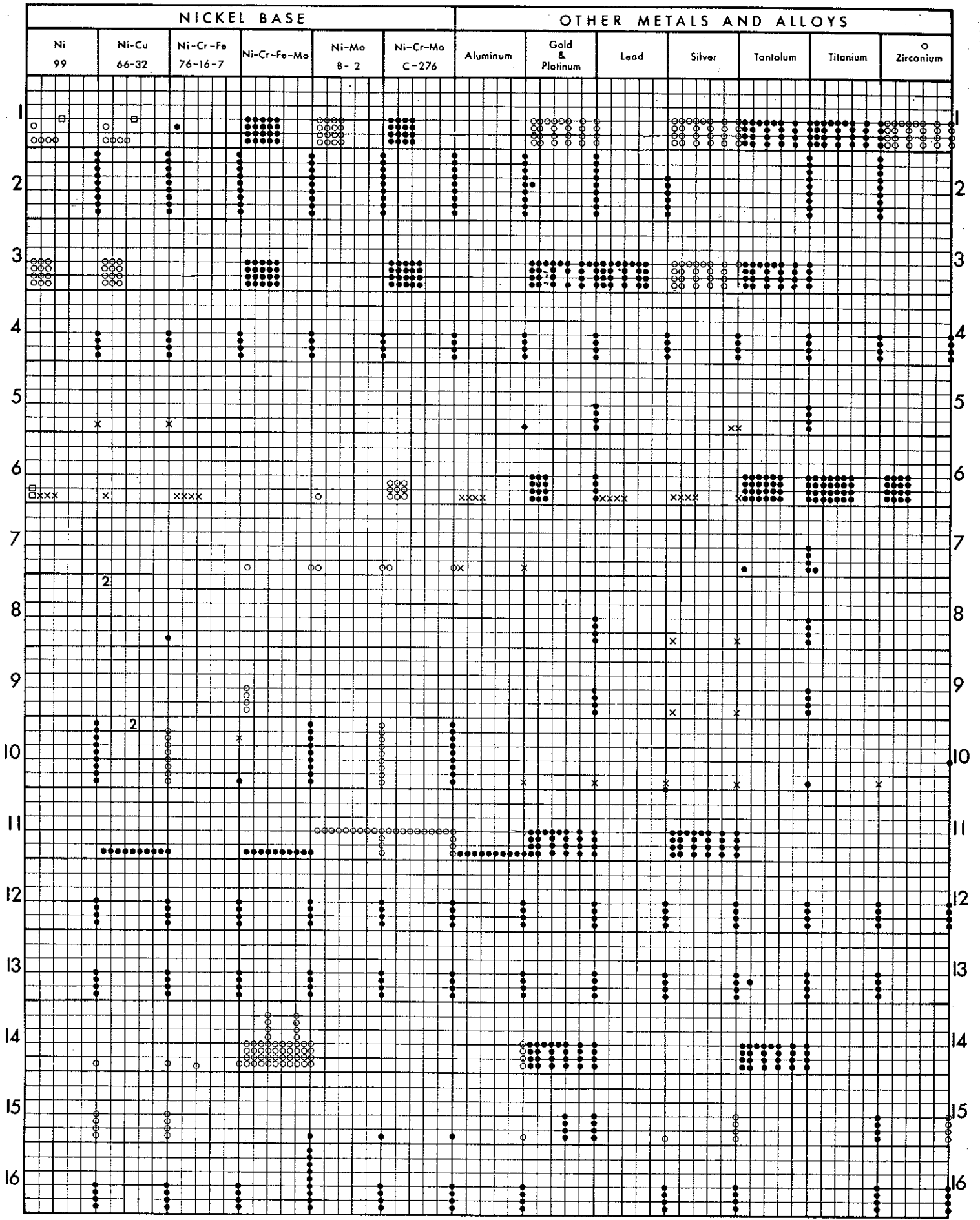
CORROSIVE	IRON BASE										COPPER BASE							
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni						
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5									
ACETIC ACID	xxx	xxxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
AURIC ACID																		
AURYL ALCOHOL	2																	
LEAD ACETATE	3																	
LEAD ARSENATE	4	x	x															
LEAD BROMIDE	5	x	x	x														
LEAD CHLORIDE	6	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LEAD DIOXIDE	7	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LEAD NITRATE	8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
LEAD SULFATE	9																	
LEAD SULFIDE	10																	
LEAD TRINITRO	11																	
LEAD TRINITRO	12	x	x															
LEAD TRINITRO	13																	
LEAD TRINITRO	14																	
LEAD TRINITRO	15																	
LEAD TRINITRO	16	x	x															



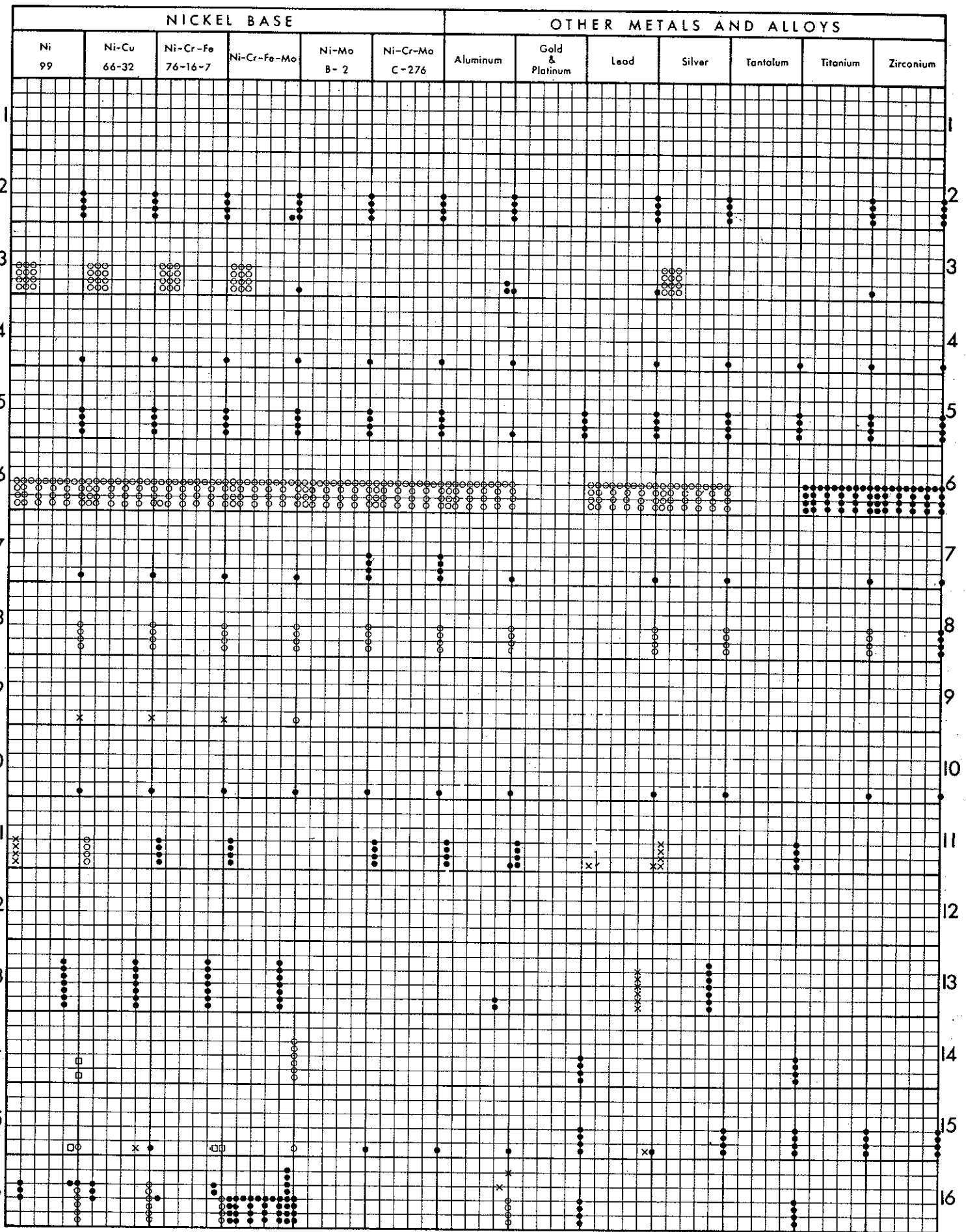
CORROSIVE	IRON BASE									COPPER BASE						
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni				
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5							
LEAD TRINITRO RESORCINATE 1																
LEVULINIC ACID 2	xxxxxx															
LINSEED OIL 3																
LITHIUM CARBONATE 4																
LITHIUM CHLORIDE 5																
LITHIUM HYDROXIDE 6																
LITHIUM HYPOCHLORITE 7																
LITHIUM SULFATE 8																
LITHOPONE 9																
10																
11																
12																
13																
14																
15																
16																



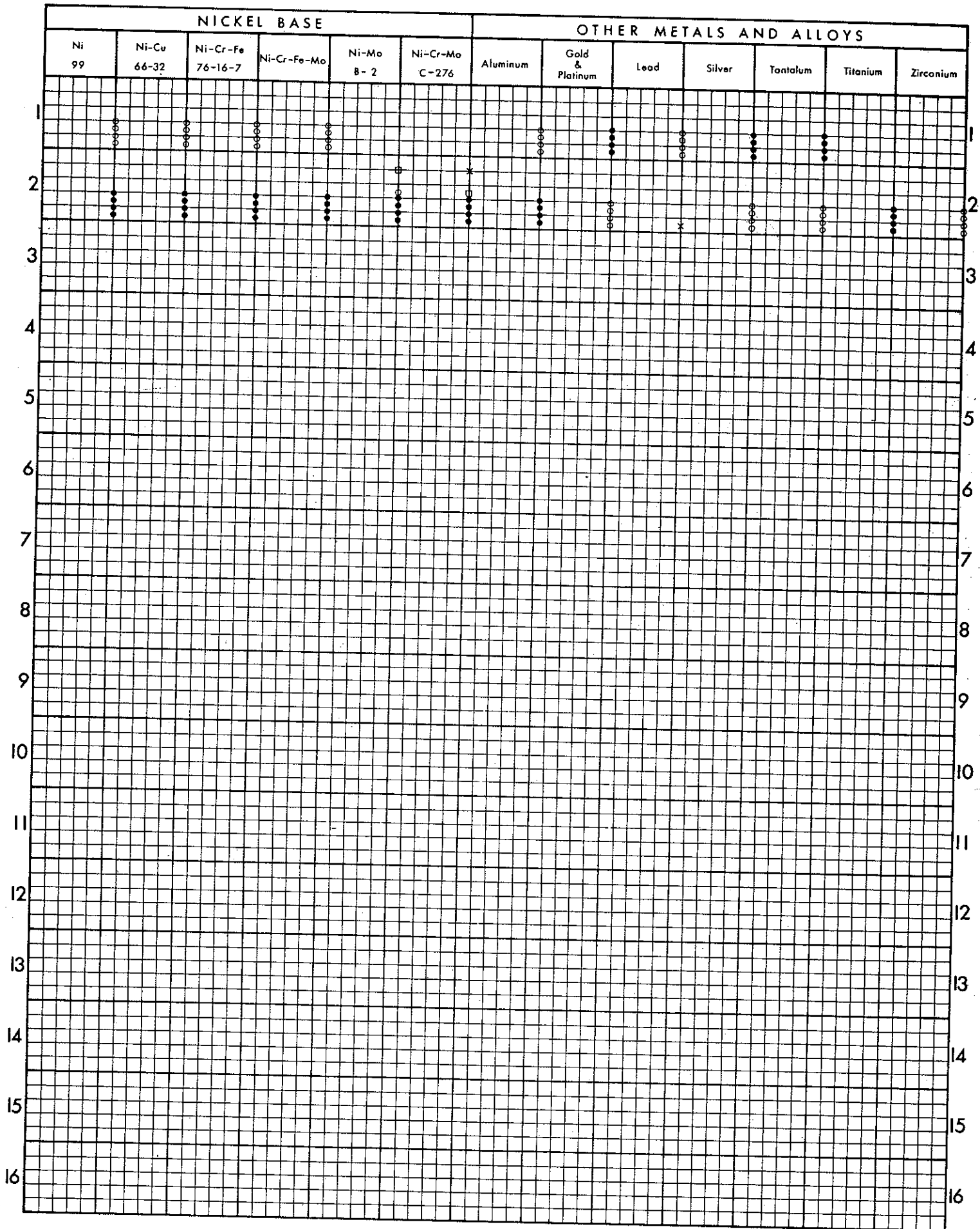
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	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
MANGANESE CHLORIDE				1	1		1 2	1 2	1 2			
MANGANESE DIOXIDE												
MANGANESE SULFATE												
MANNITOL												
MERCAPTAINS				2								
MERCURIC CHLORIDE					1 2		1 2	1 2				
MERCURIC CYANIDE												
MERCURIC IODINE												
MERCURIC NITRATE												
MERCURY												
"MERSOL" SULPHONIC ACID												
MESITYL OXIDE												
METALDEHYDE												
METHALLYL AMINE												
METHALLYL CHLORIDE												
METHANE												



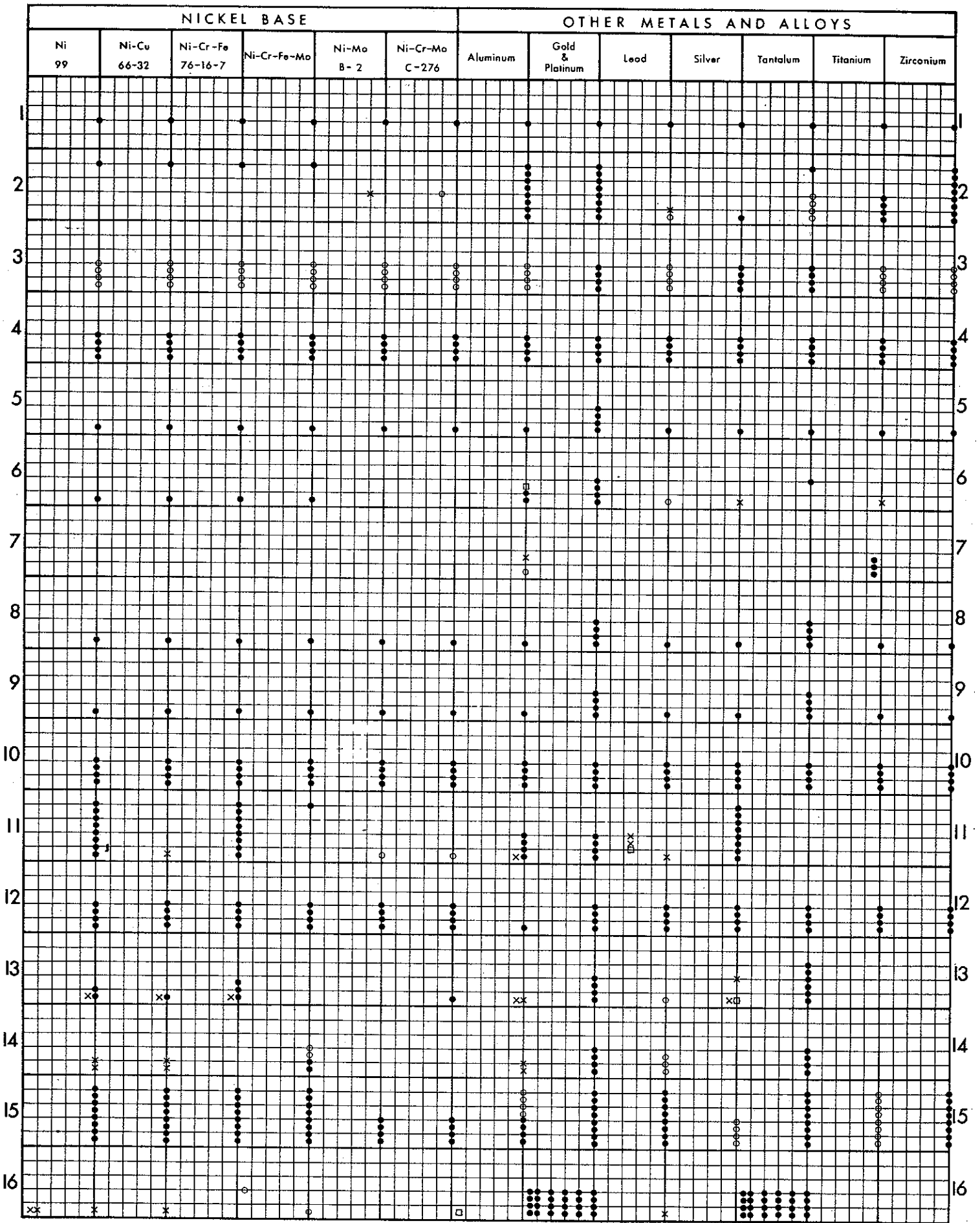
CORROSIVE	IRON BASE									COPPER BASE						
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni				
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5							
METHYL ETHYL KETONE																
METHYL ETHYL OLEATE																
METHYL FORMATE																
METHYL IODIDE																
METHYL ISOBUTYL CARBINOL																
METHYL ISOBUTYL KETONE																
METHYL ISOVALERATE																
METHYL PENTADIENE																
METHYL SULFURIC ACID																
METHYL VALERATE																
MILK																
MIXED ACIDS H ₂ SO ₄ & HNO ₃																
MOLASSES																
MONOALLYL PHTHALATE																
MONOCHLORO-BUTENE																
MONOETHANO-LAMINE																



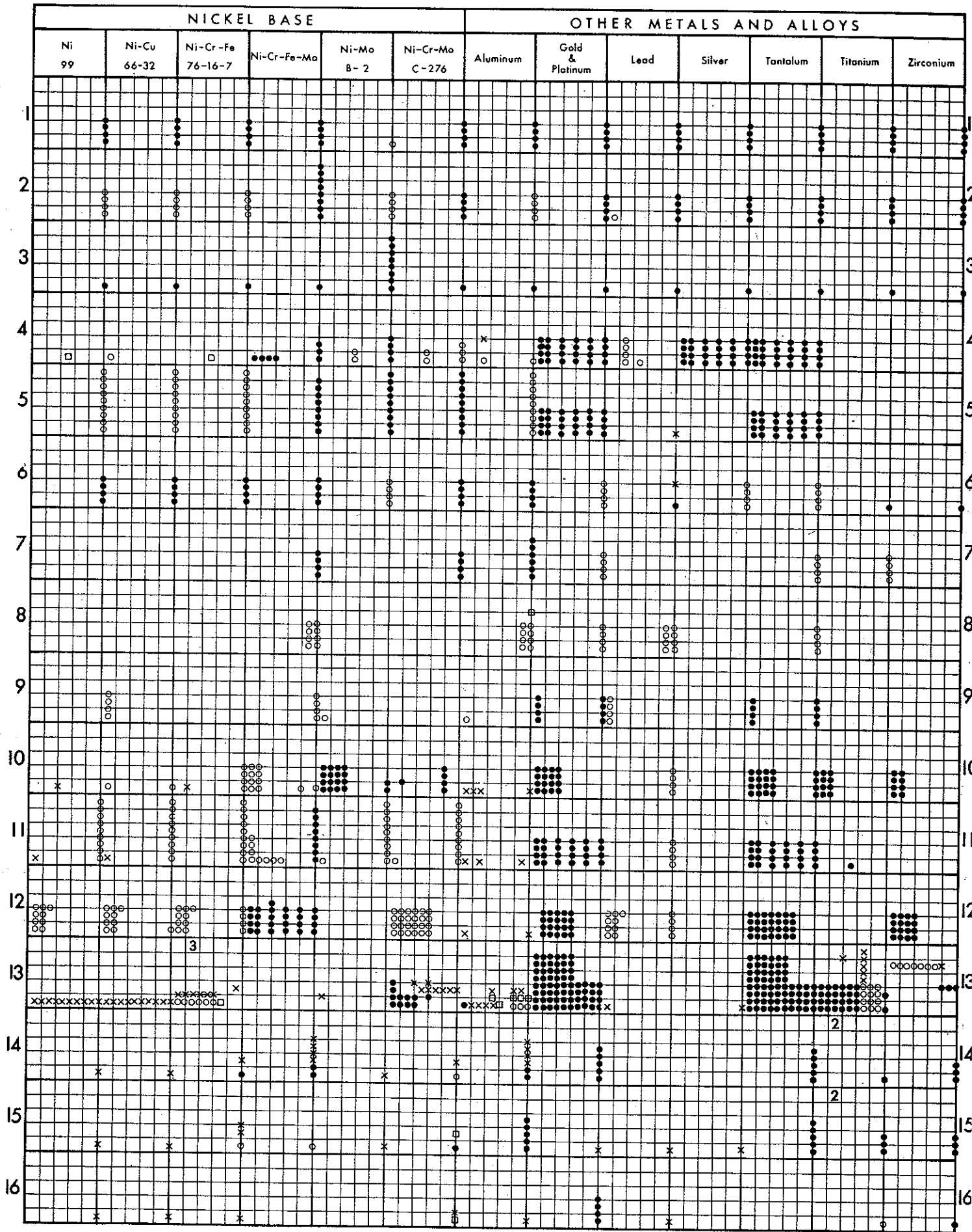
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
VANONITRO- OLVENE	1	•	•	•	•	•	•	•	•	•	•	•	•	•
MORPHOLINE	2	•	•	•	•	•	•	•	•	•	•	•	•	•
	3													
	4													
	5													
	6													
	7													
	8													
	9													
	10													
	11													
	12													
	13													
	14													
	15													
	16													



CORROSIVE	IRON BASE									COPPER BASE										
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni								
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5											
NAPHTHA																				
NAPHTHALENE																				
NAPHTHALENE CHLORIDE																				
NAPHTHALENE SULFONIC ACID	x x x	x	x							x x		x								
NAPHTHALENE ACID										1 2 3		3								
NAPHTHOLS		*	*	*	*	*	*	*	*			*								
NAPHTHO-QUINOLINE																				
NAPHTHYLAMINE + SULFONIC ACID																				
NICKEL AMMONIUM SULFATE																				
NICKEL CHLORIDE	10	x x x	x	1	1					1 2		1 2		1 2						
NICKEL NITRATE	11																			
NICKEL SULFATE	12	2	2	*																
NITRIC ACID	13																			
RED FUMING NITRIC ACID	14																			
WHITE FUMING NITRIC ACID	15																			
NITRIC & HYDROFLUORIC ACID	16																			



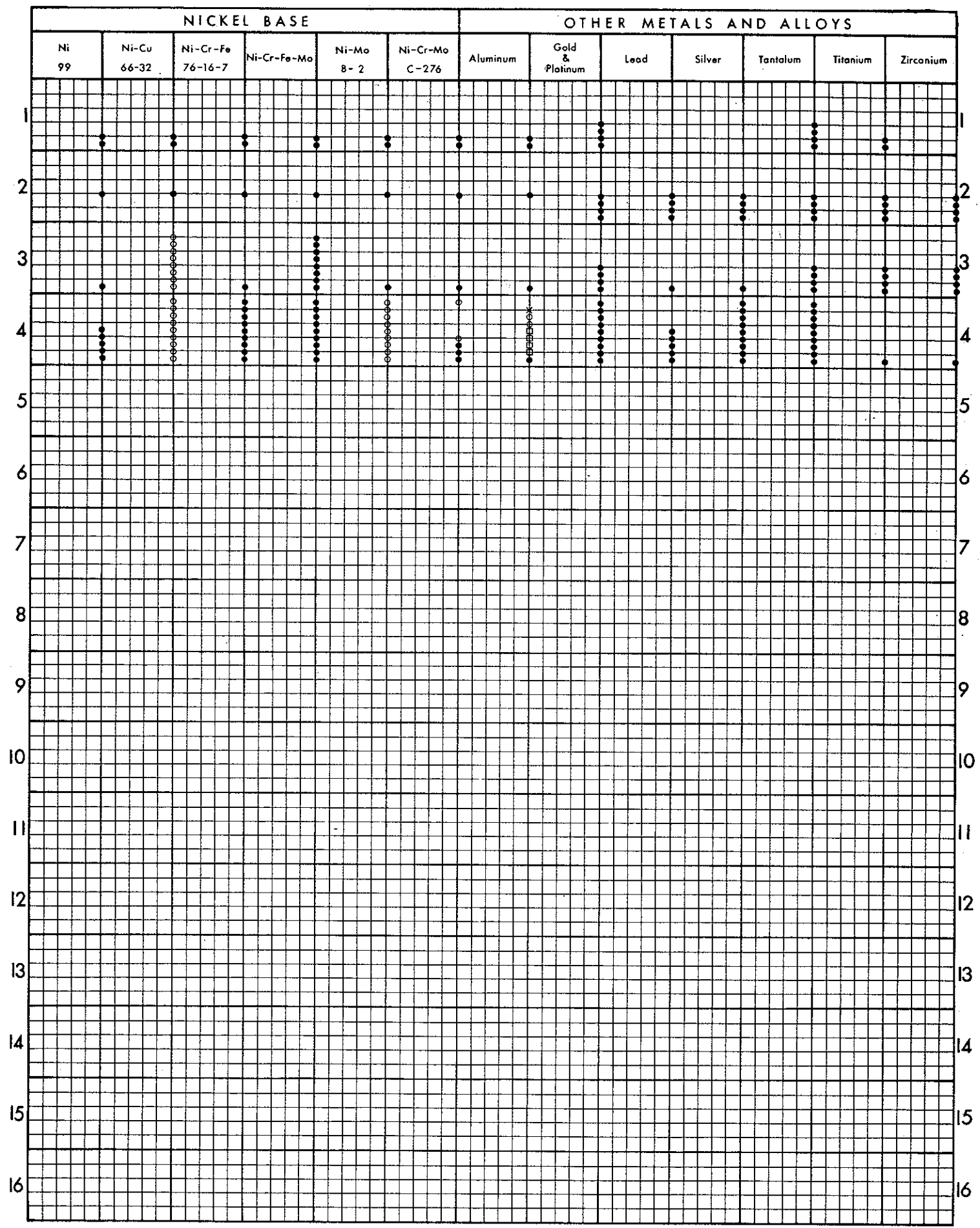
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
NITROANILINES	1	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROBENZENE	2	•	•	•	•	•	•	•	•	•	•	•	•	•
NITRODIPHENYL ETHER	3	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROETHANE	4	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROFLUOROBENZENE	5	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROGEN TETROXIDE + WATER <0.1%	6	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROGEN TETROXIDE + >10% WATER	7	•					•	•						
NITROGLYCERINE	8	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROISOPROPYL BENZENES	9	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROMETHANE	10	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROPHENOLS	11	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROPROPANE	12	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROSYL CHLORIDE	13	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROSULFURIC ACID	14	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROTOLUENES	15	•	•	•	•	•	•	•	•	•	•	•	•	•
NITROUS ACID	16	•	•	•	•	•	•	•	•	•	•	•	•	•



CORROSIVE	IRON BASE								COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
NITROUS OXIDE												
1		•	•				○	○	○	○	○	○
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												

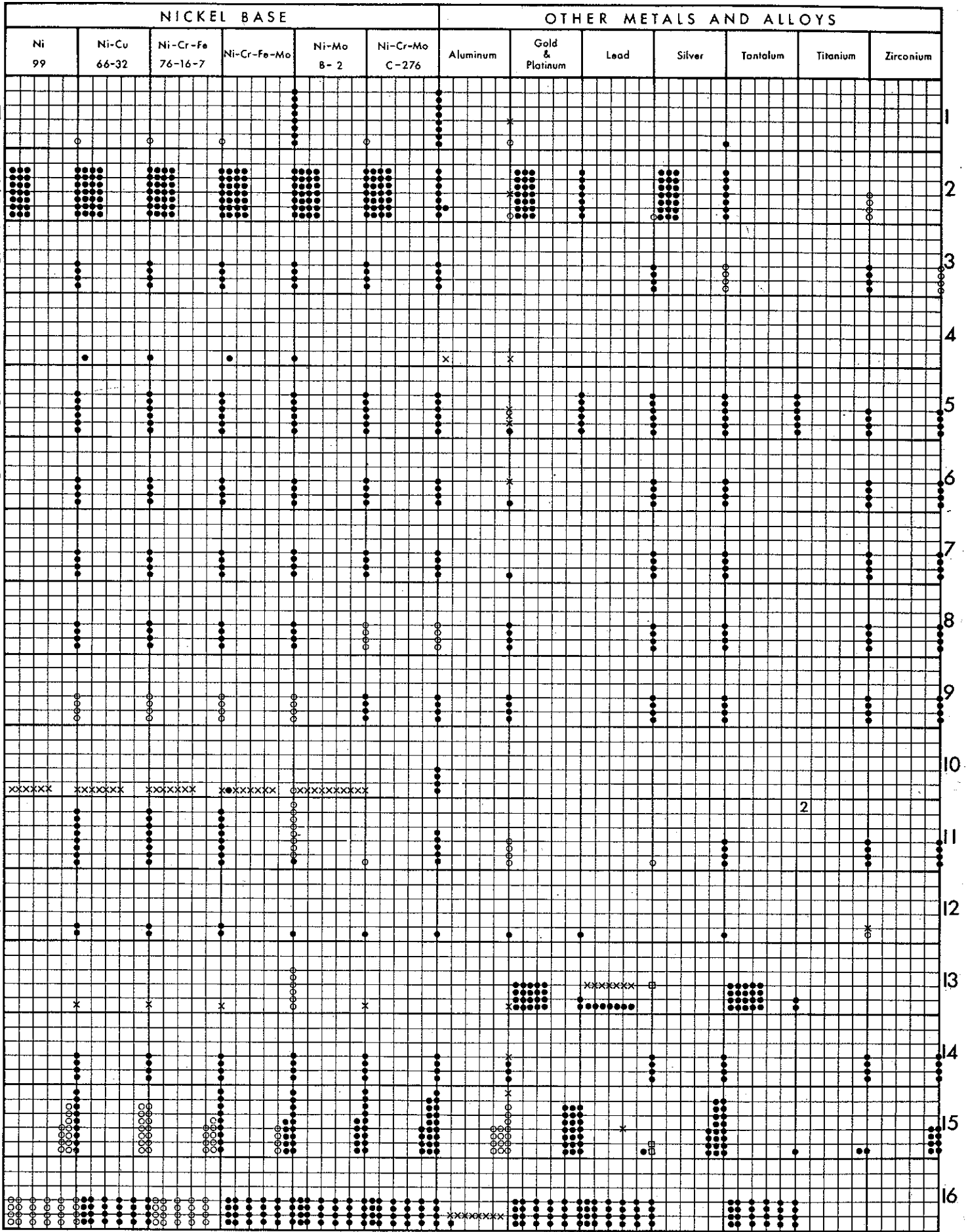
NICKEL BASE						OTHER METALS AND ALLOYS						
Ni 99	Ni-Cu 66-32	Ni-Cr-Fe 76-16-7	Ni-Cr-Fe-Mo	Ni-Mo B-2	Ni-Cr-Mo C-276	Aluminum	Gold & Platinum	Lead	Silver	Tantalum	Titanium	Zirconium
	*	*	*	o	o	xo	•				•	
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												

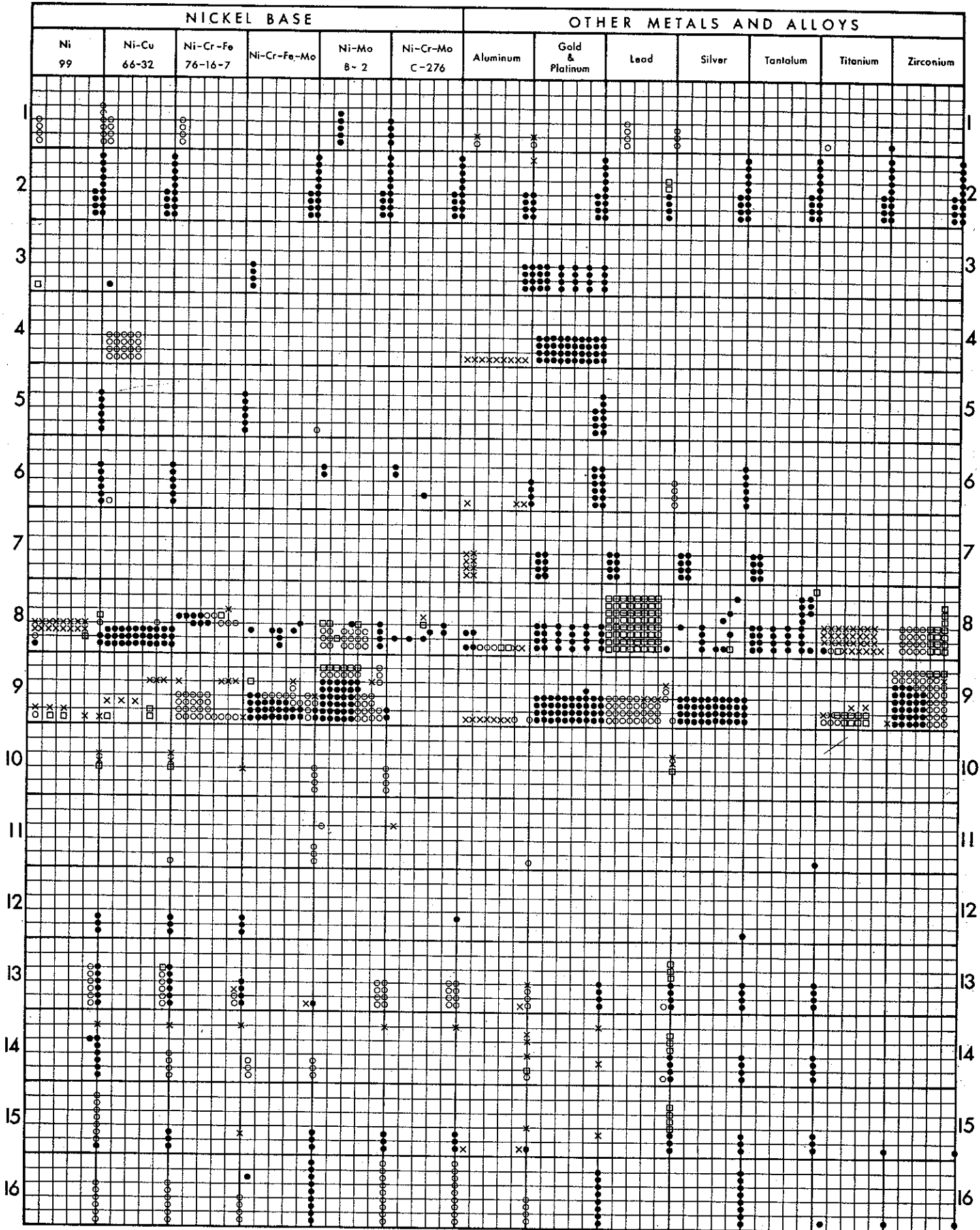
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
OCTYL ACETATE 1	•	•	•	•	•	•	•	•	•	•	•	•	•
OCTYL ALCOHOLS 2	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•	•	•
OCTYL CHLORIDE 3	•••••	•	•	•	•••••	•••••	•	•	•••••	•	•	•	•
OLEIC ACID 4	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
ORTHOTOLUIDINE 5	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
OXALIC ACID 6	x x	x x x x x x x x	o o o o o o o o	o o o o o o o o	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x x x x x x	x
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													



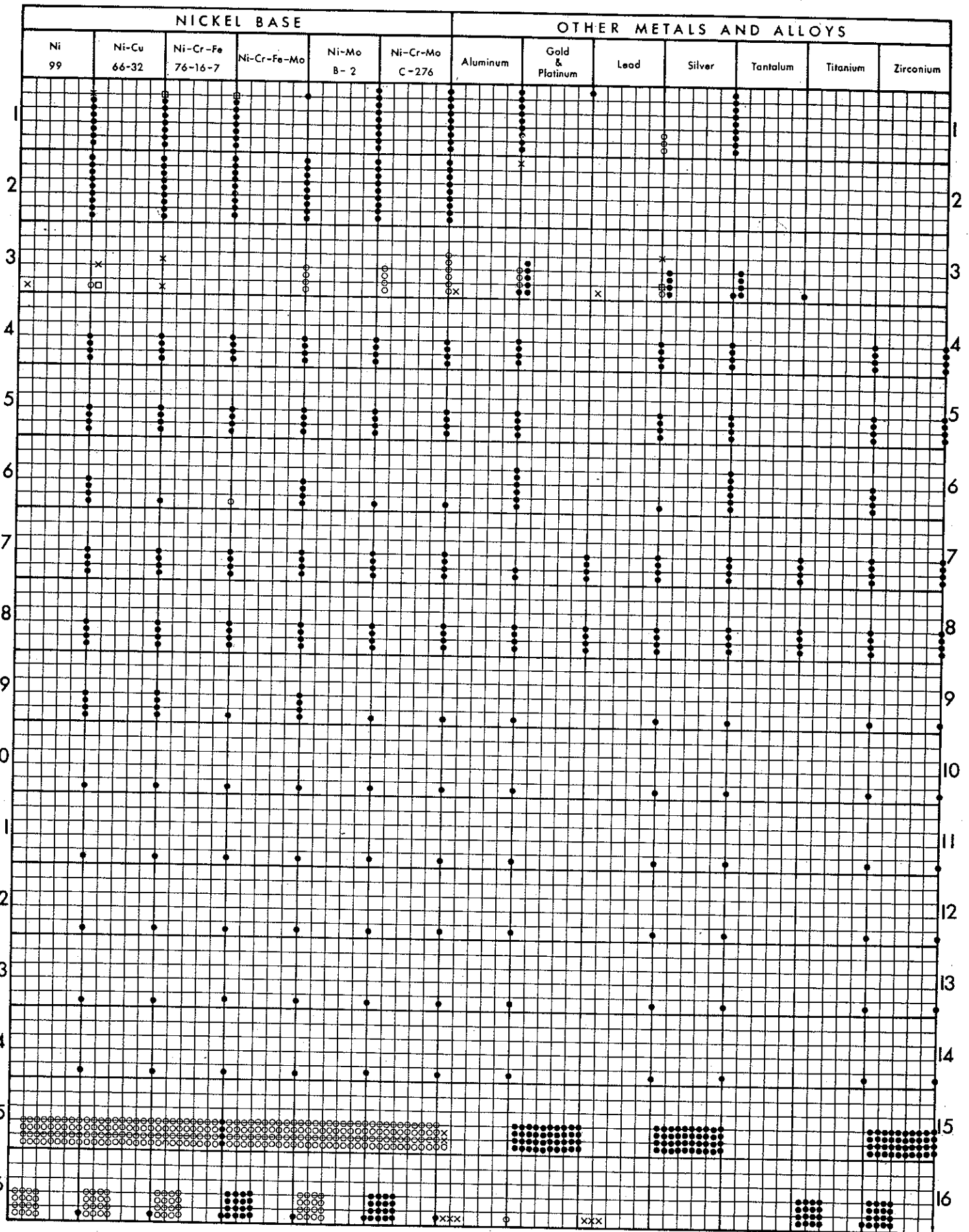
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
PALAMITIC ACID	o	*					o	o	o	o			o	
PARAFORMAL-DEHYDE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PARALDEHYDE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PARATHION	x	xx	*		o	o	o	o	o	o		x	*	
PENTACHLORO-ETHANE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PENTACHLORO-ETHYLENE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PENTACHLORO-PHENOL	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PENTAERYTHRITOL	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PENTANE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PERCHLORIC ACID	xxxxxxx	xxxxx	xxxxxxxxxxx	xx	xx	x	x	xx	x	o	xxxxxxxxx	xxxxxxxxx	xxxxxxxxx	x
PERCHLORO-ETHYLENE	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PERCHLORYL FLUORIDE	o			o	o	o	o	o	o	o	o	o	o	o
PERSULFURIC ACID														
PHENETHYL ALCOHOL	*	*	*									*	*	*
PHENOL	o	o	o	o	o	o	o	o	o	o	o	o	o	o
PHENOL-2-4-DISULFONIC ACID	o	o	o	o	o	o	o	o	o	o	o	o	o	o

CORROSIVE	IRON BASE								COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL					COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316				20-25-4.5	
PHENOL													
SULFONIC ACID	x						x						
PHENYL ACETIC ACID													
PHENYL HYDRAZINE	x	xxx	xx										
PHENYL HYDRAZINE HYDROCHLORIDE													
PHENYL MERCURIC ACETATE													
PHOSGENE													
PHOSPHATING SOLUTIONS													
PHOSPHORIC ACID													
PHOSPHORIC ACID, (AERATED)													
PHOSPHORIC ACID VAPORS													
PHOSPHORIC ANHYDRIDE													
PHOSPHOROUS													
PHOSPHOROUS OXYCHLORIDE													
PHOSPHOROUS PENTACHLORIDE													
PHOSPHOROUS TRICHLORIDE													
PHTHALIC ACID													

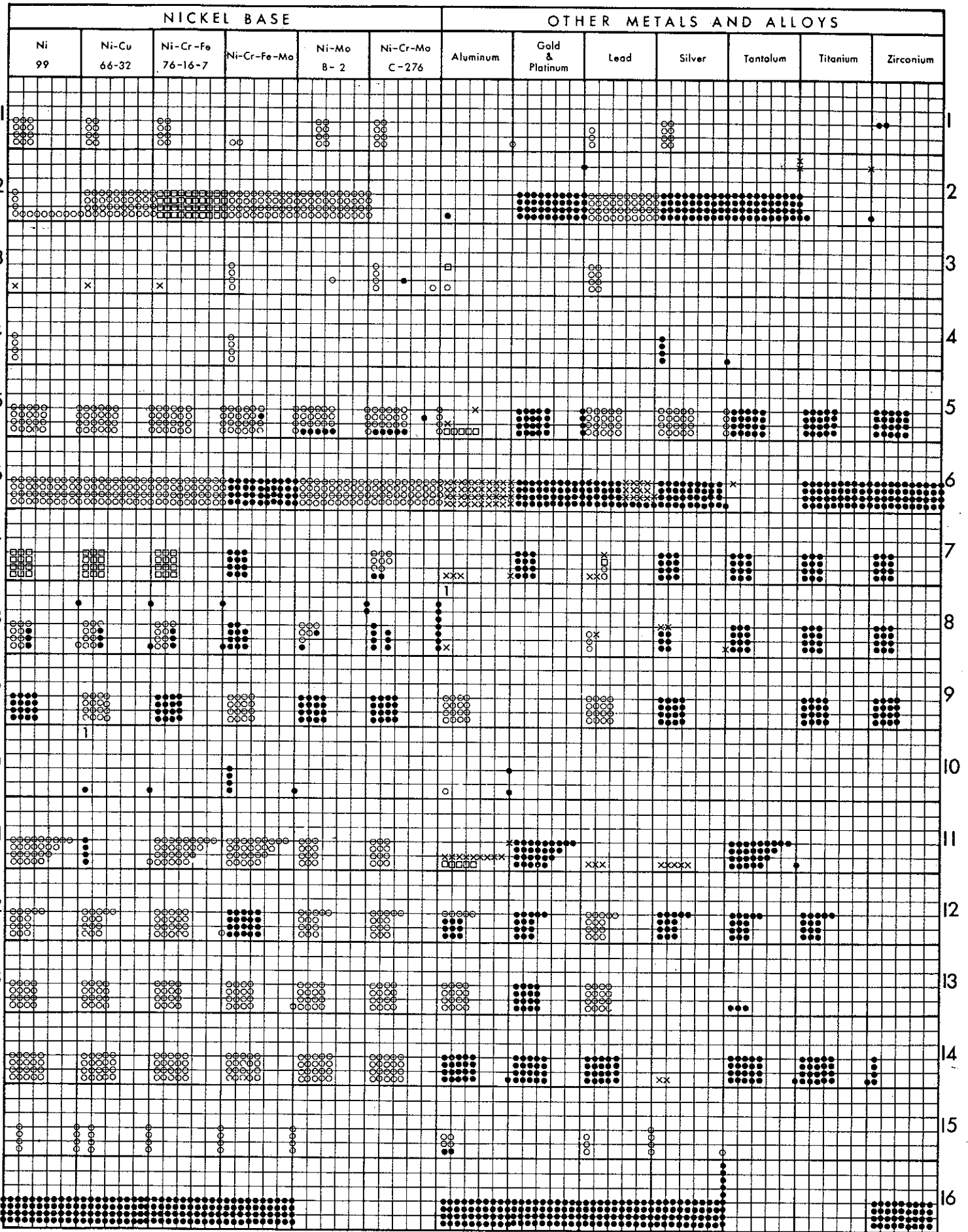




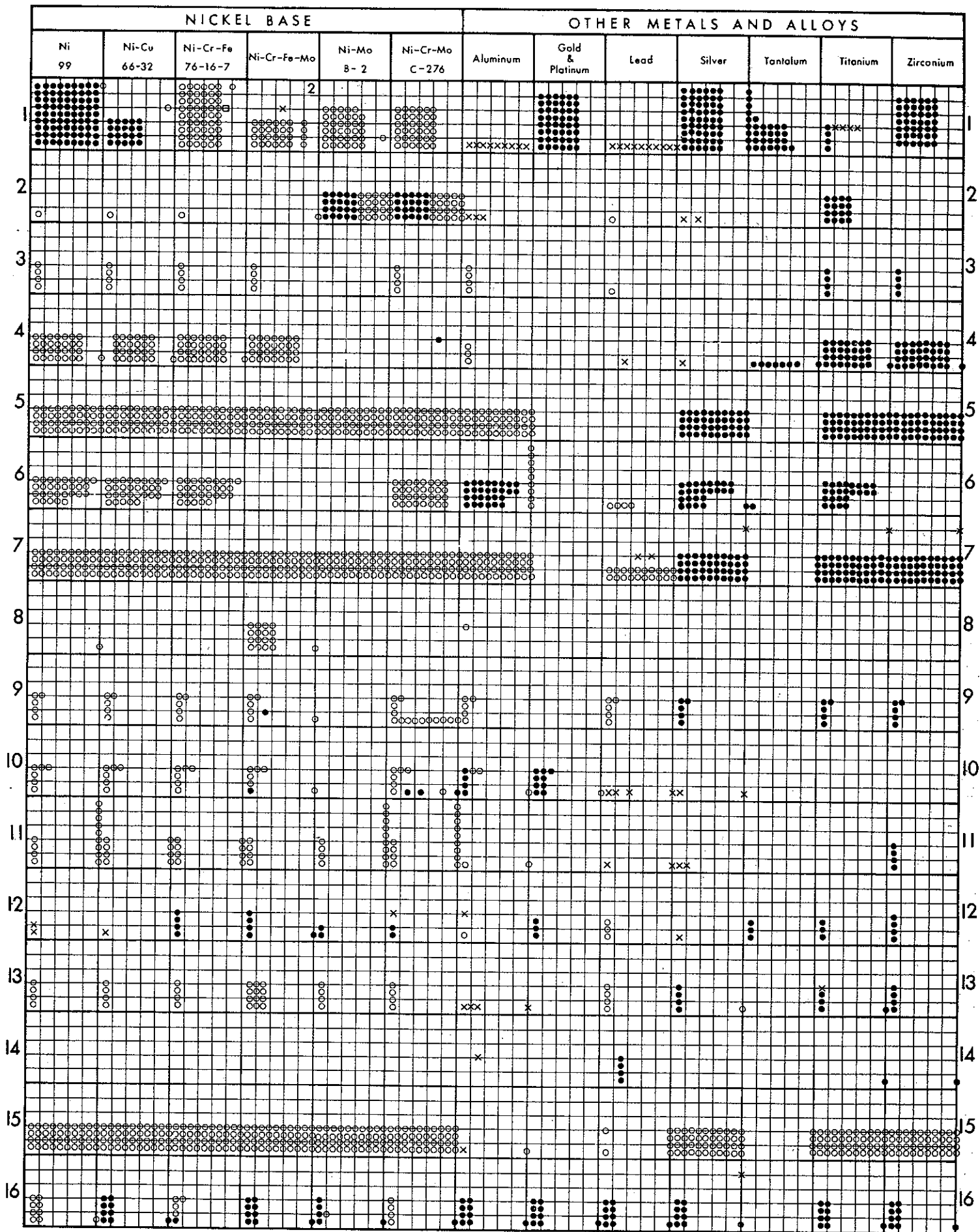
CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
1	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
4	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6	○	○	○							○				○	○
7	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
9	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
10	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
11	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
12	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
13	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
14	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
15	●	●	●												
16	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●



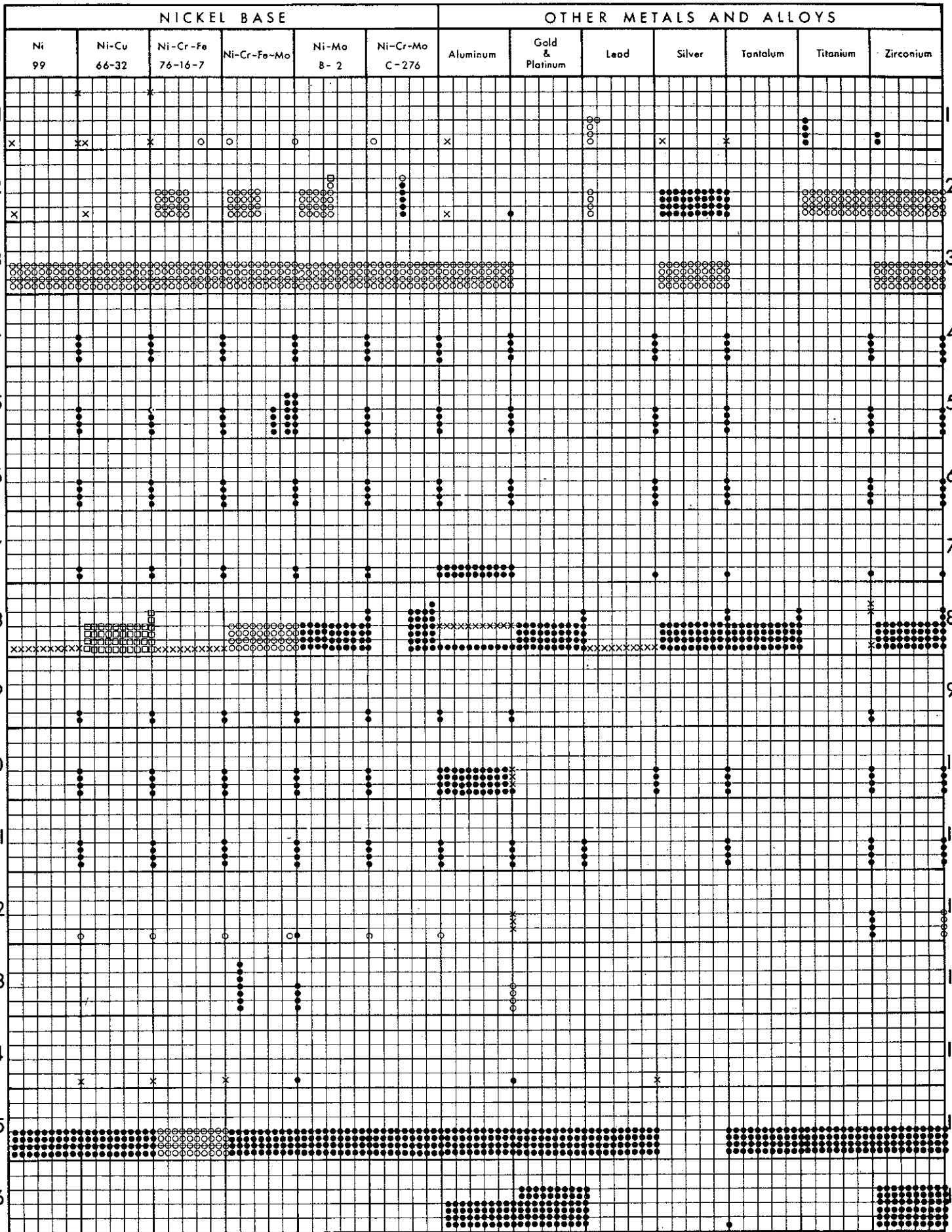
CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
POTASSIUM BIFLUORIDE	1	x	•	xx	xx	oφ	ox	oo	oo	oo	oo	oo	oo	oo	oo
POTASSIUM BISULFATE	2	xxxxxxx	xxxxxxx				xxxxxxx	•	o	o	o	o	o	o	o
POTASSIUM BISULFITE	3	x	x	x	x										
POTASSIUM BITARTRATE	4	xxxxxxx	xxxxxxx	xx	xx										
POTASSIUM BORMIDE	5	o	o	o	o	o	o	o	o	o	o	o	o	o	o
POTASSIUM CARBONATE	6	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo
POTASSIUM CHLORATE	7	xxx	xxx	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM CHLORIDE	8	o	o	ox	ox	•••	ox	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM CHROMATE	9	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM CYANATE	10	x	x			•	•	•	•	•	•	•	•	•	•
POTASSIUM CYANIDE	11	o	o	o	o	o	o	o	o	o	o	o	o	o	o
POTASSIUM DICHROMATE	12	xxxx	oooo	•••	•••	•••	xxxx	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM FERRICYANIDE	13	xxx	xxx	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM FERROCYANIDE	14	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
POTASSIUM FLUORIDE	15	o	o	o	o	o	o	o	o	o	o	o	o	o	o
POTASSIUM FORMATE	16	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••



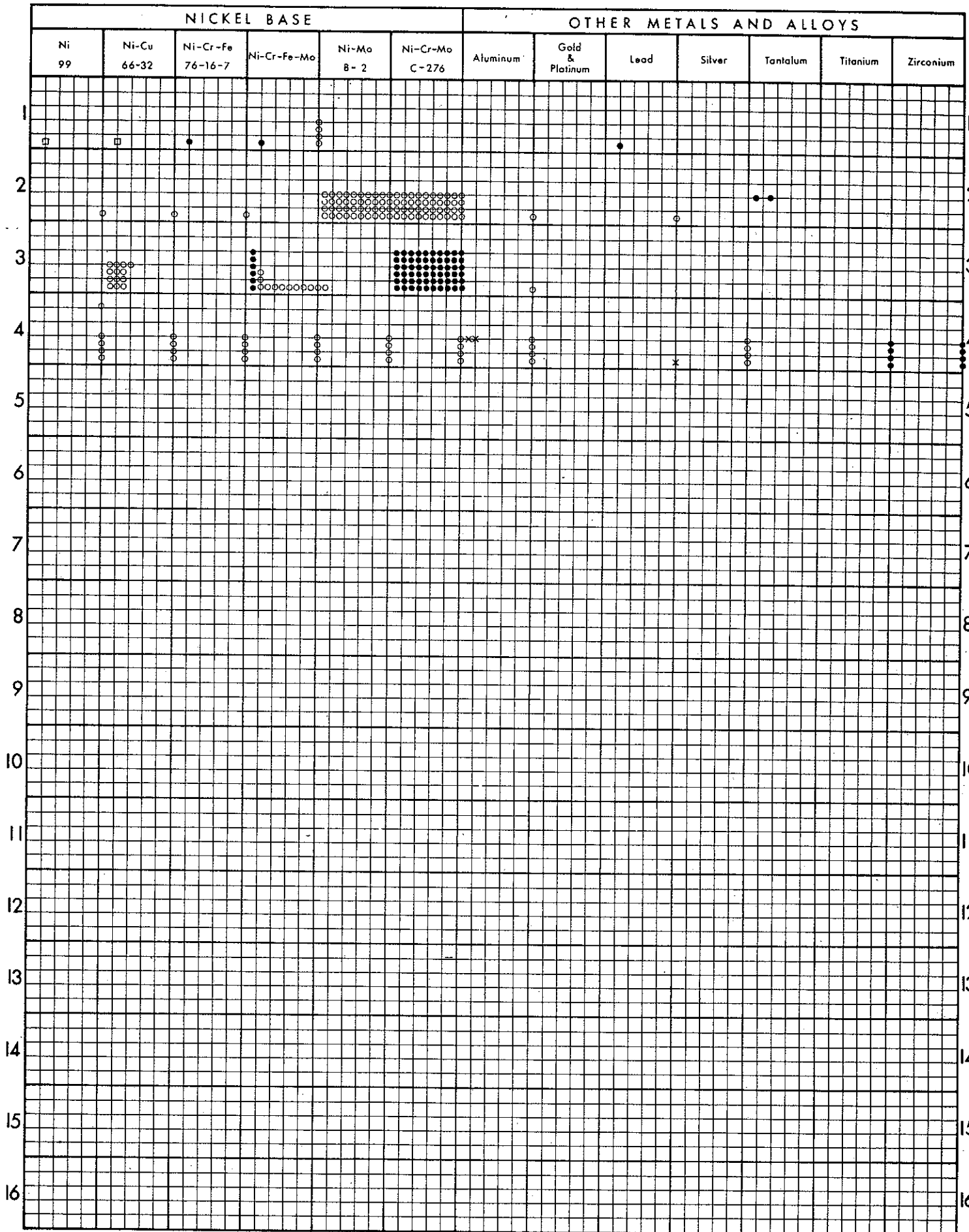
CORROSIVE	IRON BASE									COPPER BASE							
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni					
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5								
POTASSIUM HYDROXIDE	1	x	x	x	x		x	x		x	x	x	x	x	x	x	x
POTASSIUM HYPOCHLORITE	2	x	x	x	x		x	x		x	x	x	x				
POTASSIUM IODATE	3																
POTASSIUM IODIDE	4																
POTASSIUM METASILICATE	5																
POTASSIUM NITRATE	6																
POTASSIUM NITRITE	7																
POTASSIUM OXALATE	8																
POTASSIUM PERCHLORATE	9																
POTASSIUM PERMANGANATE	10																
POTASSIUM PEROXIDE	11																
POTASSIUM PERSULFATE	12																
POTASSIUM PHOSPHATE	13																
POTASSIUM PHOSPHATE + HYDROGEN SULFIDE	14																
POTASSIUM SILICATE	15																
POTASSIUM SULFATE	16																



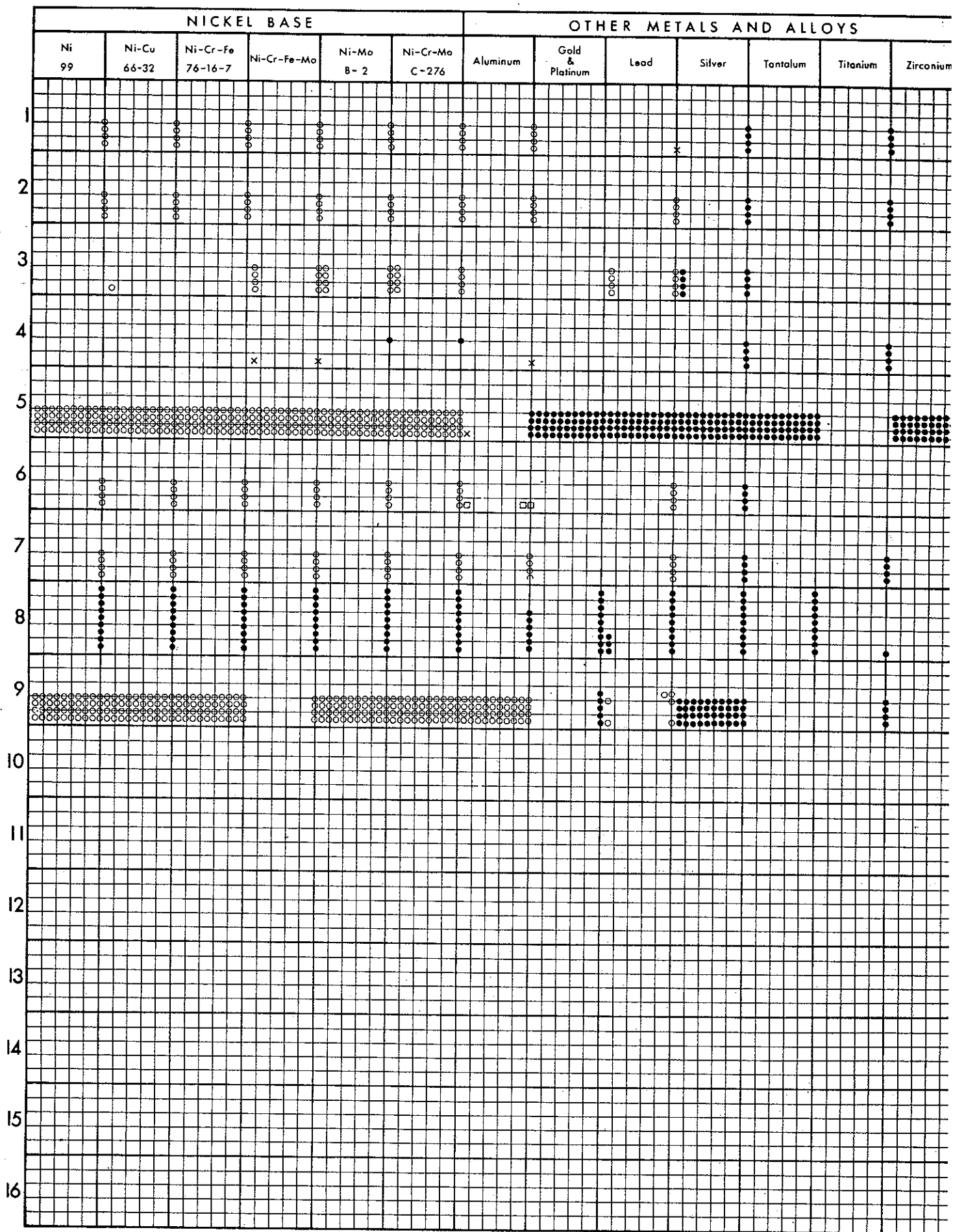
CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
POTASSIUM SULFIDE	1	x	o	o	o	o	o	o	o	o	x	x	x
POTASSIUM SULFITE	2	xxxx	xxxx	x	xxxx	xxxx	oooo	oooo	oooo	oooo	o	x	
POTASSIUM THIOCYANATE	3						oooo	oooo	oooo	oooo			
PROPANE	4												
1,2-PROPANEDIOL	5												
1,3-PROPANEDIOL	6												
PROPIONAL-DEHYDE	7												
PROPIONIC ACID	8	xxxxxxxxxxxxxxxxxxxx					oooo	oooo	oooo	oooo	oooo	oooo	oooo
N-PROPYL ACETATE	9												
N-PROPYL ALCOHOL	10												
PROPYLENE	11												
PROPYLENE DICHLORIDE	12												
PROPYLENE OXIDE	13												
N-PROPYL NITRATE	14												
PYRIDINE	15	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo	oooo
PYRIDINE + CARBOXYLIC ACID + DIMETHYLAMIDE	16						oooo	oooo	oooo	oooo	oooo	oooo	oooo



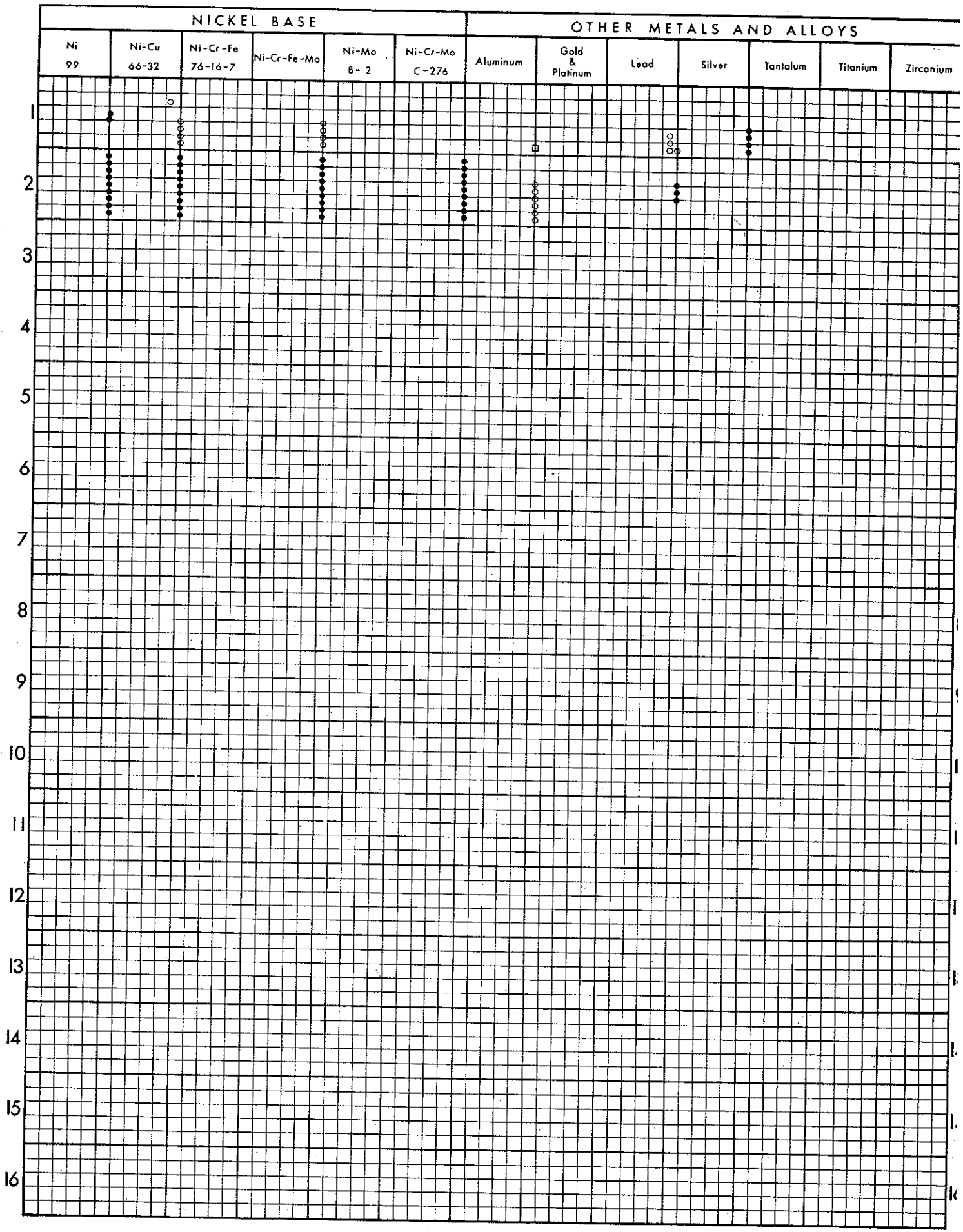
CORROSIVE	IRON BASE								COPPER BASE															
	STEEL	CAST IRON		STAINLESS STEEL					COPPER & BRONZE	BRASS	Cu-Ni													
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316				20-25-4.5												
PYRIDINE SULFONIC ACID			*																	
PYROGALLIC ACID	2	□	□	●								○	□	○										
PYROLIGNEOUS ACID	3	x	x	x	x	x	x	x	x	●	●	●	●	○	○	○	○	○	○	○	○	○	○	○
PYRUVIC ACID	4		*	*						○	○	○	○	○	○	○	○	○	○	○	○	○	○	
	5																							
	6																							
	7																							
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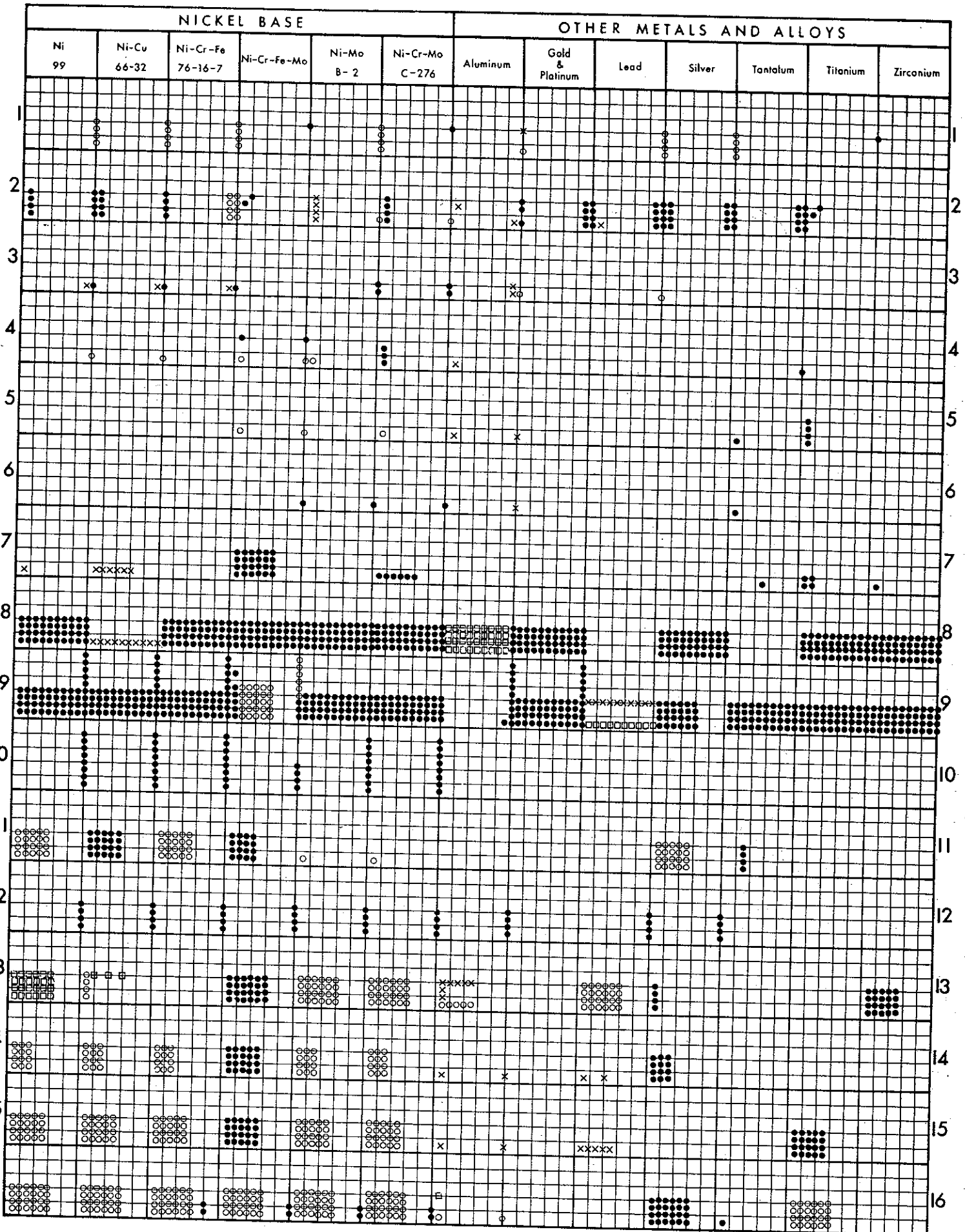
CORROSIVE	IRON BASE									COPPER BASE				
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni		
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5					
QUINALDIC ACID 1	x	x			o	o	o	o	o	o	o	o	o	o
QUININE 2	x	x			o	o	o	o	o	o	o	o	o	o
QUININE BISULFATE 3	x	x	o	o	x	x	x	x	x	x	x	x	x	x
QUININE HYDROCHLORIDE 4	x	x	x	x	x	x	x	x	x	x	x	x	x	x
QUININE SULFATE 5	x	x	x	x	x	x	x	x	x	x	x	x	x	x
QUININE TARTRATE 6	o	o	o		o	o	o	o	o	o	o	o	o	o
QUINIZARIN 7	o	o	o	o	o	o	o	o	o	o	o	o	o	o
QUINOLINE 8	o	o	o	o	o	o	o	o	o	o	o	o	o	o
QUINONE 9	o	o	o	o	o	o	o	o	o	o	o	o	o	o
10														
11														
12														
13														
14														
15														
16														

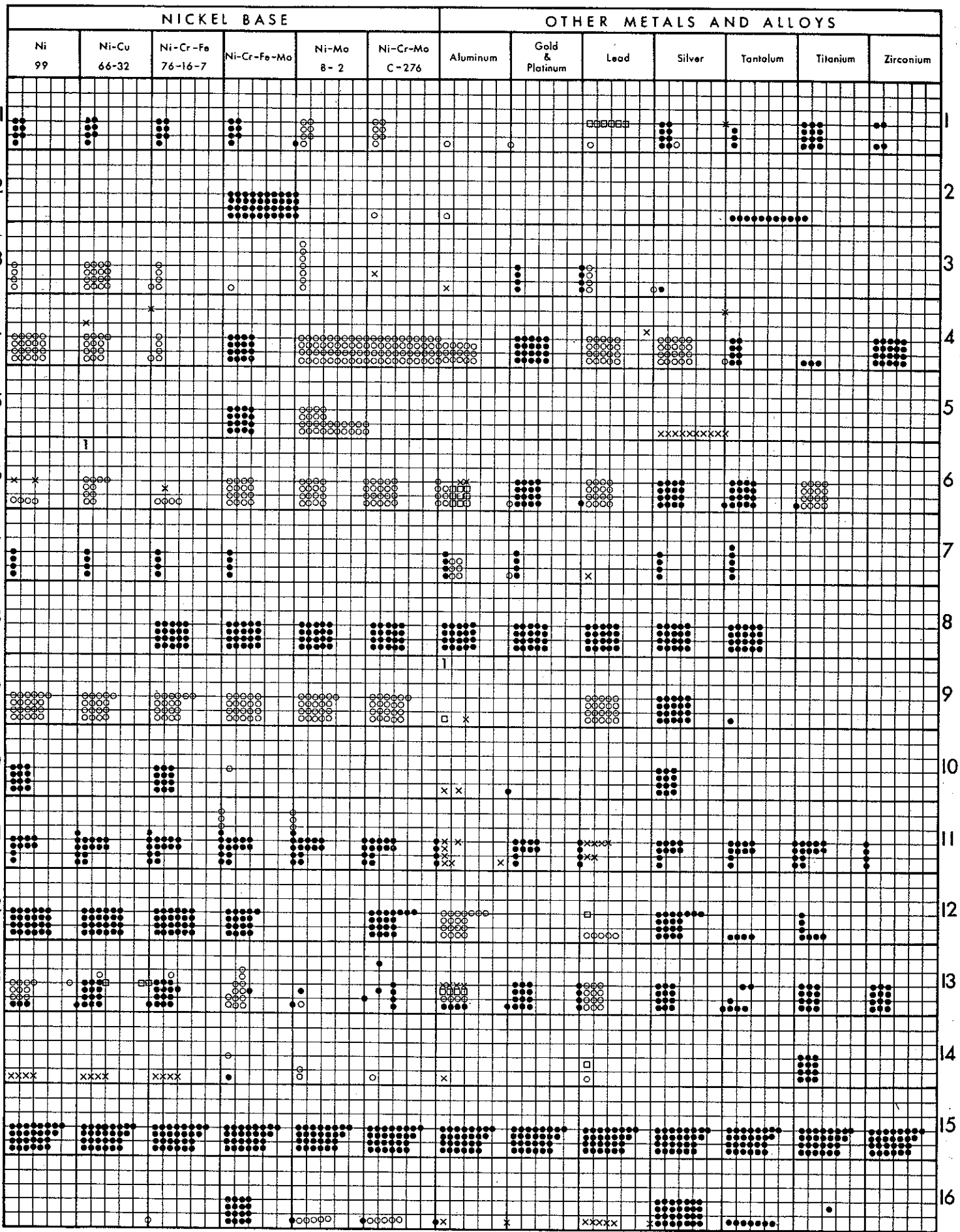


CORROSIVE	IRON BASE									COPPER BASE											
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni									
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5												
RONGALITE	1	XX	XX																		
ROSIN	2																				
	3																				
	4																				
	5																				
	6																				
	7																				
	8																				
	9																				
	10																				
	11																				
	12																				
	13																				
	14																				
	15																				
	16																				

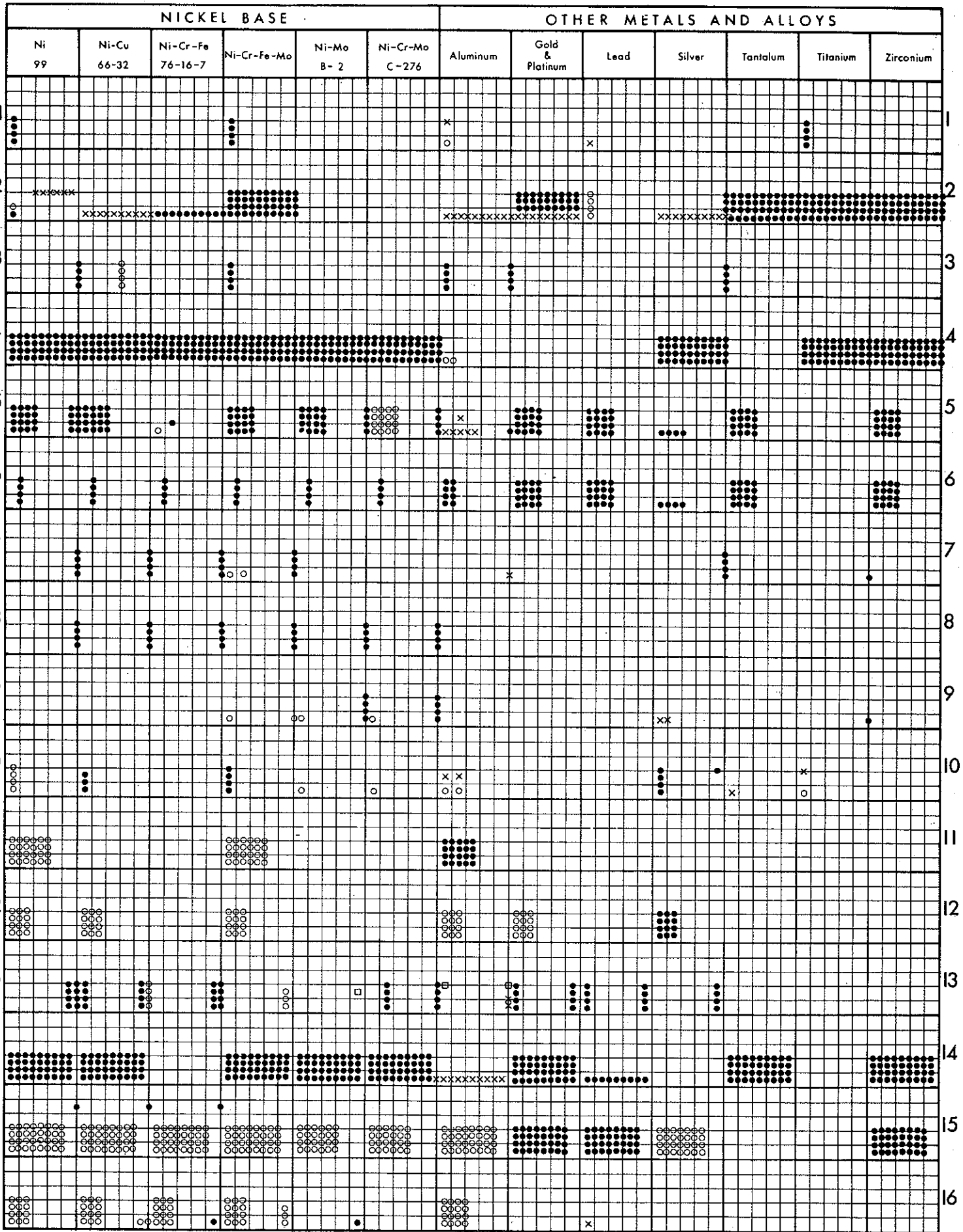


CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
SACCARIN SOLUTIONS	1	□	○	⊗	○	○	●	●	●	●	●	○	○
SALICYLIC ACID	2	□	⊗	⊗	●	●	●	●	●	●	●	●	●
SILICON TETRACHLORIDE	3	x	x	x	●	●	●	x	x		x	x	
SILVER BROMIDE	4	x	xx	xx	●	●	●	●	●	●	x	x	
SILVER CHLORIDE	5	x	xx	x	x	x	x	xx	x	x	○x		
SILVER CYANIDE	6		●	●	●		○	●	●	●	x	x	
SILVER NITRATE	7	xxxxxx	xyxxxx	○○○○○○○○	○○○○○○○○	○○○○○○○○	○○○○○○○○	○○○○○○○○	○○○○○○○○	○○○○○○○○	xxxxxxx	xxxxxxx	
SOAP	8	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	
SODIUM ACETATE	9	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	●●●●●●	
SODIUM ALKYL ARYL SULONATES	10	●	●	●	●	●	●	●	●	●	○	○	
SODIUM ALUMINATE	11	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	○○○○	○○○○	
SODIUM ALUMINUM FLUORIDE	12	●	●	●	●	●	●	●	●	●	●	●	
SODIUM ALUMINUM SULFATE	13	***	***	***	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	xxxxxxxxxxxxxxxx	
SODIUM ARSENATE	14	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	○○○○	
SODIUM ARSENITE	15	○	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	○○○○	
SODIUM BENZOATE	16	○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	○○○○	●●●●	○○○○	

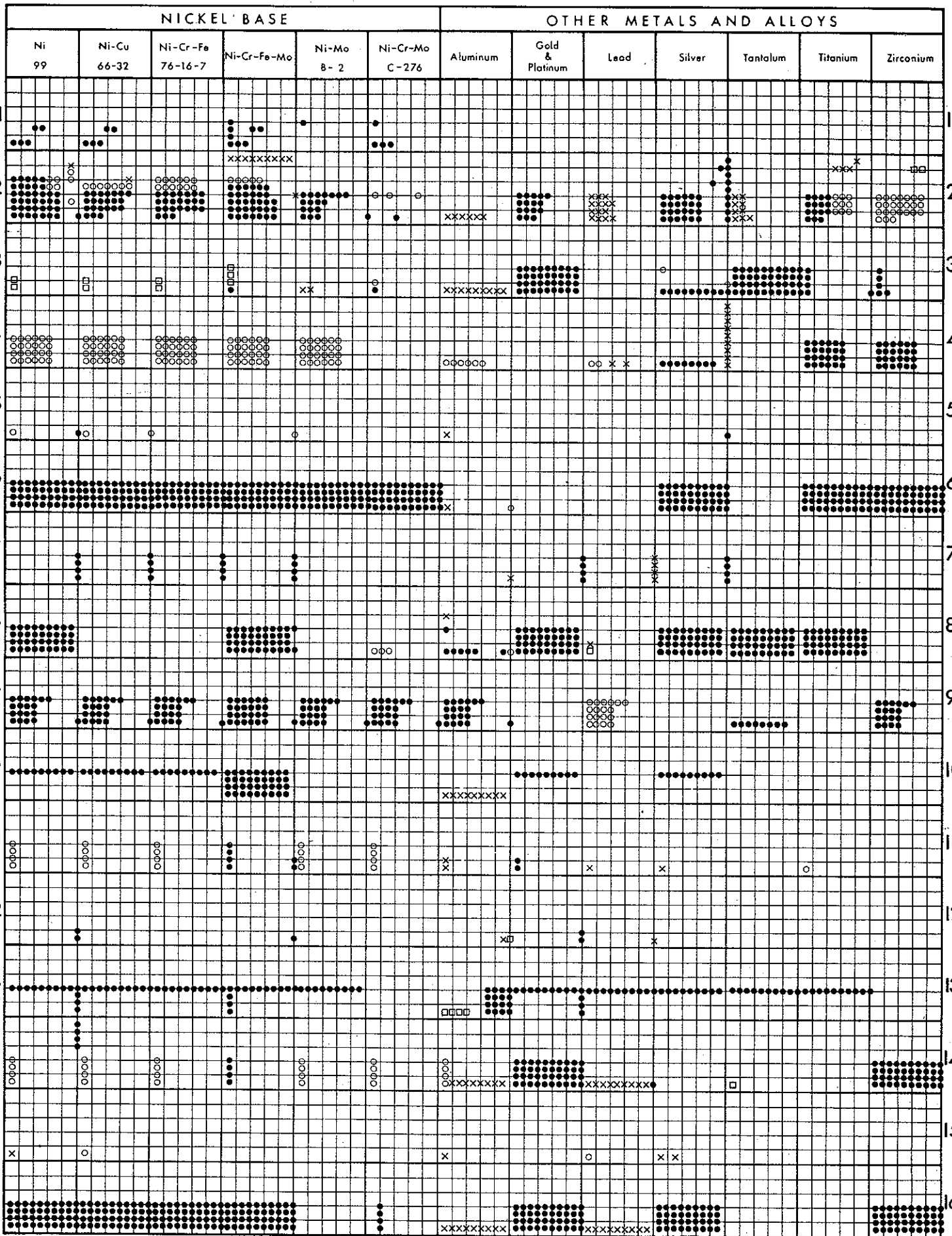


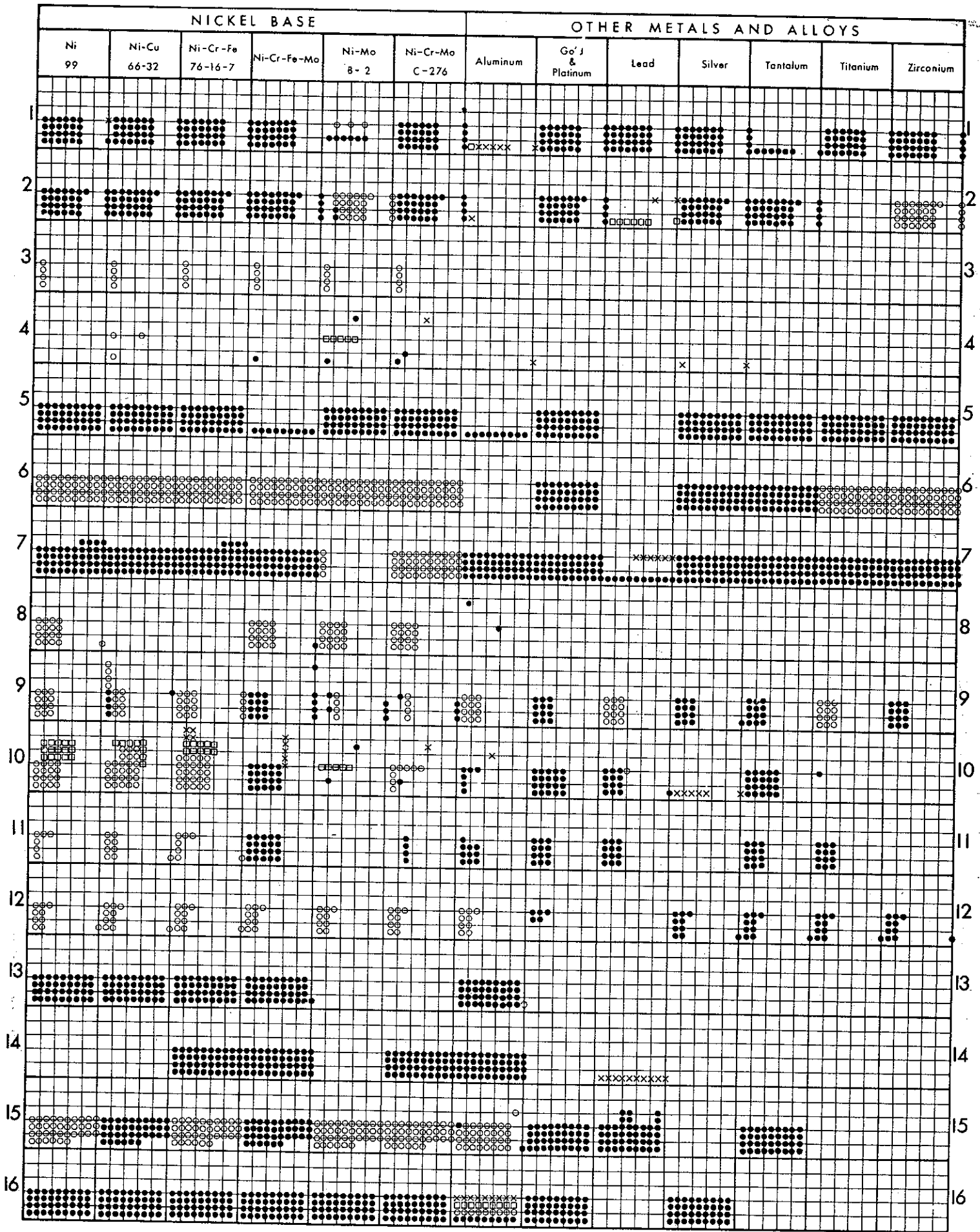


CORROSIVE	IRON BASE									COPPER BASE					
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni			
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5						
SODIUM CYANATE						•••	•••	•••	•••						
SODIUM CYANIDE	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••	••••••••••
SODIUM DIPHENYL SULFATE		•	•••	•••	•••	•••	•••	•••	•••		•••	•••			
SODIUM DISILICATE	••••••••••	••••••••••	••••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~
SODIUM DITHIONITE	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
SODIUM DODECYLBENZENE SULFONATE	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
SODIUM ETHYLATE	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
SODIUM ETHYLENEDIAMINE TETRACETATE	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••	•••
SODIUM FERRICYANIDE	•	•	••	•	••	•	••	••	••	••	••	••	••	••	••
SODIUM FLUORIDE	•••	••	••	••	••	••	••	••	••	••	••	••	••	••	••
SODIUM FLUOROCETATE	••••••••••	••••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~
SODIUM FLUOROPHOSPHATE	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	••~	••~	••~
SODIUM FLUROSILICATE	•	•••	••	•	•	••	••	••	••	••	••	••	••	••	••
SODIUM FORMALDEHYDE SULFOXYLATE	••••••••••	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••••~	••~	••~	••~
SODIUM FORMATE	••••••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~
SODIUM GLUTAMATE	•••••	••••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~	••~

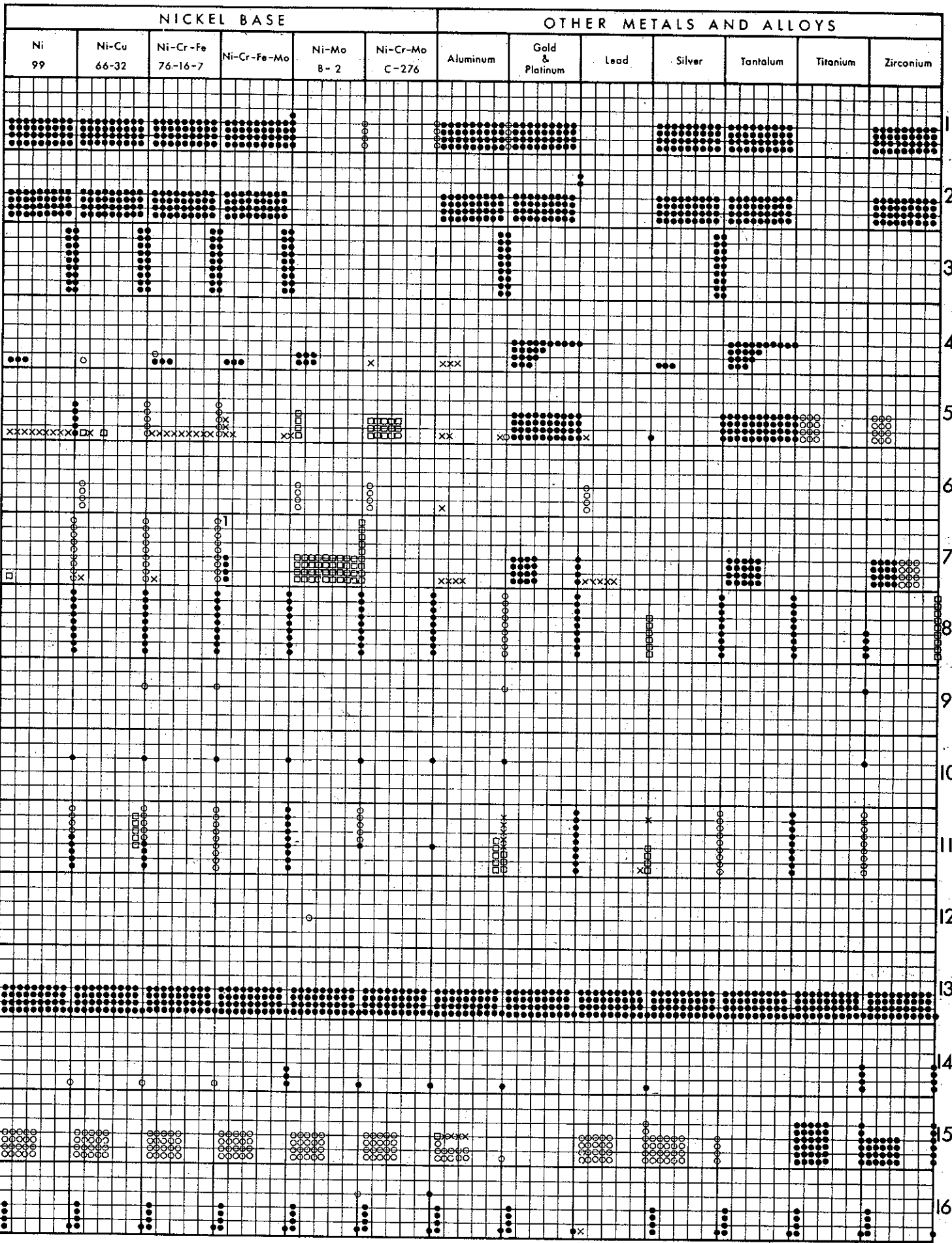


CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
SODIUM HYDROSULFIDE	□	xx				• •	• •	• •	• •	• •			
SODIUM HYDROXIDE	2	x	x	x	x	x	x	x	x	x	x	x	x
SODIUM HYPOCHLORITE	3	x	x	x	x	x	x	x	x	x	x	x	x
SODIUM IODIDE	4	○	○	○	○	○	○	○	○	○	○	○	○
SODIUM METAPHOSPHATE	5	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM METASILICATE	6	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM METHYLATE	7	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM NITRATE	8	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM NITRITE	9	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM PENTACHLOROPHENATE	10	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM PERBORATE	11	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM PERCARBONATE	12	x	x										
SODIUM PERCHLORATE	13	x	x	x	x	x	x	x	x	x	x	x	x
SODIUM PEROXIDE	14	•	•	•	•	•	•	•	•	•	•	•	•
SODIUM PERSUFATE	15	x	x										
SODIUM PHENOLATE	16	•	•	•	•	•	•	•	•	•	•	•	•

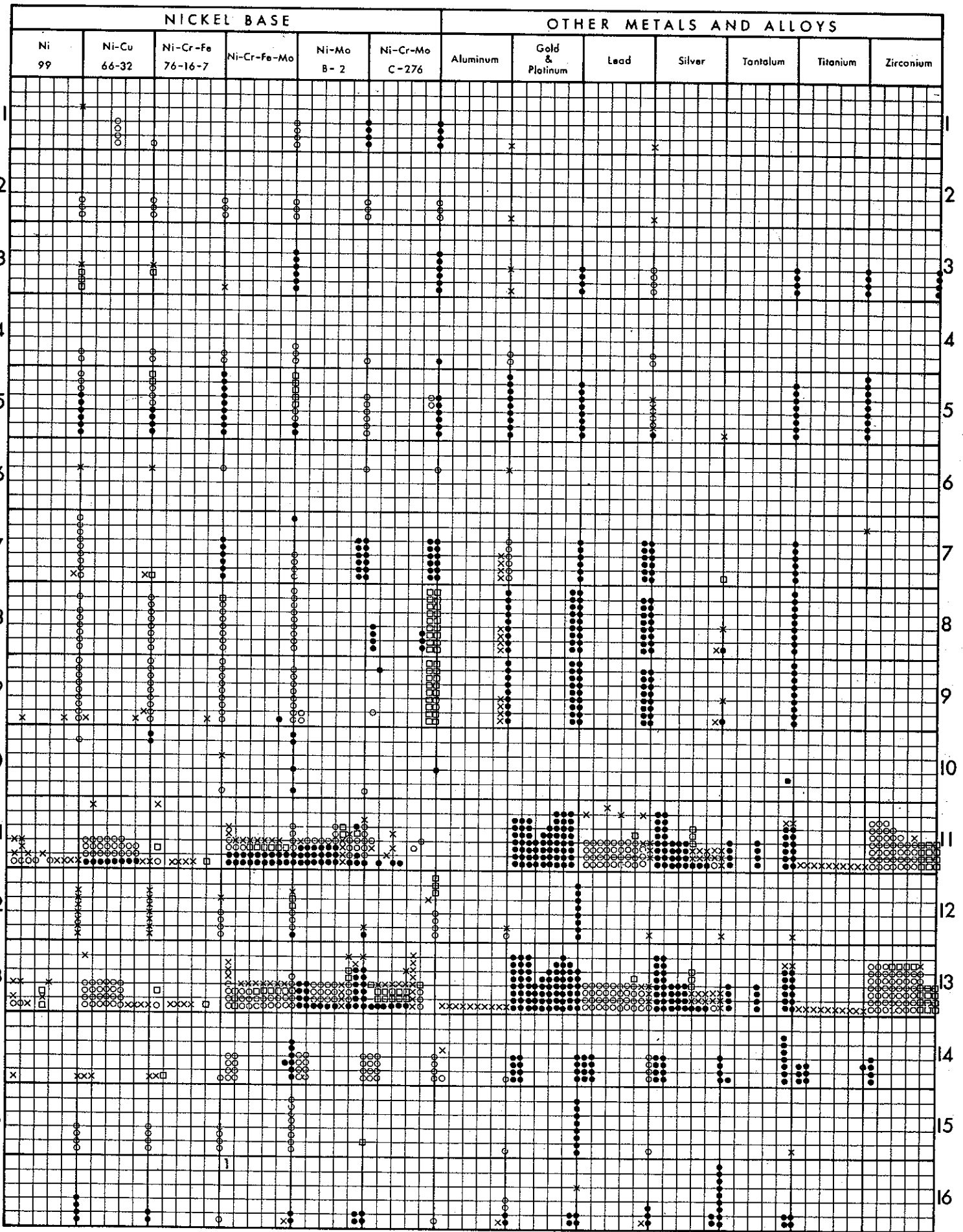




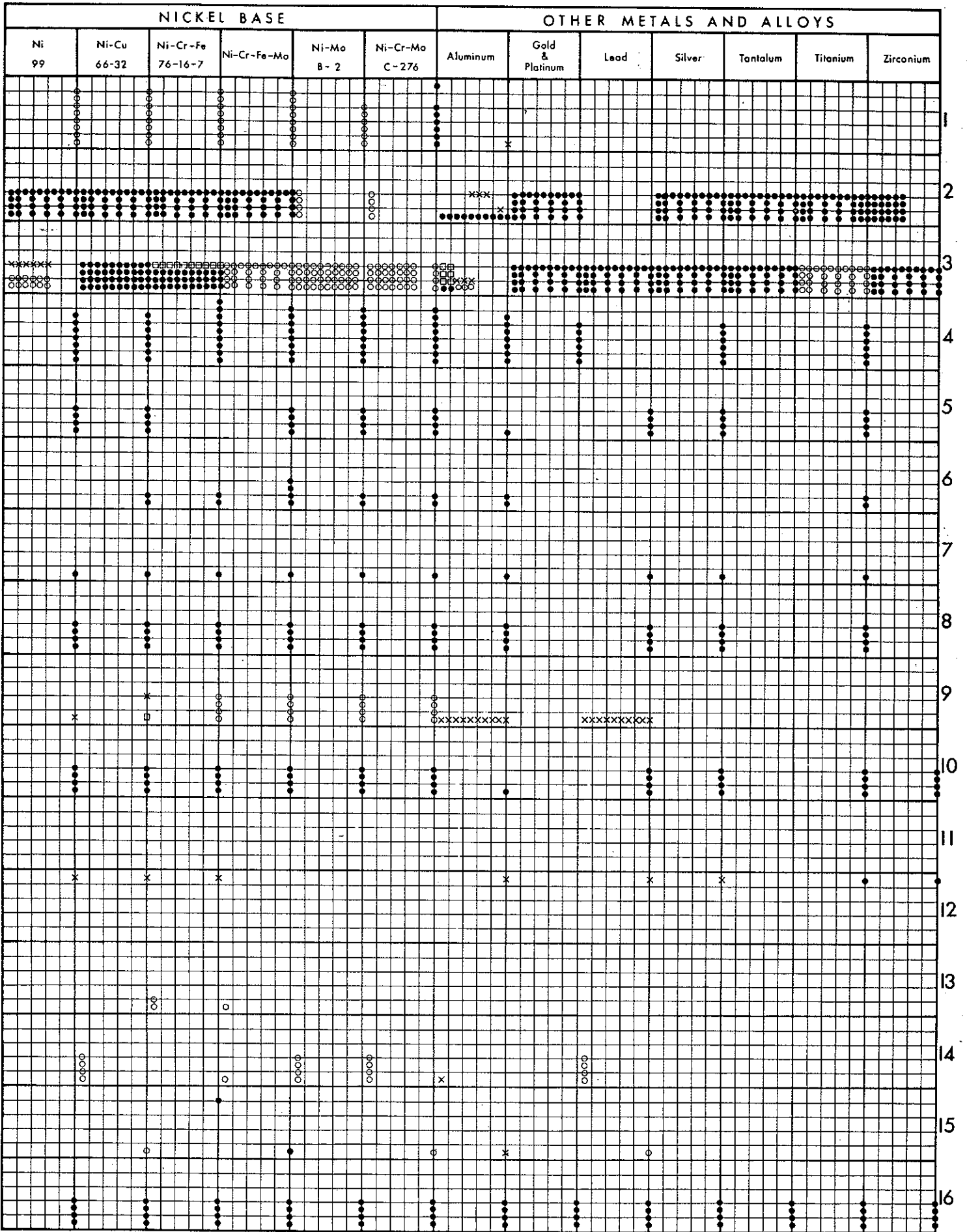
CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
SORBITOL	1	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
SORBASE	2	xxx	xx			•••••	•••••	•••••	•••••	•••••	•••••	•••••
STAND OIL	3		x	x		•••••	•••••	•••••	•••••	•••••	•••••	•••••
STANNIC AMMONIUM CHLORIDE	4	xxx	xxx	x	x	o	o	o	o	o	o	o
STANNIC CHLORIDE	5	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
STANNOVS BISULFATE	6	x	x							o	o	
STANNOVS CHLORIDE	7	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx
STEAM	8		•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
STEAM GEOTHERMAL (AERATED)	9		•	•	•	•	•	•	•	•	•	•
STEAM GEOTHERMAL (AIRFREE)	10		•	•	•	•	•	•	•	•	•	•
STEARIC ACID	11	x	x	x	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
STRONTIUM CHLORIDE	12					x	x					
STRONTIUM NITRATE	13	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
STYRENE	14		•	•	•	•	•	•	•	•	•	•
SUCCINIC ACID	15	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••
SUGAR	16	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••	•••••



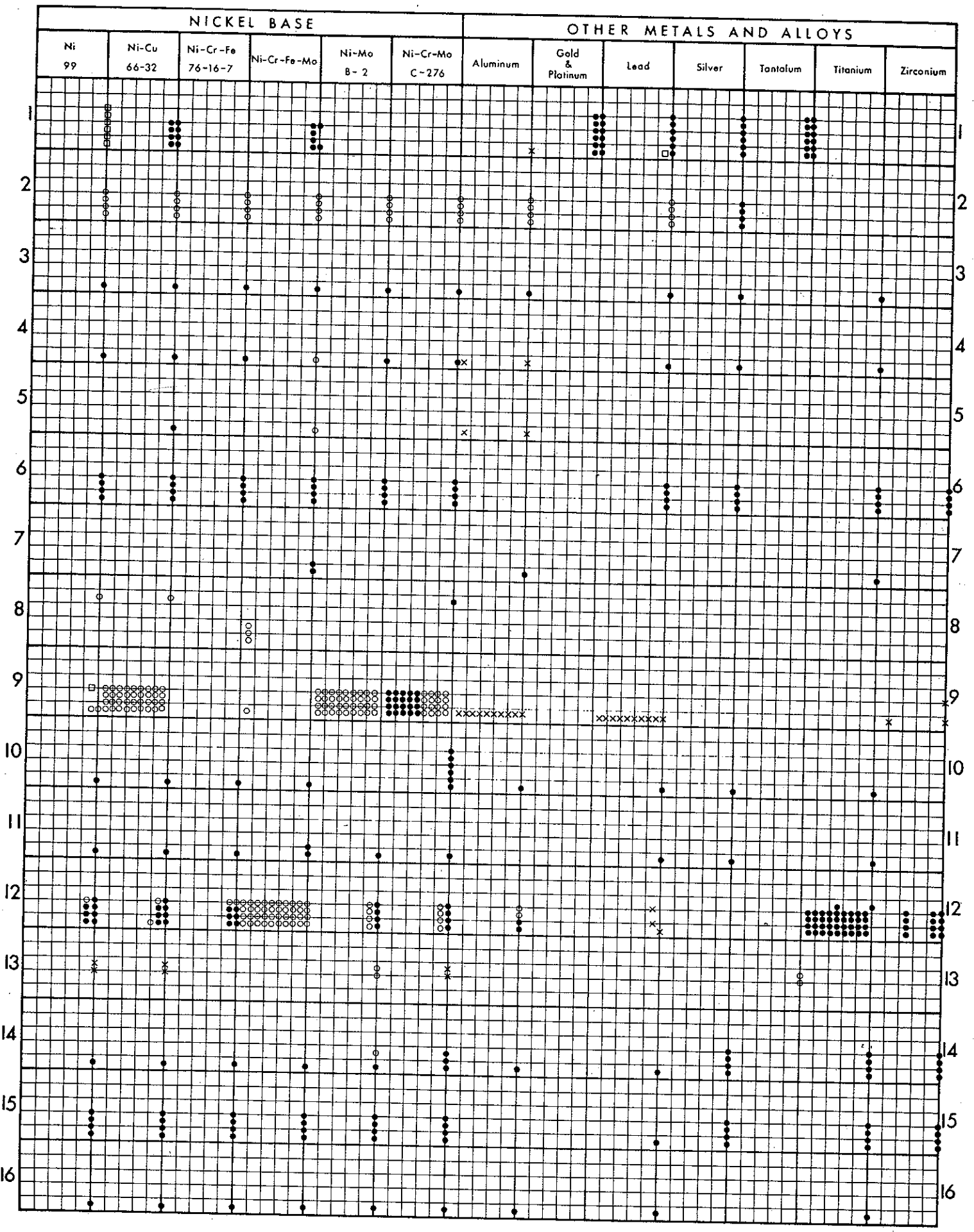
CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
SULFATE BLACK LIQUOR							1 2	1 2				
SULFATE GREEN LIQUOR												
SULFATE LIQUOR WITH 10% SULFUR DIOXIDE								1				
SULFONATED OIL								1	1			
SULFUR								1	1			
SULFUR, AERATED												
SULFUR CHLORIDE								1	1			
SULFUR CONTAINING OILS												
SULFUR DIOXIDE												
SULFUR DIOXIDE 2-5% PLUS H ₂ O												
SULFURIC ACID, AERATED												
SULFURIC ACID FUMING												
SULFURIC ACID NO AIR (STATIC)												
SULFUROUS ACID												
SULFUR TRIOXIDE												
SULFURYL CHLORIDE												



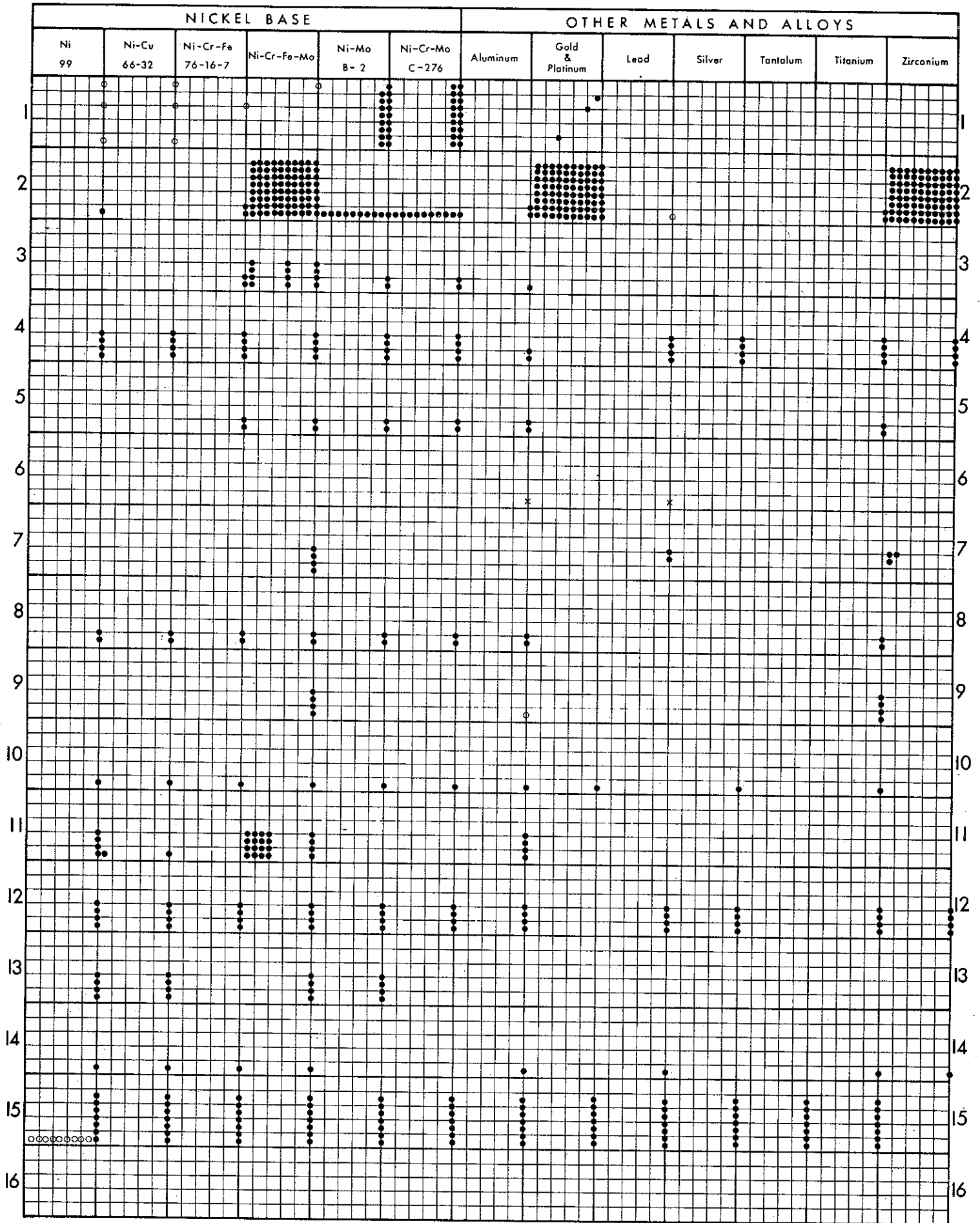
CORROSIVE	IRON BASE									COPPER BASE						
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni				
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5							
TALL OIL		*	*		*	*		*	*							
1		*	*		*	*		*	*							
TANNIC ACID		●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
2	●	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○
TARTARIC ACID			○	○	○	○	○	○	○	○	○	○	○	○	○	○
3	x	xx	○	○	○	○	○	○	○	○	○	○	○	○	○	○
TERPENES				●				●		●		●				
4		*	*	●				●		●		●		*	*	*
TERPINOL		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
5		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TETRBETHYLENE PENTAMINE		●	●	●				●		●		●		●		*
6		●	●	●				●		●		●		●		*
TETRAFLUO- RETHYLENE																
7		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TETRAHYDRO- NAPHALENE		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
8		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
TETRA PHOPNORIC ACID		*		*	*	*		*	*	*	*	*	*	*	*	*
9	xx	xx	xx	○	○	○	○	○	○	○	○	○	○	○	○	○
THIOAMYL ALCOHOL		●	●	●				●		●		●		●		●
10		●	●	●				●		●		●		●		●
THIONYL CHLORIDE																
11																
TIN		○	○					○	○	○	○	*	*	*	*	*
12		○	○					○	○	○	○	*	*	*	*	*
TIN AMMONIUM CHLORIDE								1	1	1						
13	x	x		x	x			x	x	x	x	x	x	x	x	x
TITANIUM SULFATE																
14	x	x														
TITANIUM TETRACHLORIDE																
15		x	●		x	x		x	x	x	x	x	x	x	x	x
TOLVENE		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
16		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●



CORROSIVE	IRON BASE									COPPER BASE												
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni										
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5													
TOLVENE																						
SULFANYL CHLORIDE			*																			
1	□	□	•																			
TOLUQUINONE																						
2	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
TOLYLALDEHYDE																						
3	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TOXAPHENE																						
4	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TOXAPHENE & SULFUR																						
5	x	x																				
TRIBROMO ETHYLBENZENE																						
6	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRIBUTYL AMINE																						
7	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRIBUTYL PHOSPHATE																						
8	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRICHLORO ACETIC ACID																						
9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
TRICHLORO-BENZENE																						
10	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRICHLORO-ETHANES																						
11	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRICHLORO-ETHYLENE																						
12	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
TRICHLORO-ETHYLENE CONDENSATE																						
13	x	x																				
TRICHLORO MONOFLUORO ETHANE																						
14	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRICHLORO PROPANE																						
15	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
TRICHLORO-TRIFLUORO ETHANE																						
16	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

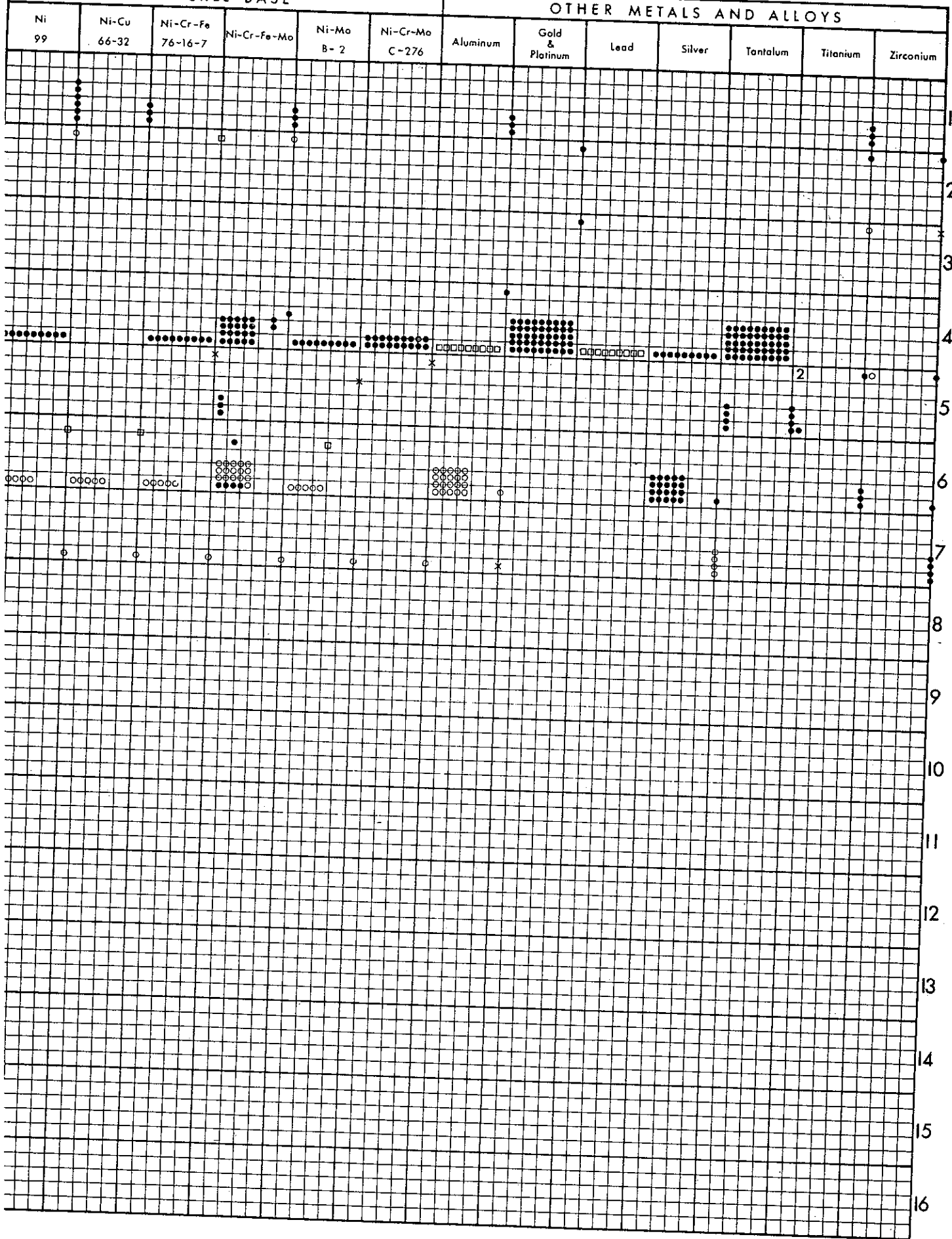


CORROSIVE	IRON BASE									COPPER BASE		
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5			
TRICRESYL PHOSPHATE				*	*			o	o		*	*
TRIETHANOL-AMINE			*								*	*
TRIETHYLAMINE											*	*
TRIETHYLENE GLYCOL											*	*
TRETHYLAMINE												
TETRAMINE												
TRIFLUORO ACETIC ACID												
TRI-ISOBUTYL ALUMINUM CHLORIDE	*	*	*	*	*			*	*	*	*	*
TRI-ISOPROPANOL AMINE												
TRI-METHYL BENZENES												
TRI-ISOPROPYL BENZYL CHLORIDE												
TRIMETHYL AMINE												
TRIMETHYL PENTANES												
TRIMETHYL PHOSPHITE												
TRIPHENYL PHOSPHITE												
TURPENTINE												

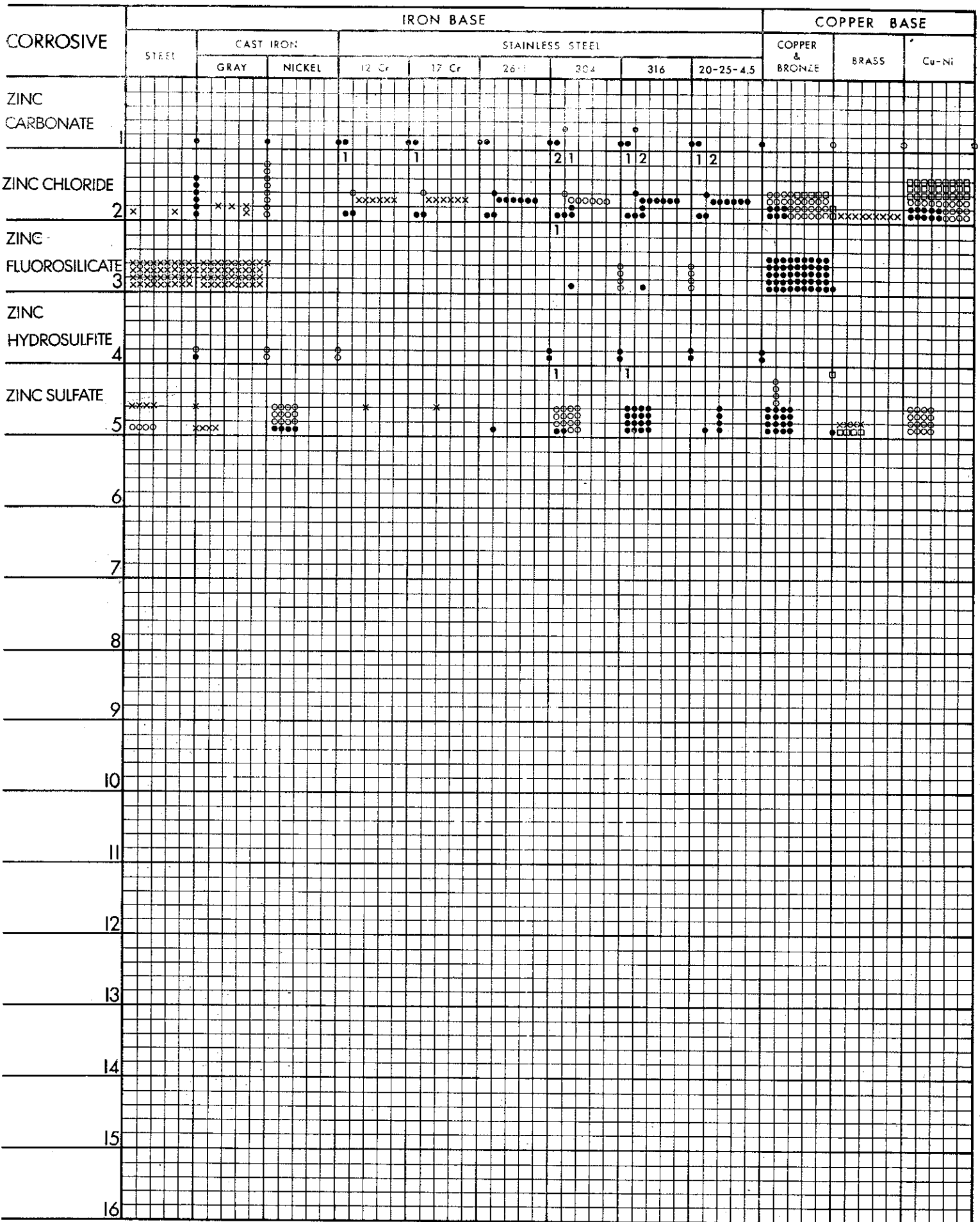


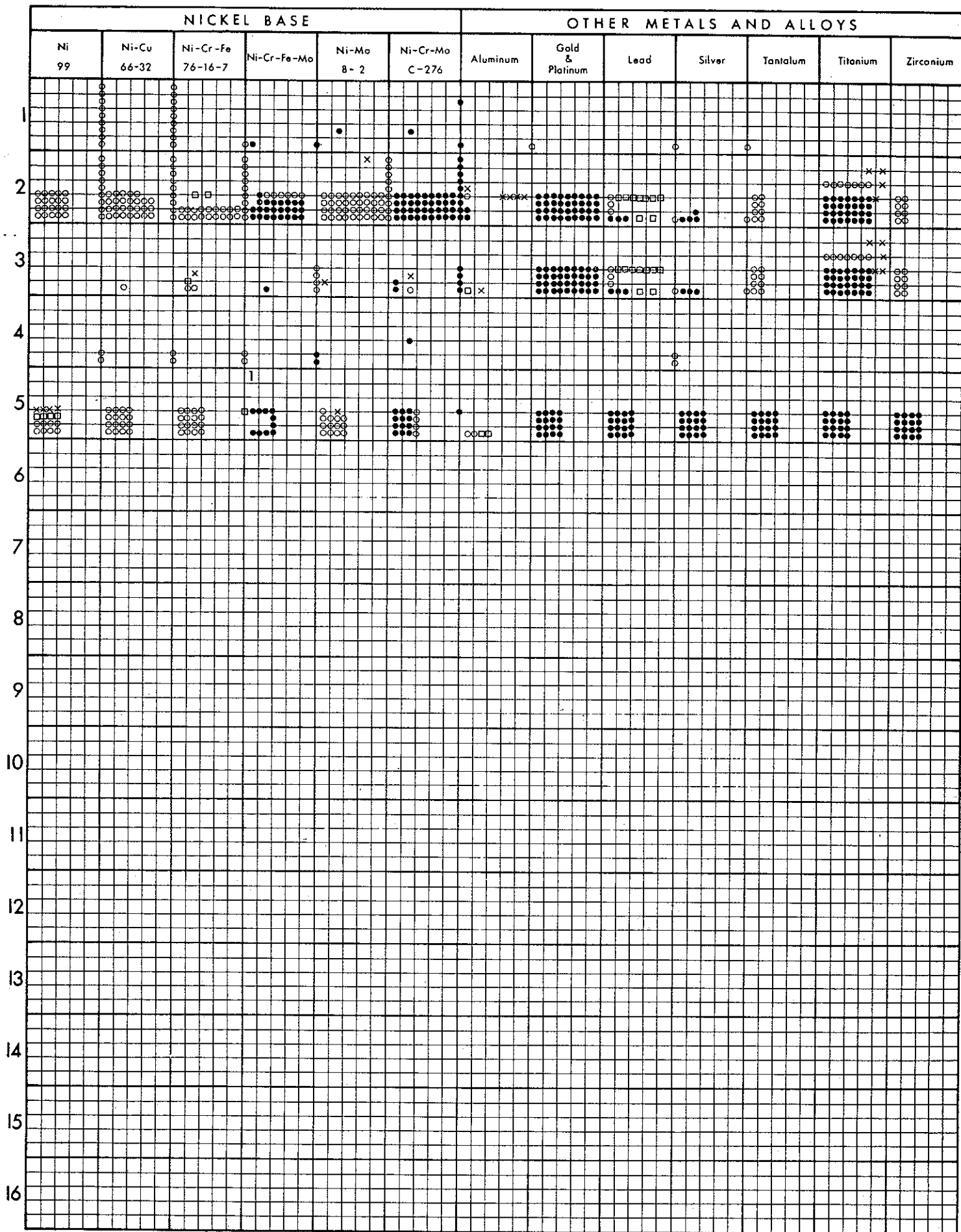
NICKEL BASE

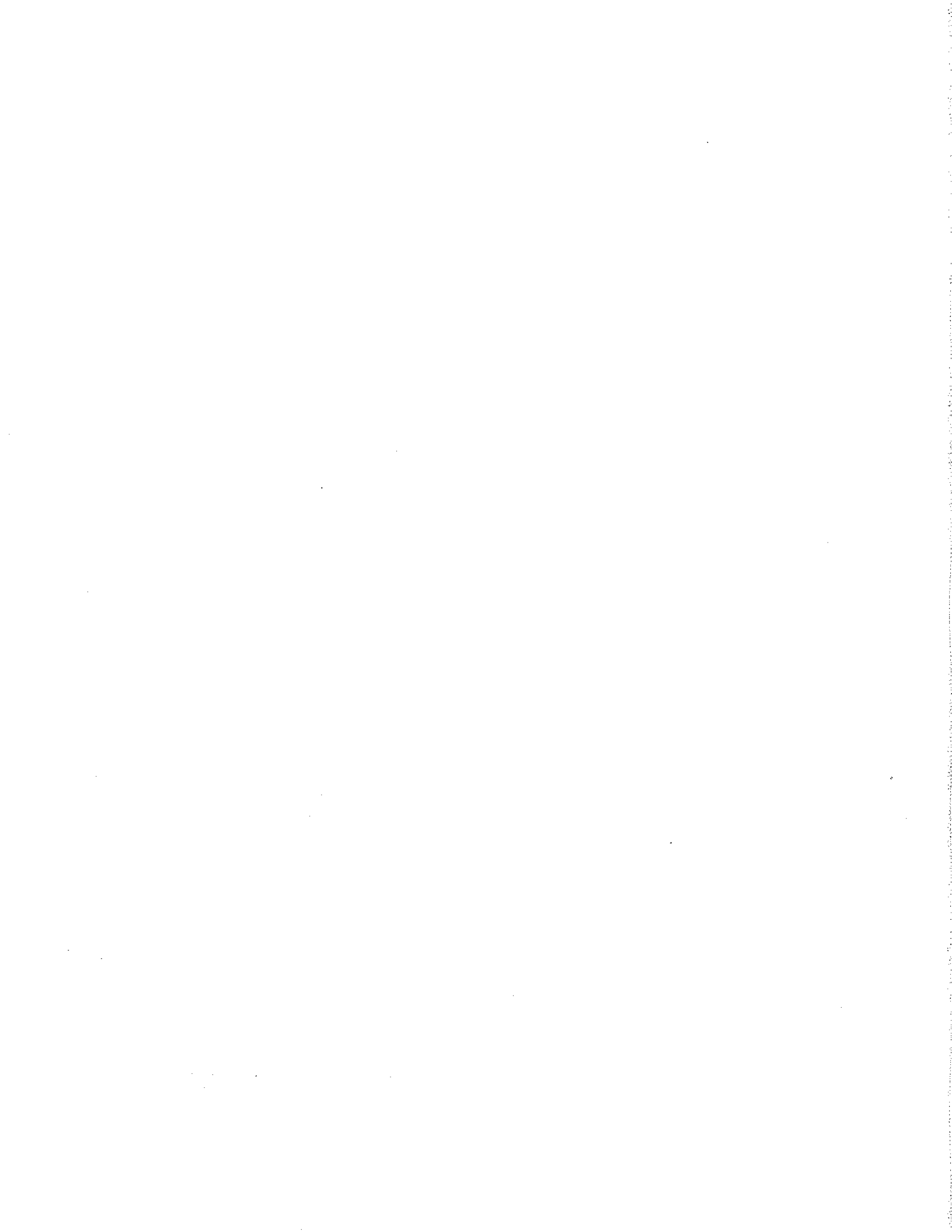
OTHER METALS AND ALLOYS



CORROSIVE	IRON BASE									COPPER BASE			
	STEEL	CAST IRON		STAINLESS STEEL						COPPER & BRONZE	BRASS	Cu-Ni	
		GRAY	NICKEL	12 Cr	17 Cr	26-1	304	316	20-25-4.5				
VEGETABLE OILS							•••••	•••••	•••••	•••••	•••••	•••••	•••••
1	•	•	•										
VINYL ACETATE													
2	•	•	•				•	•	•	•	○	○	
VINYL BENZENE													
3	•	•	•	•	•	•	•	•	•	•	•	•	•
VINYL CHLORIDE													
4	•	•	•	•	•	•	○	○	○	○	•	○	•
XYLENE													
5	•	•	•	•	•	•	•	•	•	•	•	•	•
XYLIDINE													
6	○	○	○										
YEAST	••••••••	••••••••					••••••••	••••••••	••••••••	••••••••	••••••••	••••••••	••••••••
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													







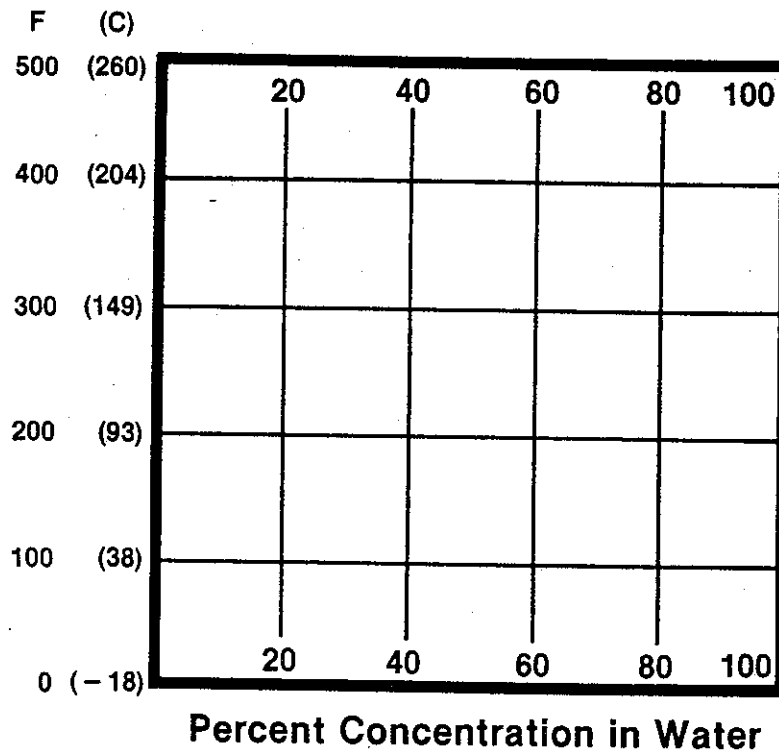
Section 2

Short Tables

The following "short" tables contain data on additional materials not found in the main tables and are organized separately to conserve space. Data in this section also represent exposure in the 0 to 500 F (-18 to 260 C) corrosive temperature range, are of the same kind and reliability as other data found in this volume, and come from the same sources.

Data are plotted in the same matrix used in the main tables (shown below). The reader is advised to examine this matrix before attempting to use the tables. A replica of the matrix also appears on the fold-out page immediately following the introduction for ready reference when reading the tables. A key to the data points (giving average penetration rates per year), a key to footnotes, and a table of identifications and nominal analyses of metals and alloys are also located on the fold-out page.

Consult the introduction for further instructions on how to use this data survey.



CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Gray Cast Iron	Aluminum							
ALLYL BROMIDE										
1										
ALUMINUM FLUOROSULFATE	304	316	Ni-Cr-Fe-Mo	Ni 99	Ni-Cu 66-32	Ni-Cr-Fe 76-16-7	Ni-Cr-Mo C-276			
2	○	○	○	●	●	●	●			
ALUMINUM OXALATE	Copper & Bronze	Ni-Cu 66-32	Ni-Mo B-2	Ni-Cr-Mo C-276						
3	○	○	○	●	●					
ALUMINUM STEARATE	Steel	Gray Cast Iron	316	Ni-Cr-Fe-Mo						
4	●	●	●	●	●					
AMMONIUM ARSENATE	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo						
5	●	●	●	●	●					
AMMONIUM AZIDE	Steel	Silicon Cast Iron	Copper & Bronze	Ni 99	Aluminum	Lead				
6		*	●	*	*	○	○	○	●	
AMMONIUM BENZOATE	Steel	Gray Cast Iron	Nickel Cast Iron	Silicon Cast Iron						
7		●	●	●	●					
AMMONIUM BORATE	Steel	Gray Cast Iron	Nickel Cast Iron	316	Ni-Cr-Fe-Mo					
8	○	○	○	○	○					
AMMONIUM IODIDE	Silicon Cast Iron	316	Copper							
9		○	○	*						
AMMONIUM LACTATE	Silicon Cast Iron	Aluminum								
10		○	○	○						

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Aluminum								
AMMONIUM THIOGLYCOLATE 1										
ANTHRANILIC ACID 2	Steel	Silicon Cast Iron	Aluminum							
ARSENIC PENTOXIDE & 62% SULFURIC 3	304	316	Ni 99	Ni-Cu 66-32	Ni-Cr-Fe 76-16-7					
ARSENIC DISULFIDE 4	Steel	Gray Cast Iron	Copper	Aluminum	Silver					
ARSENIC TRIOSULFIDE 5	Steel	Gray Cast Iron	Copper	Brass	Silver					
BEER 6	304	316								
BERYLIUM OXIDE 7	Ni 99	Ni-Cu 66-32	Ni-Cr-Fe 76-16-7	Titanium	Zirconium					
BISMUTH SUBCARBONATE 8	Steel	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Cu 66-32				
BISMUTH NITRATE 9	Steel	Silicon Cast Iron	Ni-Cr-Fe-Mo							
BROMOBENZYL CYANIDE 10	Steel	Gray Cast Iron	Ni 99	Ni-Cu 66-32	Lead					

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	304	316	Ni-Cr-Fe-Mo	Ni 99	Ni-Cu 66-32	Silver				
BROMISOVALERYL UREA										
BUTYL BENZOIC ACID	Steel	Silicon Cast Iron	Gray Cast Iron	304	Ni 99	Aluminium				
CALCIUM CYANAMIDE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
CALCIUM CYANIDE	Steel	Gray Cast Iron	Nickel Cast Iron	Gold	Platinum					
CALCIUM HYDROSULFIDE	304	316	Ni-Cr-Fe-Mo	Aluminium						
CALCIUM PEROXIDE	Steel	Gray Cast Iron	304	316	Ni-Cr-Fe-Mo	Aluminium				
CALCIUM PHENOSULFATE	Steel	Silicon Cast Iron	Gray Cast Iron							
CALCIUM PROPIONATE	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Ni-Cr-Fe-Mo	Aluminium					
CALCIUM PYRIDINE SULFONATE	Silicon Cast Iron	Ni-Cr-Fe-Mo	Ni-Cr-Mo C-276							
CEROUS CHLORIDE	Steel	304	316	Copper	Nickel					

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Copper	Aluminum	Lead	Silver					
CEROUS FLUORIDE										
1										
CEROUS SULFATE	Steel	Silicon Cast Iron	Lead	Silver						
2										
CHLOROBENZENE 60% CHLORAL 40%	Ni 99	Ni-Cu 66-32	Ni-Cr-Fe 78-16-7	Ni-Cr-Mo C-276						
3										
CHLOROBENZOYL CHLORIDE	Steel	304	Copper	Ni-Cr-Mo C-276	Aluminum	Lead	Silver			
4										
CHLOROPICRIN	304	316								
5										
CINNAMIC ACID	Steel	Silicon Cast Iron	Gray Cast Iron							
6										
COBALTOUS SULFATE	Steel	Silicon Cast Iron	316	Aluminum	Lead					
7										
COPPER GLUCONATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Aluminum					
8										
COPPER NAPHTHENATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Aluminum					
9										
CYANOHYDRIN	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo			
10										

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni 99		
DIBUTYL SEBACATE										
1										
DIBUTYL SULFATE	304	316	Ni-Cu 66-32							
2										
DICHLOROACETIC ACID	304	Tantalum	Titanium	Zirconium						
3										
DIETHYLCARBONATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
4										
DIISOBUTYL ALUMINUM CHLORIDE	Steel	Gray Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Mo B-2				
5										
DIMETHYL CHLORACETO ACETAMIDE	304	316	Ni 99	Ni-Cu 66-32	Ni-Mo B-2	Aluminum				
6										
DIMETHYL (UNS) HYDRAZINE + HYDRAZINE 50%-50%	Steel	304	316	Ni-Cr-Fe 76-16-7	Aluminum	Titanium				
7										
DIMETHYL SULFATE	Steel	Silicon Cast Iron	Gray Cast Iron							
8										
FERRIC FERROCYANIDE	Silicon Cast Iron	Ni-Cu 66-32	Ni-Cr-Fe-Mo							
9										
FERROUS AMMONIUM CITRATE	Silicon Cast Iron	Ni-Cr-Fe 76-16-7	Ni-Mo B-2	Ni-Cr-Mo C-276						
10										

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	304	316	Ni-Cr-Fe-Mo	Ni-Cr-Mo C-276						
FERROUS IODIDE										
1	○	○	●	●						
GLYCEROL MONOCHLORO HYDRIN	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
2		○	○	●	○					
GOLD CYANIDE PLATING SOLUTION	304	316	Ni-Cr-Fe-Mo	Tantalum						
3	●	●	●	●						
IRON SULFAMATE	Silicon Cast Iron	316	Ni-Cr-Fe-Mo							
4	○	○	○	○						
ISOBUTYLENE CHLOROHYDRIN	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
5		○	○	○	○					
ISOBUTYRIC ACID	Steel	Silicon Cast Iron	Ni-Cr-Fe-Mo	Aluminum						
6		○	○	○	●					
ISOPROPYL NITRATE	Silicon Cast Iron	Titanium								
7	○	○	○							
LEAD FLUOSILICATE + 8.5% H ₂ Si-Fe + 6.9% Pb-Si-F ₆	304	316	Ni-Cr-Fe-Mo							
8	○	○	○							
LEAD NAPHTHENATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Copper					
9	●	●	●	●	●					
LEAD PATHALATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo			
10		○	○	○	○	○	○	○	○	○

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
LEAD SALICYLATE										
1										
LEAD STEARATE	Steel	Silicon Cast Iron	Gray Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Mo B-2			
2										
LEAD TETRA-ACETATE	Steel	Silicon Cast Iron	Gray Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Mo B-2			
3										
LINALYL ACETATE	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Cu 66-32	Aluminum				
4										
LITHIUM BENZOATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
5										
LITHIUM BROMIDE	304	316	99	Ni-Cu 66-32	Ni-Cr-Fe					
6										
LITHIUM SALICYLATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
7										
MAGNESIUM GLUCONATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Titanium					
8										
MAGNESIUM GLYCEROPHOSPHATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
9										
MAGNESIUM HYPOPHOSPHITE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
10										

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Silicon Cast Iron	304	Aluminum							
MAGNESIUM PERCHLORATE 1										
MANGANESE CARBONATE 2	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Copper					
MANGANESE LINOLEATE 3	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
MANGANESE NAPHTHENATE 4	Steel	Silicon C. I.	Gray C. I.	Nickel C. I.	304	316	Ni-Cr-Fe-Mo			
MERCURIC ACETATE 5	304	316	Ni-Cr-Fe-Mo							
MERCURIC SULFATE 6	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Cr-Fe 76-16-7	Lead				
METHACRYLIC ACID 7	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316				
METHYL ABIETATE 8	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo			
METHYL ACRYLATE 9	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	304	316				
METHYLAMYL ACETATE 10	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Copper					

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
METHYL LACTATE 1										
METHYL METHACRYLATE 2			304	316	Ni-Cr-Fe-Mo	Aluminum				
METHYL PROPIONATE 3			Gray Cast Iron	Copper						
METHYL SALICYLATE 4			Gray Cast Iron	Copper	Ni-Cu 66-32	Aluminum	Silver			
MONOMETHYL HYDRAZINE 5		304	Ni-Cr-Fe-Mo	Aluminum						
NAPHTHENIC ACIDS 6		304	316	Ni-Cu 66-32	Ni-Cr-Fe 76-16-7					
NICKEL ACETATE 7		Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Ni-Cu 66-32	Aluminum			
NICOTINE 8		304	316	Aluminum						
NITRIC ACID (25-35%) + 515 ppm CHLORIDES 9		304	316	Ni-Cr-Fe-Mo	Ni-Cr-Fe 76-16-7	Ni-Cr-Mo C-276				
NITROXYLENE 10		Steel	Gray Cast Iron	Nickel Cast Iron	Aluminum					

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Gray Cast Iron	304	Copper	Ni-Cr-Fe 76-16-7					
PENICILLIN NUTRIENT										
PERACETIC ACID	Silicon Cast Iron	316	Aluminum							
PERMANGANIC ACID	Silicon Cast Iron	316	Ni-Cr-Fe-Mo							
PHENOL + 3.5% SULFURIC ACID	Steel	Silicon Cast Iron	304	Copper	Brass	Ni-Mo B-2				
PHENYL GLYCINE	Silicon Cast Iron	N, 99	Aluminum							
PHOSPHORUS TRIBROMIDE	Silicon Cast Iron	Lead	Titanium	Zirconium						
POTASSIUM CITRATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						
POTASSIUM GLUCONATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron	Silver					
POTASSIUM METABISULFITE	Steel	Silicon Cast Iron	316	Ni-Cr-Fe-Mo	Lead					
POTASSIUM STANNATE	Steel	Silicon Cast Iron	Gray Cast Iron	Nickel Cast Iron						

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Silicon Cast Iron	Ni-Cr-Fe-Mo	Aluminum						
RESORCINOL 1		•	•	•	•					
RICINOLEIC ACID 2		•	•	•						
SELENIC ACID 3	•		•		•		•		•	
SELENOUS ACID 4	•	•	•		•		•		•	
SILICOTUNGSTIC ACID 5		•	•							
SILVER SULFATE 6		•	•							
SODIUM BOROHYDRIDE 7	•	•	•							
SODIUM CYANIMIDE 8	•	•	•	•	•	•	•	•	•	•
SODIUM GLUCONATE 9		•	•	•						
SODIUM HYPOPHOSPHATE 10		•	•	•						

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Steel	Gray Cast Iron	Nickel Cast Iron	Ni-Cu						
SODIUM HYPOPHOSPHITE 1										
SODIUM OLEATE 2	Steel	Silicon Cast Iron	304	316	Ni-Cr-Fe-Mo	Titanium				
SODIUM OXALATE 3	Steel	304	Aluminum	Titanium						
SODIUM PROPIONATE 4	Steel	304	316	Aluminum						
SODIUM PYROSULFITE 5	304	316	Ni-Cr-Fe-Mo	Copper	Ni-Cu	Aluminum	Lead	Silver		
SODIUM RESINATE 6	Steel	Gray C	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo				
SODIUM STANNATE 7	Steel	304	316	Aluminum						
SODIUM TETRASULFIDE 8	Steel	Gray Cast Iron								
SODIUM TRICHLOROACETATE 9	Steel	Gray Cast Iron	Nickel Cast Iron							
STANNOUS FLUORIDE 10	316	Ni-Cr-Fe-Mo								

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	304	Ni-Cr-Fe-Mo	Ni-Mo	Aluminum						
STREPTOMYCIN										
STRONTIUM CARBONATE	Steel	Gray Cast Iron	Nickel Cast Iron							
STRONTIUM CHLORIDE	Steel	304	316	Ni	Ni-Cu	Ni-Cr-Fe	Ni-Mo			
SULFAMIC ACID	Steel	Gray Cast Iron	304	316	Copper	Brass	Aluminum	Titanium		
SULFANILIC ACID	Gray Cast Iron	Nickel Cast Iron	Titanium	Zirconium						
SULFONIC ACIDS	Steel	Gray Cast Iron	304	Ni-Cr-Fe-Mo	Aluminum					
TERPINYL ACETATE	Gray Cast Iron	Nickel Cast Iron	Nickel	Ni-Cu	Aluminum					
THIOGLYCOLIC ACID	Steel	316	Ni-Cr-Fe-Mo	Ni-Cr-Mo C-276	Aluminum					
THIOPHOSPHORYL CHLORIDE	Ni-Cr-Fe-Mo	Nickel	Ni-Cu	Lead						
THIOUREA	316	Ni-Cr-Fe-Mo								

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	304	316	Ni-Cr-Fe-Mo	Nickel	Ni-Cu	Ni-Cr-Fe	Ni-Cr-Mo C-276			
ZINC DIHYDROGEN PHOSPHATE 1				○ □	□	□	○			
ZINC NAPHTHENATE 2	Steel	Gray Cast Iron	Nickel Cast Iron							
ZINC OXIDE 3	Aluminum	Silver								
ZINC PHENOLSULFONATE 4	Steel	Gray Cast Iron	Nickel Cast Iron							
5										
6										
7										
8										
9										
10										

CORROSIVE

MISCELLANEOUS METALS AND ALLOYS

THORIUM
NITRATE

1

304	316	Aluminum																		
•	••	•																		

TRIACETIN

2

Steel	Aluminum																			
	•	•																		

TRIALLYLAMINE

3

Steel	Gray Cast Iron	Nickel Cast Iron	Copper	Brass																
	•	•	•	•																

TRICHLOROETHANOL
AMINE

4

Steel	Gray Cast Iron	Copper	Brass																	
	•	•	•																	

TRIETHYL
PHOSPHATE

5

Steel	Gray Cast Iron	Nickel Cast Iron	Copper	Brass																
	•	•	•	•																

TRIFLUOROACETIC
ACID

6

Steel	Copper	Aluminum																		
	•	•																		

TRIDECYLENIC
ACID

7

Steel	316	Ni-Cr-Fe-Mo	Aluminum																	
	•	•••																		

TRISODIUM
CHLORIDES

8

304	316	Ni-Cr-Fe-Mo																		
•	•	•																		

TRISULFURIC
ACID

9

Aluminum	Zirconium																			
•	•																			

TETRACRYLIC
CYANIDE

10

Steel	Gray Cast Iron	Nickel Cast Iron	304	316	Ni-Cr-Fe-Mo															
••	•	•	•	•	•															

Section 3

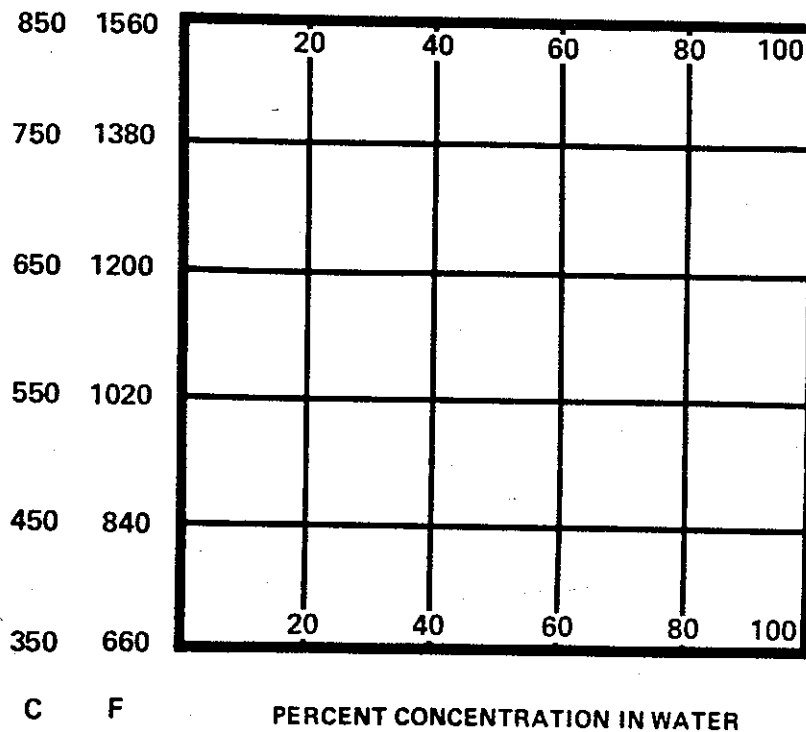
High Temperature

Tables

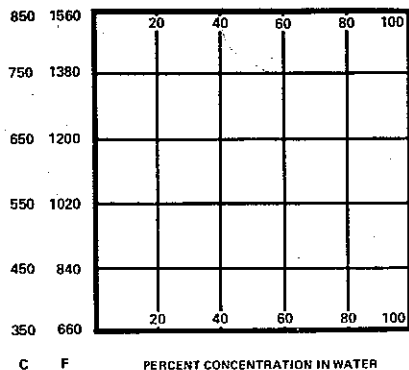
The following tables contain data representing exposure of materials to corrosives in the 660 to 1560 F (350 to 850 C) temperature range which could not easily be accommodated in the main tables. The data are of the same kind and reliability and come from the same sources as other data found in this volume.

The reader is advised to examine the following matrix upon which the tables in this section are based (and which differs from the matrix used in two preceding sections) before attempting to use the tables. A replica of the matrix appears at the bottom of each page in this section along with a key to data points (giving average penetration rates per year), footnotes, and a table of average penetration rates per year compared to weight loss.

Consult the introduction for further instructions on how to use this data survey.



CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Silicon Cast Iron	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Nickel	Ni-Cu	NiCrFe				
ALIPHATIC DICARBOXYLIC ACID	1										
	24			*	*	*	*	0	0		
ALUMINUM	Gray Cast Iron	Silicon Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Copper	Brass 70-80	Brass 59-83	Nickel	Ni-Cu
	2										
	25		*	*	26	26	*	*	*	*	*
AMMONIA	NiCrFe	Tantalum	Titanium	Aluminum Oxide	Columbium	Fosterite	FeO Cr ₂ O ₃	Magnesia	Molybdenum	Silicon Carbide	Tungsten
	3										
	27		*	*			*	*	*	*	*
AMMONIUM CHLORIDE	NiMo	NiCrMo									
	4										
BARIUM CHLORIDE	Stainless 302-347	NiCrFe	Platinum	Titanium							
	5										
6											
7											
8											
9											
10											



AVERAGE PENETRATION PER YEAR

Code Mils 1 inch / 1000 Micros

● < 2 0.002 50.8

○ < 20 0.020 508.0

□ 20-50 0.020-0.050 508.0-1270.0

x > 50 0.050 1270.0

SOME CONVERSION FACTORS

Steel: mpy = lb/(l²/yr x 24.5

ipy x 696 x density = mdd

g/m²/d x 0.0144 ÷ density = ipy

1 micron = 0.03937 mil

Parts per million = 0.001 g/liter

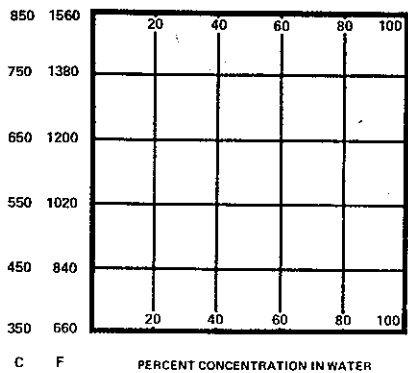
Normal = 1 g equiv. liter (wt)

AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS			
CDS	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr
ALUMINUM			
●	<3.79	<138	<0.0284
○	<37.90	<1380	<0.284
□	37.9-945.5	1380-3450	0.284-0.71
x	>945.5	>3450	>0.71
COPPER, NICKEL or IRON			
●	<11.9	<435	<0.0896
○	<119.0	<4350	<0.896
□	119.0-297.5	4350-10875	0.896-2.24
x	>297.5	>10875	>2.24
LEAD			
●	<15.75	<576	<0.1178
○	<31.50	<5760	<1.178
□	31.5-393.75	5760-14,400	1.178-2.945
x	>393.75	>14,400	>2.945
TANTALUM			
●	<23.06	<843	<0.172
○	<230.6	<8430	<1.72
□	230.6-576.5	8430-21,075	1.72-4.3
x	>576.5	>21,075	>4.3

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Nickel Cast Iron	Silicon Cast Iron	Mild Steel	Stainless 302-347	AC1 20Cr30Ni	Copper	Brass 70-80	Brass 59-93	Nickel	Ni-Cu
BIPHENYL 1							10710C				
BISMUTH 2											
CADMIUM 3											
CALCIUM 4											
CARBON DIOXIDE 5											
CALCIUM CHLORIDE 6											

FOOTNOTES FOR DATA SQUARES		
1. No water	13. May pit	27. > 538 C = nitriding
2. No air, oxygen	14. May stress crack	28. Over 1000 C
3. Low air, oxygen	15. Transgranular attack	29. 8 fps
4. Pits	16. Vapor	30. Oxide
5. Stress cracks	17. Aerated	31. When wet
6. Stress corrosion	18. Catalyzes	32. Weight gain
7. Discolors	19. Static	33. 125 psi
8. Crevice attack	20. Agitated	
9. Intergranular attack	21. ~ 7 pH	
10. No chlorides	22. < 7 pH	
11. May discolor	23. > 7 pH	
12. May catalyze	24. 25 to 100 C	
	25. Graphitizes	
	26. Embrittles	

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Nickel Cast Iron	Silicon Cast Iron	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Copper	Brass 70-80	Brass 59-93	Nickel	Ni-Cu
CARBON MONOXIDE				26				17	17	>1000 c	24
CARBON TETRACHLORIDE											
CHLORINE											
CHLORINE + STEAM											
CESIUM											
COPPER SULFIDE											



AVERAGE PENETRATION PER YEAR			
Code	Mils	1 inch 1000	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020	508.0
□	50	0.050	1270.0
X	> 50	0.050	1270.0

SOME CONVERSION FACTORS

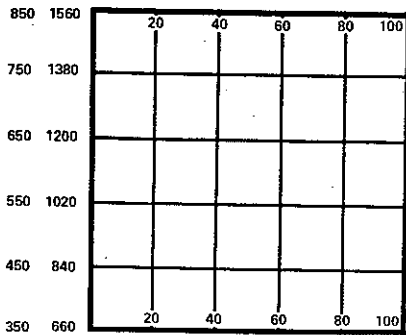
Steel: mpy = lb/in²/yr x 24.5
 ipy x 696 x density = mdd
 g/m²/d x 0.0144 x density = ipy
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS				
CDS	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr	
ALUMINUM				
●	<3.79	<138	<0.0284	
○	<37.90	<1380	<0.284	
□	37.9-945.5	1380-3450	0.284-0.71	
X	>945.5	>3450	>0.71	
COPPER, NICKEL or IRON				
●	<11.9	<435	<0.0896	
○	<119.0	<4350	<0.896	
□	119.0-297.5	4350-10875	0.896-2.24	
X	>297.5	>10875	>2.24	
LEAD				
●	<15.75	<576	<0.1178	
○	<31.50	<5760	<1.178	
□	31.5-393.75	5760-14,400	1.178-2.945	
X	>393.75	>14,400	>2.945	
TANTALUM				
●	<23.06	<843	<0.172	
○	<230.6	<8430	<1.72	
□	230.6-576.5	8430-21,075	1.72-4.3	
X	>576.5	>21,075	>4.3	

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS											
	Ni-Cu	NiCrFe	NiMo	Silver								
FATTY ACIDS				34								
1												
FLUORINE	Nickel	Ni-Cu	NiCrFe	NiCrMo	Gold	Platinum						
2			32						*	*		
FORMALDEHYDE	Stainless 302-347	Platinum	Silver									
3			33									
GALLIUM	Nickel	Tantalum	Titanium	Beryllium	Molybdenum	Rhenium	Tungsten					
4				9								
GLASS	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Stainless 405-410								
5												
6												
7												
8												

- | FOOTNOTES FOR DATA SQUARES | | |
|----------------------------|---------------------------------------|-----------------|
| 1. No water | 13. May pit | 32. With steam |
| 2. No air, oxygen | 14. May stress crack | 33. As catalyst |
| 3. Low air, oxygen | 15. Transgranular attack | 34. No solder |
| 4. Pits | 16. Vapor | |
| 5. Stress cracks | 17. Aerated | |
| 6. Stress corrosion | 18. Catalyzes | |
| 7. Discolors | 19. Static | |
| 8. Crevice attack | 20. Agitated | |
| 9. Intergranular attack | 21. ~ 7 pH | |
| 10. No chlorides | 22. < 7 pH | |
| 11. May discolor | 23. > 7 pH | |
| 12. May catalyze | 24. No sulfur | |
| | 25. With sulfur | |
| | 26. No hydrogen sulfide | |
| | 27. No quartz | |
| | 28. Embrittled by O ₂ or N | |
| | 29. No nitrogen | |
| | 30. Liquid or vapor | |
| | 31. Decarburizing | |

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Nickel Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Copper	Brass 70-80	Brass 69-93	Cupronickel	NiCrFe
HYDROGEN	27	28	29	30	31	32	33	34	35	36	37
	38	39	40	41	42	43	44	45	46	47	48
HYDROGEN CHLORIDE	Mild Steel	Stainless 302-347	ACI 20Cr30Ni	Nickel	Ni-Cu	NiCrFe	NiMo	NiCrMo	Gold	Platinum	Silver
	29	30	31	32	33	34	35	36	37	38	39
HYDROGEN CHLORIDE + STEAM + AIR	Stainless 316-317	Ni-Cu	Aluminum	Silver							
	40	41	42	43	44	45	46	47	48	49	50
HYDROGEN + H ₂ S	Stainless 302-347	Stainless 405-410									
	51	52	53	54	55	56	57	58	59	60	61
HYDROGEN FLUORIDE	Mild Steel	Stainless 302-347	Copper	Nickel	Ni-Cu	NiCrFe	Aluminum	Magnesium			
	62	63	64	65	66	67	68	69	70	71	72
HYDROGEN SULFIDE	Mild Steel	NiCrFe	Platinum	Rhodium							
	73	74	75	76	77	78	79	80	81	82	83



Code	Mils	1/1000	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020	508.0
□	50	0.050	1270.0
x	> 50	0.050	1270.0

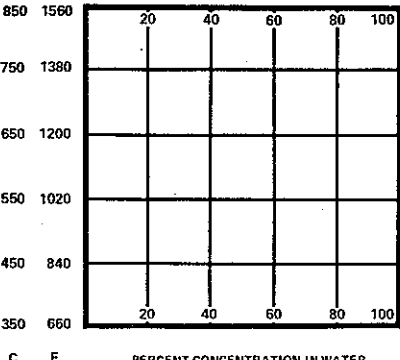
SOME CONVERSION FACTORS
 Steel: mpy = lb/(ft²·yr) x 24.5
 ipy x 696 x density = mdd
 g/m²/d x 0.0144 x density = ipy
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS			
CDS	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr
ALUMINUM			
●	<3.79	<138	<0.0284
○	<37.90	<1380	<0.284
□	37.9-945.5	1380-3450	0.284-0.71
x	>945.5	>3450	>0.71
COPPER, NICKEL or IRON			
●	<11.9	<435	<0.0896
○	<119.0	<4350	<0.896
□	119.0-297.5	4350-10875	0.896-2.24
x	>297.5	>10875	>2.24
LEAD			
●	<15.75	<576	<0.1178
○	<31.50	<5760	<1.178
□	31.5-393.75	5760-14,400	1.178-2.945
x	>393.75	>14,400	>2.945
TANTALUM			
●	<23.06	<843	<0.172
○	<230.6	<8430	<1.72
□	230.6-576.5	8430-21,075	1.72-4.3
x	>576.5	>21,075	>4.3

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Mild Steel	Stainless 316-317	NiCrFe	NiMo	NiCrMo	Platinum	Silver	Titanium		
HYDROGEN IODIDE + IODINE + WATER	1										
	[Grid with corrosion symbols]										
IRON, MOLTEN 1535 C	Aluminum Oxide	Magnesia	Silicon Carbide	Zircon	FeO Cr ₂ O ₃	Fosterite					
	2										
LEAD	Gray Cast Iron	Nickel Cast Iron	Mild Steel	Stainless 302-304	Stainless 316-317	Stainless 405-410	Copper	Brass 70-80	Brass 59-93	Nickel	Ni-Cu
	3										
	NiCrFe	NiCrMo	Tantalum	Titanium	Zirconium	Aluminum Oxide	Columbium	FeO Cr ₂ O ₃	Fosterite	Magnesia	Molybdenum
	[Grid with corrosion symbols]										
	Silicon Carbide	Tungsten	Zircon								
	[Grid with corrosion symbols]										

- FOOTNOTES FOR DATA SQUARES**
- | | | |
|-------------------------|--------------------------------------|-----------------------------------|
| 1. No water | 13. May pit | 34. Annealed |
| 2. No air, oxygen | 14. May stress crack | 35. No cold work |
| 3. Low air, oxygen | 15. Transgranular attack | 36. Brittle 41. Weight lost |
| 4. Pits | 16. Vapor 20. Agitated | 37. ~ Impervious |
| 5. Stress cracks | 17. Aerated 21. ~ 7 pH | 38. No silica 42. Loses ductility |
| 6. Stress corrosion | 18. Catalyzes 22. < 7 pH | 39. Hydrogen purges > 150 |
| 7. Discolors | 19. Static 23. > 7 pH | 40. Weight gained vol/o |
| 8. Crevice attack | 24. + 7% H ₂ S, 2000 psig | 43. Anhydrous, 100% |
| 9. Intergranular attack | 25. < 7% H ₂ S, 500 psig | 44. 50 hours |
| 10. No chlorides | 26. + Steam | |
| 11. May discolor | 27. Embrittles | |
| 12. May catalyze | 28. May carburize | |
| | 29. < 0.04% P + S, < 0.35 C | |
| | 30. < Rc 22 | |
| | 31. 1500 psi | |
| | 32. < 60,000 psi UYS | |
| | 33. Low H ₂ S | |

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS																		
	Silicon Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Copper	Brass 70-80	Brass 59-93	Nickel	Ni-Cu	NiCrFe								
LITHIUM		5	9	9				5		5		9	9	19	9	19	9	19	9
		200C		200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C	200C
MAGNESIUM																			
MERCURY																			
NAPHTHENIC ACIDS																			



AVERAGE PENETRATION PER YEAR

Code	Mils	$\frac{1 \text{ inch}}{1000}$	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020	508.0
	50	0.050	1270.0
X	> 50	0.050	1270.0

SOME CONVERSION FACTORS

Steel: $\text{mpy} = \text{lb/ft}^2/\text{yr} \times 24.5$
 $\text{ipy} \times 696 \times \text{density} = \text{mdd}$
 $\text{g/m}^2/\text{d} \times 0.0144 \div \text{density} = \text{ipy}$
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

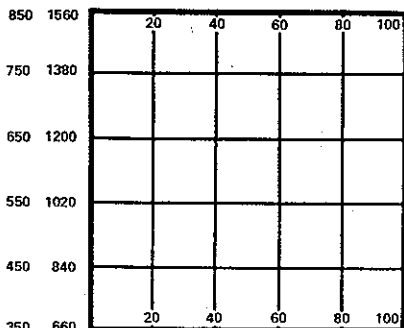
AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS

Code	$\text{mg/dm}^2/\text{day}$	$\text{g/m}^2/\text{yr}$	$\text{lb/ft}^2/\text{yr}$
ALUMINUM			
●	< 3.79	< 138	< 0.0284
○	< 37.90	< 1380	< 0.284
□	37.9-945.5	1380-3450	0.284-0.71
X	> 945.5	> 3450	> 0.71
COPPER, NICKEL or IRON			
●	< 11.9	< 435	< 0.0896
○	< 119.0	< 4350	< 0.896
□	119.0-297.5	4350-10875	0.896-2.24
X	> 297.5	> 10875	> 2.24
LEAD			
●	< 15.75	< 576	< 0.1178
○	< 157.5	< 5760	< 1.178
□	31.5-393.75	5760-14,400	1.178-2.945
X	> 393.75	> 14,400	> 2.945
TANTALUM			
●	< 23.06	< 843	< 0.172
○	< 230.6	< 8430	< 1.72
□	230.6-576.5	8430-21,075	1.72-4.3
X	> 576.5	> 21,075	> 4.3

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS											
	Mild Steel	Nickel	Ni-Cu	NiCrFe								
PHENOL 1				39								
PHOSGENE 2	NiMo 40	NiCrMo 40	Gold 40	Platinum 40								
POTASSIUM ③ ④ 3	Stainless 302-347 41	Stainless 316-317 9 28 29	Nickel 42	NiCrFe 9 30	Tantalum 2 1b15c	Titanium 25c	Columbium 32 33	Molybdenum 31 300c				
POTASSIUM CARBONATE 4	Silicon Cast Iron 80c	NiMo 90c	Molybdenum 90c									
POTASSIUM CYANIDE ① 5	Mild Steel 34	Platinum 17	Titanium 17	Tungsten 17								
POTASSIUM HYDROXIDE 6	Stainless 302-347 20	Stainless 316-317 20	Copper 1	Nickel 35 36 21	Ni-Cu 1 38	Platinum 17	Silver 17					
POTASSIUM NITRATE 7	NiCrFe 19	NiFeCr 19	NiMo 19	NiCrMo 19								
8												

FOOTNOTES FOR DATA SQUARES		
1. No water	13. May pit	35. Mass transfer
2. No air, oxygen	14. May stress crack	36. No sulfur
3. Low air, oxygen	15. Transgranular attack	37. Phase boundary
4. Pits	16. Vapor	38. Vacuum
5. Stress cracks	17. Aerated	39. 4200 psi
6. Stress corrosion	20. Agitated	40. 15 psig
7. Discolors	21. ~ 7 pH	41. Type 347
8. Crevice attack	18. Catalyzes	42. Low carbon
9. Intergranular attack	19. Static	43. Low velocity
10. No chlorides	22. < 7 pH	
11. May discolor	23. > 7 pH	
12. May catalyze	24. Lithium chloride	
	25. < 100 ppm oxygen	
	26. Embrittled by oxygen	
	27. Stressed	
	28. Flowing	
	29. 32-38 ppm oxygen	
	30. Decarburization	
	31. < 50 ppm oxygen	
	32. < 10 ppm oxygen	
	33. 15 fps	
	34. Stress relieved	

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	Copper	Nickel	Ni-Cu	NiCrFe	Aluminum	Gold	Platinum
POTASSIUM PEROXIDE 1											
POTASSIUM THIOSULFATE 2											
POTASSIUM TITANIUM FLUORIDE 3											
SODIUM 4	Gray Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Stainless 405-410	Copper	Brass 59-93	Nickel	Ni-Cu	NiCrFe
	Silver	Tantalum	Titanium	Zirconium	Aluminum Oxide	FeO Cr ₂ O ₃	Columbium	Fosterite	Magnesia	Silicon Carbide	Vanadium
SODIUM ACETATE 5											



AVERAGE PENETRATION PER YEAR

Code	Mils	1 inch / 1000	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020-0.050	508.0-1270.0
x	> 50	0.050	1270.0

SOME CONVERSION FACTORS

Steel: mpy = lb/ft²/yr x 24.5
 lpy x 696 x density = mdd
 g/m²/d x 0.0144 ÷ density = lpy
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

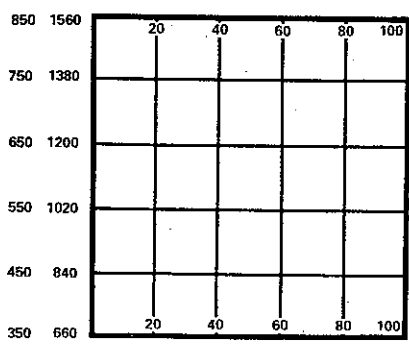
AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS

CDS	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr
ALUMINUM			
●	<3.79	<138	<0.0284
○	<7.90	<1380	<0.284
□	37.9-945.5	1380-3450	0.284-0.71
x	>945.5	>3450	>0.71
COPPER, NICKEL or IRON			
●	<11.9	<435	<0.0896
○	<119.0	<4350	<0.896
□	119.0-297.5	4350-10875	0.896-2.24
x	>297.5	>10875	>2.24
LEAD			
●	<15.75	<576	<0.1178
○	<150	<5760	<1.178
□	31.5-393.75	5760-14,400	1.178-2.945
x	>393.75	>14,400	>2.945
TANTALUM			
●	<23.06	<843	<0.172
○	<230.6	<8430	<1.72
□	230.6-576.5	8430-21,075	1.72-4.3
x	>576.5	>21,075	>4.3

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gold	Platinum	Tantalum								
SODIUM BISULFATE 1			888 C								
SODIUM CARBONATE 2	Mild Steel 28	Stainless 302-347 5 900 C	Stainless 316-317 14-28 900 C	NiCrFe	Platinum	Tantalum	Iridium 860 C	Molybdenum	Rhenium 860 C		
SODIUM CHLORIDE 3	Stainless 316-317	NiCrFe 4-22 250 C	Platinum 30	Silver	Titanium 31						
SODIUM CYANIDE ① 4	Gray Cast Iron	Mild Steel	Stainless 302-347 8	Stainless 316-317 8	ACI 20Cr30Ni	Ni-Cu	NiCrFe 250 C	Platinum 17	Tantalum 17	Titanium 17	
SODIUM HEXAMETA PHOSPHATE 5	Mild Steel	Stainless 302-347	ACI 20Cr30Ni	Nickel	Ni-Cu	NiCrFe	NiMo	NiCrMo	Gold	Platinum	Silver
	Tantalum	Titanium	Beryllium	Molybdenum	Tungsten	Vanadium					
SODIUM HYDROXIDE 6	Gray Cast Iron 32-33	Nickel Cast Iron	Mild Steel 32-33	Stainless 302-347 4	ACI 20Cr30Ni 4	Copper	Cupronickel	Nickel 34 35	Ni-Cu	NiCrFe 9	NiCrMo
	Aluminum	Platinum	Tantalum	Titanium	Molybdenum	Tungsten	Vanadium				

- FOOTNOTES FOR DATA SQUARES**
- | | | |
|-------------------------|--------------------------|---------------------------|
| 1. No water | 13. May pit | 27. ~ 10 ppm oxygen |
| 2. No air, oxygen | 14. May stress crack | 28. Decarburizes |
| 3. Low air, oxygen | 15. Transgranular attack | 29. > 400 C |
| 4. Pits | 16. Vapor | 30. No ammonia salts |
| 5. Stress cracks | 17. Aerated | 31. With fluorides |
| 6. Stress corrosion | 18. Catalyzes | 32. Hydrogen embrittles |
| 7. Discolors | 19. Static | 33. If stressed |
| 8. Crevice attack | 20. Agitated | 34. Mass transfer > 500 C |
| 9. Intergranular attack | 21. ~ 7 pH | 35. 30 ft/min |
| 10. No chlorides | 22. < 7 pH | |
| 11. May discolor | 23. > 7 pH | |
| 12. May catalyze | 24. Low carbon | |
| | 25. Flowing | |
| | 26. < 100 ppm oxygen | |

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS									
	Mild Steel	Stainless 302-347	Stainless 405-410	Copper	Nickel	Ni-Cu	Gold	Platinum	Silver	
SODIUM NITRATE	40				5	5				
			*	*	*	41	*	*	*	*
SODIUM PERCHLORATE	Gold	Platinum	Silver	Tantalum	Titanium	Zirconium	Molybdenum	Palladium	Tungsten	
			24		*	*	*	*	*	*
SODIUM PEROXIDE	Silver	Titanium								
		24								
SODIUM POTASSIUM	Mild Steel	Stainless 302-347	Stainless 316-317	NiCrFe	Tantalum	Zirconium	Beryllium	Columbium		
			3	LIQUID METAL INTERFACE	2	1000C		3	1400C	
SODIUM SILICATES	Gray Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	NiCrFe	Platinum			
		1100C	1100C	1100C	1100C	900-1000C	1000C			
SODIUM SULFATE	ACI 20Cr30Ni	NiCrFe	Gold	Platinum	Silver	Titanium	Zirconium			
		930C	1000C	900C	900C	883C	900C	900C		
SODIUM SULFIDE	Stainless 316-317	Platinum	Tantalum							
		920C	920C							



AVERAGE PENETRATION PER YEAR

Code	Mils	1 inch / 1000	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020	508.0
□	50	0.050	1270.0
x	> 50	0.050	1270.0

SOME CONVERSION FACTORS
 Steel: mpy = lb/ft²/yr x 24.5
 ipy x 696 x density = mdd
 g/m²/d x 0.0144 ÷ density = ipy
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

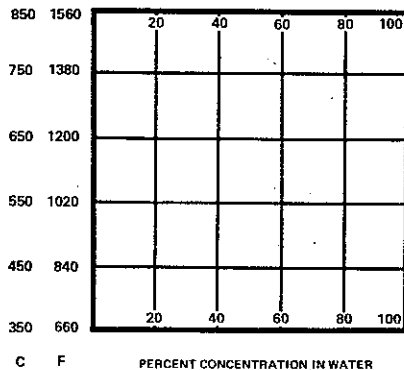
AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS

Code	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr
ALUMINUM			
●	<3.79	<138	<0.0284
○	<37.90	<1380	<0.284
□	37.9-945.5	1380-3450	0.284-0.71
x	>945.5	>3450	>0.71
COPPER, NICKEL or IRON			
●	<11.9	<435	<0.0896
○	<119.0	<4350	<0.896
□	119.0-297.5	4350-10875	0.896-2.24
x	>297.5	>10875	>2.24
LEAD			
●	<15.75	<576	<0.1178
○	<31.50	<5760	<1.178
□	31.5-393.75	5760-14,400	1.178-2.945
x	>393.75	>14,400	>2.945
TANTALUM			
●	<23.06	<843	<0.172
○	<230.6	<8430	<1.72
□	230.6-576.5	8430-21,075	1.72-4.3
x	>576.5	>21,075	>4.3

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Gray Cast Iron	Nickel Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Stainless 405-410	Nickel	Ni-Cu	NiCrFe	NiFeCr
STEAM	27	25	27	3	29	29	29	25	31	2	32
			28	30						10	34
STRONTIUM NITRATE + TETRAHYDRATE	NiMo	NiCrMo	Aluminum	Gold	Platinum	Silver	Tantalum	Zirconium	Molybdenum	Tungsten	
			27		1000c	25	35	37		200c	
SULFUR	Gray Cast Iron	Silicon Cast Iron	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Nickel	Ni-Cu	NiCrFe	NiCrMo	Aluminum	Platinum
	19			16	19						1000c
SULFUR DIOXIDE	Gray Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Nickel	Ni-Cu	NiCrFe	NiMo	Aluminum	Gold
	1000c	16		16		38			16		1000c
	Platinum	Titanium	Iridium	Molybdenum	Rhodium	Tungsten					
	1000c	16	1000c	1000c	1000c	17					39

- FOOTNOTES FOR DATA SQUARES**
- | | | |
|-------------------------|--------------------------|---------------------------------------|
| 1. No water | 13. May pit | 34. 125 mpy, 1204 C |
| 2. No air, oxygen | 14. May stress crack | 27. Flowing, no pressure |
| 3. Low air, oxygen | 15. Transgranular attack | 28. 4400 psig |
| 4. Pits | 16. Vapor | 29. 5000 psig |
| 5. Stress cracks | 17. Aerated | 30. May sensitize > 1400 psi |
| 6. Stress corrosion | 18. Catalyzes | 31. May embrittle |
| 7. Discolors | 19. Static | 32. 268 mpy, 1204 C |
| 8. Crevice attack | 20. Agitated | 33. 8-mil pits, 1095 C |
| 9. Intergranular attack | 21. ~ 7 pH | 35. H ₂ evolved > 1127 C |
| 10. No chlorides | 22. < 7 pH | 36. 198 C, < 200 psig |
| 11. May discolor | 23. > 7 pH | 37. Weight gain |
| 12. May catalyze | 24. Explosive | 38. Embrittles |
| | 25. No pressure | 39. No sulfur |
| | 26. + Vanadium pentoxide | 40. May explode if wet under pressure |
| | | 41. Low carbon |

CORROSIVE	MISCELLANEOUS METALS AND ALLOYS										
	Nickel Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Nickel	NiCrFe	NiCrMo	Aluminum		
SULFUR TRIOXIDE											
1											
TIN	Gray Cast Iron	Tantalum	Titanium	Columbium	Molybdenum	Tungsten					
2											
URANIUM FLUORIDE	Mild Steel	Nickel	Ni-Cu	NiCrFe							
3											
VANADIUM PENTOXIDE	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Nickel	NiCrFe	NiFeCr	NiMo	NiCrMo			
4											
VINYL CHLORIDE	Stainless 302-347	ACI 20Cr30Ni	Ni-Cu	Platinum							
5											
WATER GAS	Gray Cast Iron	Nickel Cast Iron	Mild Steel	Stainless 302-347	Stainless 316-317	ACI 20Cr30Ni	Copper	Nickel	NiCrFe	Aluminum	Gold
6											
	Platinum										



AVERAGE PENETRATION PER YEAR

Code	Mils	1 inch / 1000	Microns
●	< 2	0.002	50.8
○	< 20	0.020	508.0
□	20-50	0.020	508.0
	50	0.050	1270.0
x	> 50	0.050	1270.0

SOME CONVERSION FACTORS

Steel: mpy = lb/ft²/yr x 24.5
 ipy x 696 x density = mdd
 g/m²/d x 0.0144 ÷ density = ipy
 1 micron = 0.03937 mil
 Parts per million = 0.001 g/liter
 Normal = 1 g equiv. liter (wt)

AVERAGE PENETRATION RATE/YR COMPARED TO WEIGHT LOSS

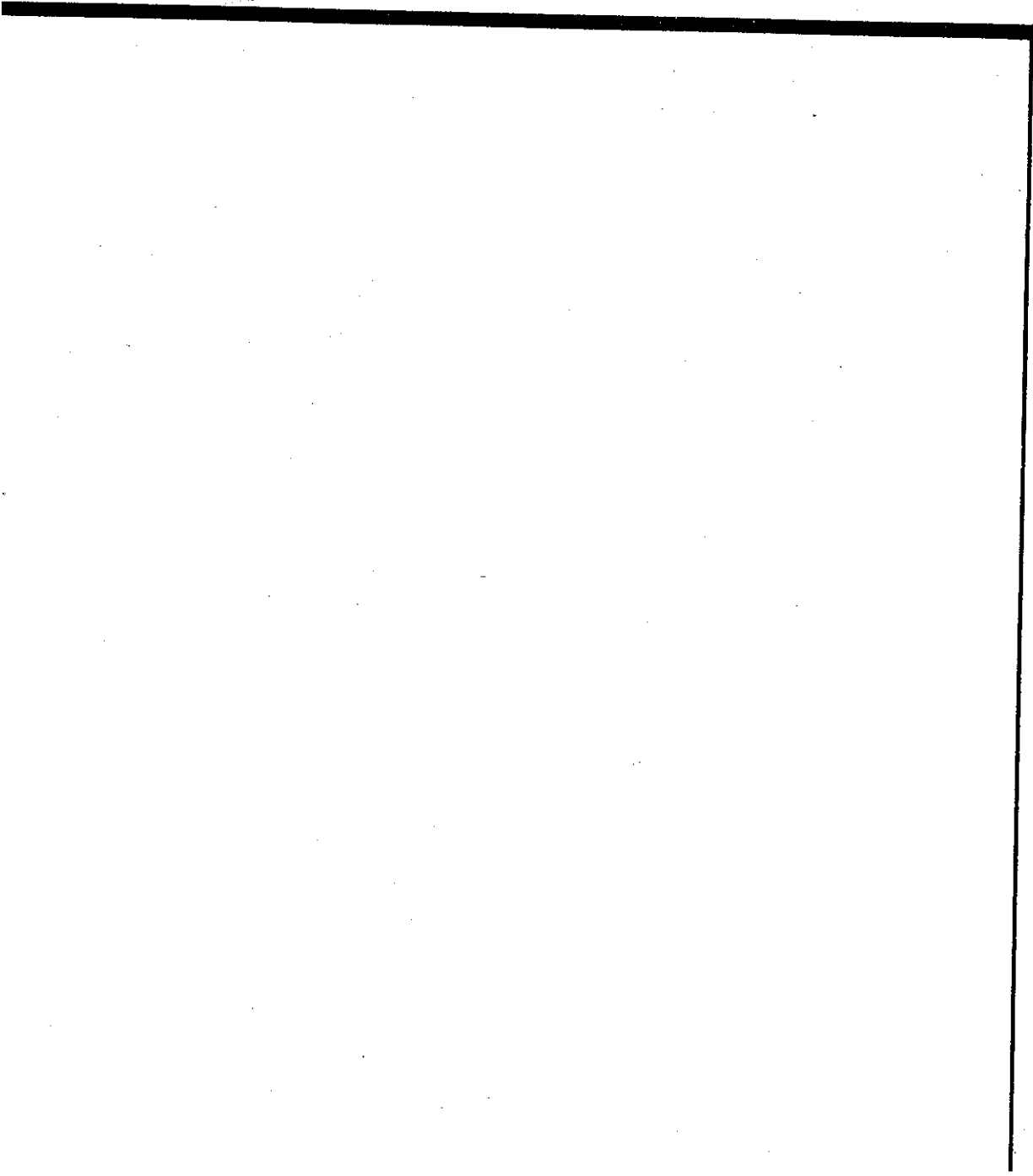
Code	mg/dm ² /day	g/m ² /yr	lb/ft ² /yr
ALUMINUM			
●	<3.79	<138	<0.0284
○	<37.90	<1380	<0.284
□	37.9-945.5	1380-3450	0.284-0.71
x	>945.5	>3450	>0.71
COPPER, NICKEL or IRON			
●	<11.9	<435	<0.0896
○	<119.0	<4350	<0.896
□	119.0-297.5	4350-10875	0.896-2.24
x	>297.5	>10875	>2.24
LEAD			
●	<15.75	<576	<0.1178
○	<31.50	<5760	<1.178
□	31.5-393.75	5760-14,400	1.178-2.945
x	>393.75	>14,400	>2.945
TANTALUM			
●	<23.06	<843	<0.172
○	<230.6	<8430	<1.72
□	230.6-576.5	8430-21,075	1.72-4.3
x	>576.5	>21,075	>4.3

CORROSIVE		MISCELLANEOUS METALS AND ALLOYS										
		Mild Steel	Nickel	Ni-Cu	NiCrFe	Tantalum	Titanium	Aluminum Oxide	FeO Cr ₂ O ₃	Columbium	Fosterite	Magnesia
ZINC	1	[Grid with corrosion data points: 'x' marks in Mild Steel, Ni-Cu, NiCrFe, Tantalum, Titanium, FeO Cr ₂ O ₃ , Columbium, Fosterite, and Magnesia columns. 'o' marks in Columbium and Fosterite columns. Number '25' is present in the Titanium column.]										
		Molybdenum	Silicon Carbide	Tungsten	Zircon							
		[Grid with corrosion data point: 'o' mark in Molybdenum column. Number '33' is present in the Molybdenum column.]										
		[Empty grid]										
		[Empty grid]										
		[Empty grid]										
		[Empty grid]										
		[Empty grid]										
		[Empty grid]										

- | FOOTNOTES FOR DATA SQUARES | | | |
|----------------------------|--------------------------|-----------------------------|------------------------|
| 1. No water | 13. May pit | 27. With sodium sulfate | 32. Stellite |
| 2. No air, oxygen | 14. May stress crack | 28. Stress relieve pressure | 33. Diffuses into |
| 3. Low air, oxygen | 15. Transgranular attack | vessels | |
| 4. Pits | 16. Vapor | 20. Agitated | |
| 5. Stress cracks | 17. Aerated | 21. ~ 7 pH | 29. Except deoxidized |
| 6. Stress corrosion | 18. Catalyzes | 22. < 7 pH | CDA 110 |
| 7. Discolors | 19. Static | 23. > 7 pH | 30. In sulfur reducing |
| 8. Crevice attack | 24. Mass transfer | | atm. |
| 9. Intergranular attack | 25. Variable | 31. No sulfur | |
| 10. No chlorides | 26. With sodium | | |
| 11. May discolor | | | |
| 12. May catalyze | | | |

Section 4

Graphs



References and Comments for Figure 1

The data points in Figure 1 are labeled with the reference numbers of their sources as listed below. The letter symbols in the figure refer to the comments following the references.

REFERENCES:

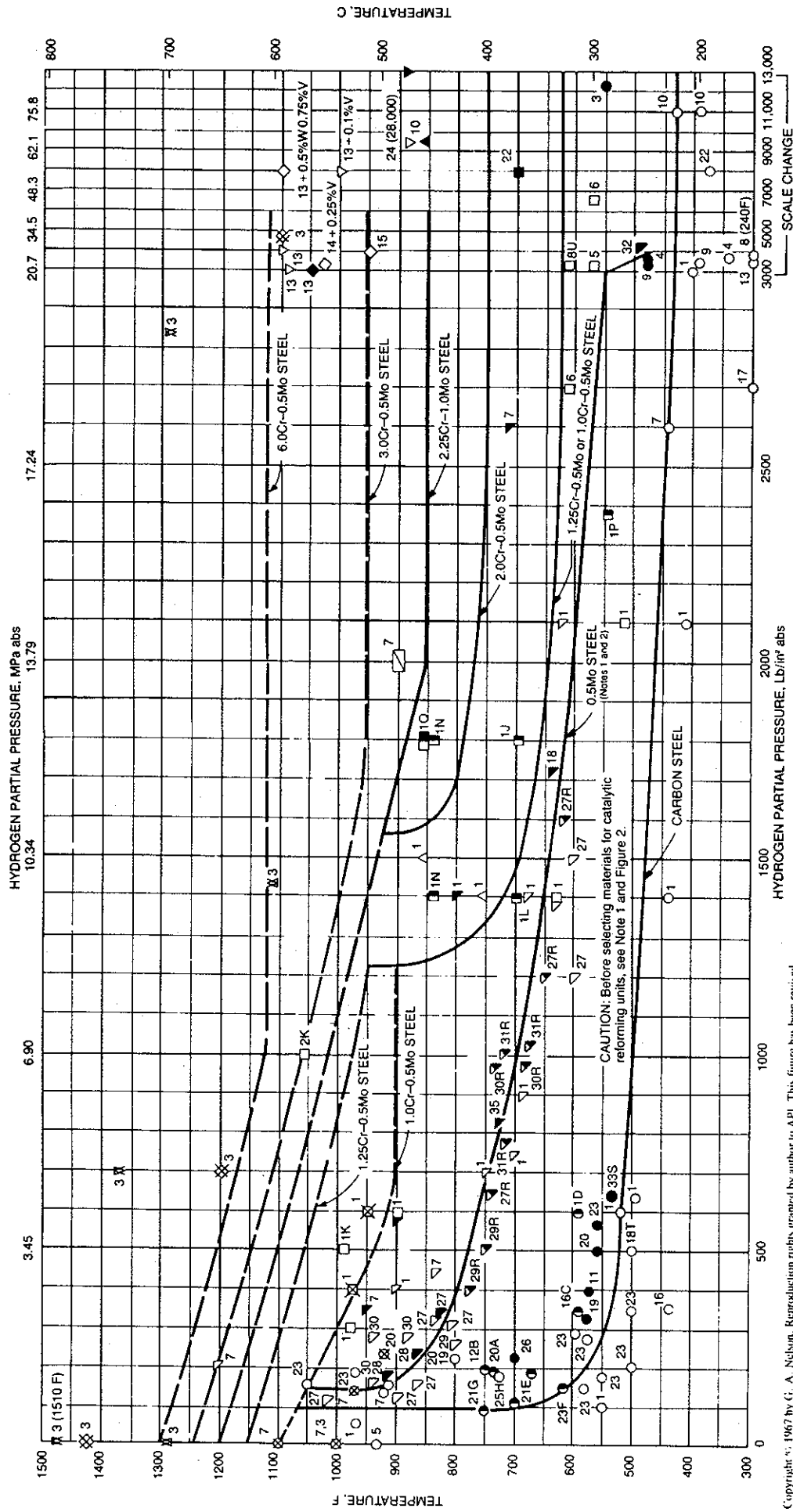
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COMMENTS:

- A. A section made of A 106 pipe was found to be attacked to 27 percent of its thickness after 5745 hours. Other pieces of pipe in the same line were unaffected.
- B. The attack was concentrated in the overheated section of a hot bent steel elbow. The unheated straight portions of the elbow were not attacked.
- C. In a series of 29 steel samples, 12 were attacked while 17 were not.
- D. After 2 years' exposure, five out of six pieces of carbon steel pipe were attacked. One piece of pipe was unaffected.
- E. Attack was concentrated in the weld and heat-affected sections of A 106 pipe. Metal on either side of this zone was unaffected.
- F. After 11 years' service, attack was found in the hot bend section of A 106 pipe. Unheated straight sections were not affected.
- G. After 2 years' service, all parts of carbon steel pipe, including weld and heat-affected zones, were satisfactory.
- H. After 4 years' service, weld and heat-affected zones of A 106 pipe showed cracks.
- J. After 31 years' service, a forging of 0.3C-1.3Cr-0.25Mo steel showed cracks 0.007 inch (0.2 millimeter) deep.
- K. Pipes of 1.25Cr-0.25Mo steel.
- L. After 8 years' service, a forging of 0.3C-1.3Cr-0.25Mo steel was unaffected.
- M. After 4 years' service, a forging of 0.2C-1.2Cr-0.35Mo steel showed cracks 0.032 inch (0.8 millimeter) deep.
- N. After 7 years' service, a forging of 0.3C-1.52Cr-0.50Mo steel showed cracks 0.050 inch (1.3 millimeters) deep.
- P. After 30 years' service, a forging of 0.30C-0.74Cr-0.43Ni steel was unaffected.
- Q. After 15 years in ammonia service, a pipe of 0.15C-2.25Cr-1.00Mo steel showed no hydrogen cracks but was nitrided to a depth of 0.012 inch (0.3 millimeter).
- R. Stainless steel cladding on 0.5Mo steel. No known hydrogen attack.
- S. After 8 years, carbon steel cracked.
- T. After 18 years, carbon steel did not show hydrogen attack.
- U. After 450 days' exposure, 1.25Cr-0.5Mo valve body was not damaged by hydrogen.

Operating Limits for Steels in Hydrogen Service to Avoid Decarburization and Fissuring*



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- NOTES:**
1. After approximately 9-18 years' service, eight occurrences of hydrogen attack have been reported in C-0.5Mo steels operating below the 1977 0.5Mo curve in catalytic reforming units. These steels experienced hydrogen attack under conditions in which extensive decarburization or carbon migration to grain boundaries was not documented or reported prior to 1980. Further use of 0.5Mo steel in catalytic reforming units to resist internal fissuring should be evaluated rigorously until information is available to explain this phenomenon. Refer to 2.3 in the text, Table 1, and Figure 2.
 2. The curve for 0.5Mo steel can apply to either C-0.5Mo or Mn-0.5Mo steels.
 3. Austenitic stainless steels are generally not decarburized in hydrogen at any temperature or hydrogen pressure.
 4. Effect of trace alloying elements (up to 1000 pounds per square inch absolute (6.90 megapascals) hydrogen partial pressure and below 1000 F (538 C):
 a. Mo has four times the resistance of Cr to hydrogen attack.
 b. Mo is equivalent to V, Ti, or Nb up to 0.1 percent.
 c. Si, Ni, Cu, P, and S do not increase resistance.
 5. The limits described by these curves are based on experience with cast steel as well as annealed and normalized steels at stress levels defined by the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. Refer to 2.5 and 2.6 in the text for additional information.

LEGEND

SURFACE DECARBURIZATION
 INTERNAL DECARBURIZATION

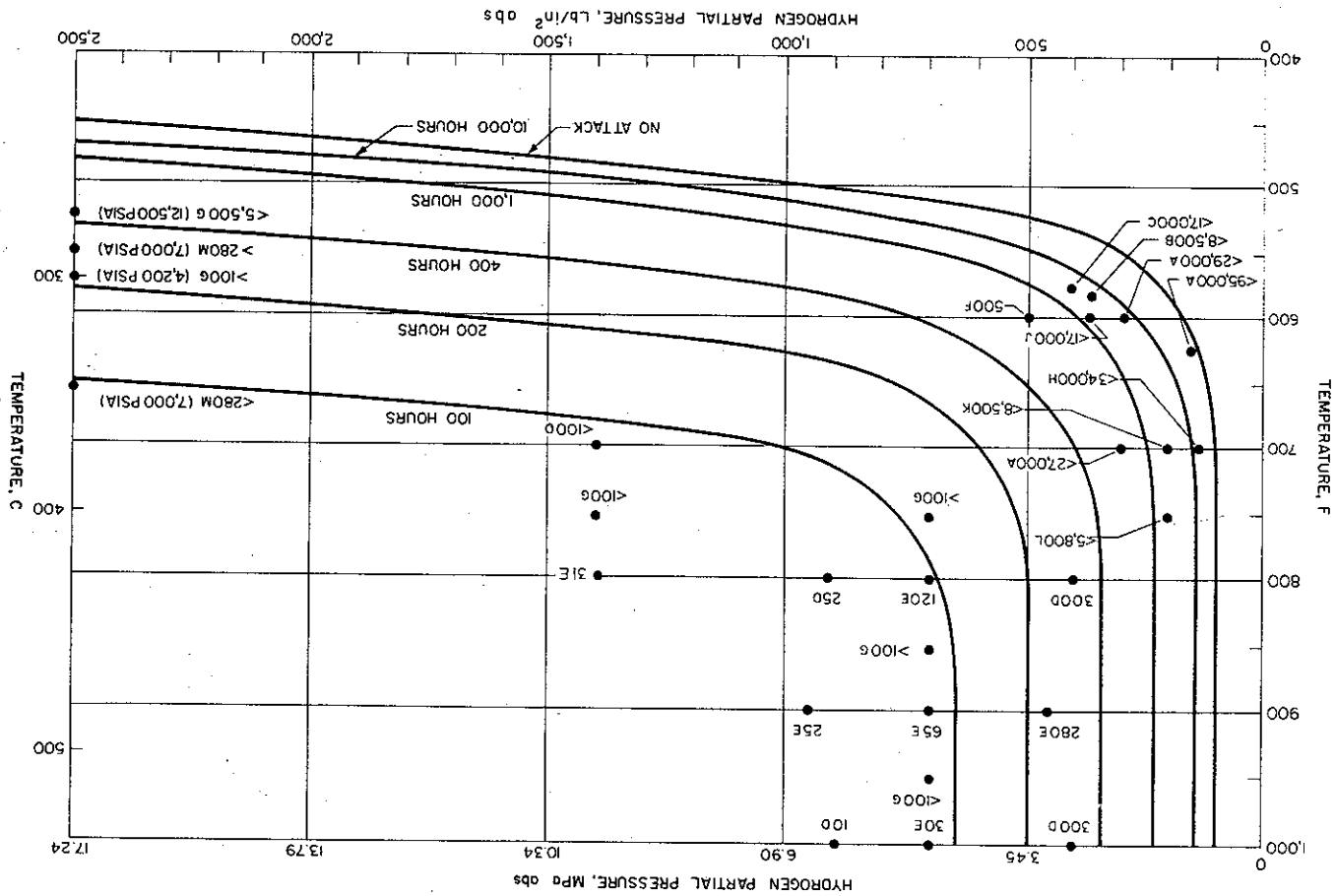
SATISFACTORY
 HYDROGEN ATTACK
 SURFACE DECARBURIZATION
 SEE COMMENTS

(HYDROGEN ATTACK)

LOW CARBON	0.5 Mo	1.0 Cr	2.0 Cr	2.25 Cr	3.0 Cr	6.0 Cr
0.5 Mo	0.5 Mo	0.5 Mo	1.0 Mo	0.5 Mo	0.5 Mo	0.5 Mo

*Figure 1 of "Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants, API Publication 941, Third Edition, May 1983. Reprinted with permission from the American Petroleum Institute, Washington, DC.

Time for Incipient Attack of Carbon Steel in Hydrogen Service



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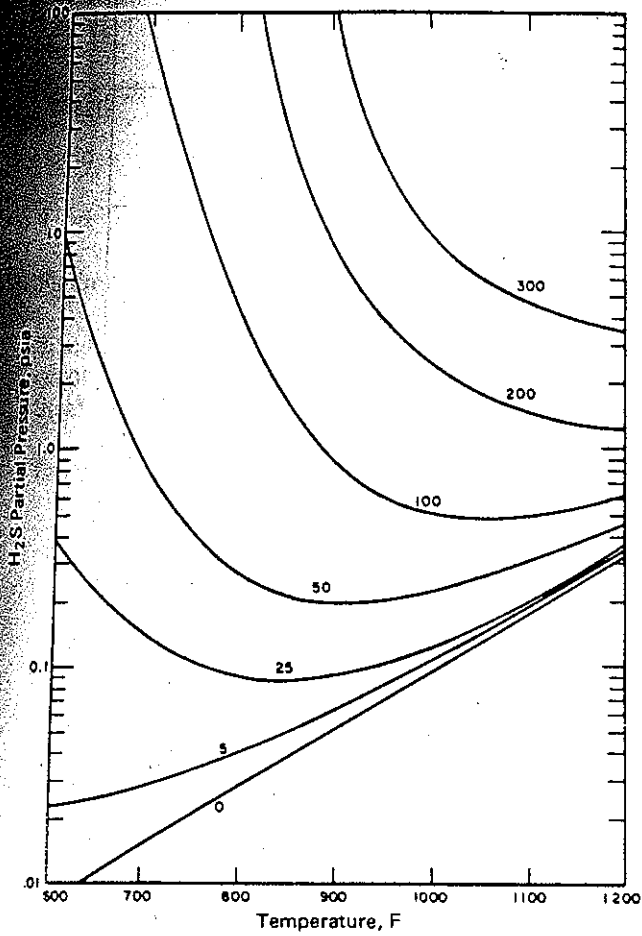
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Figure 4 of "Steels for Hydrogen Service at Elevated Temperatures and Pressures in Petroleum Refineries and Petrochemical Plants," API Publication 941, Third Edition, May 1983. Reprinted with permission from the American Petroleum Institute, Washington, DC.

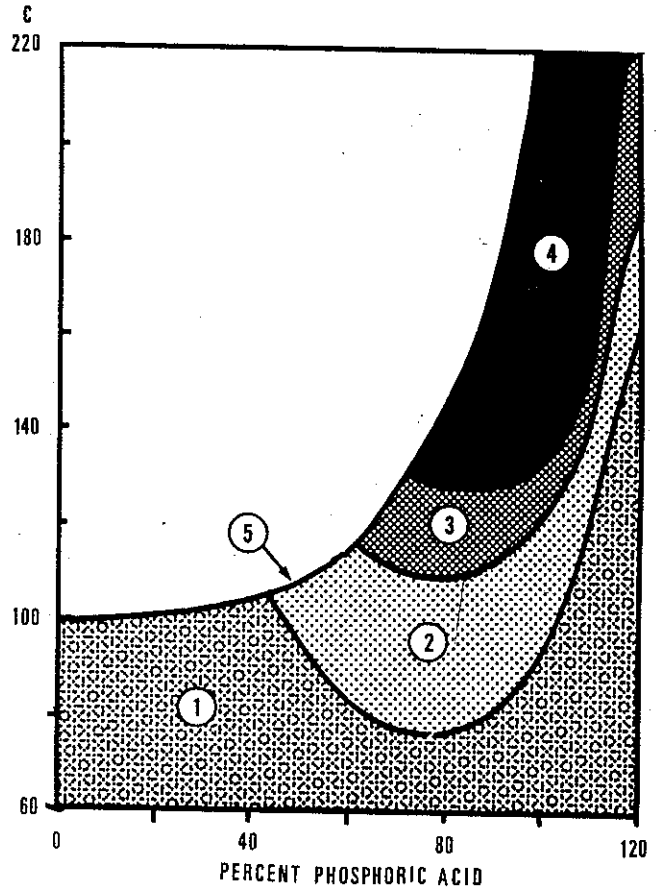
HYDROGEN SULFIDE and PHOSPHORIC ACID

Hydrogen Sulfide vs Low Cr Steels



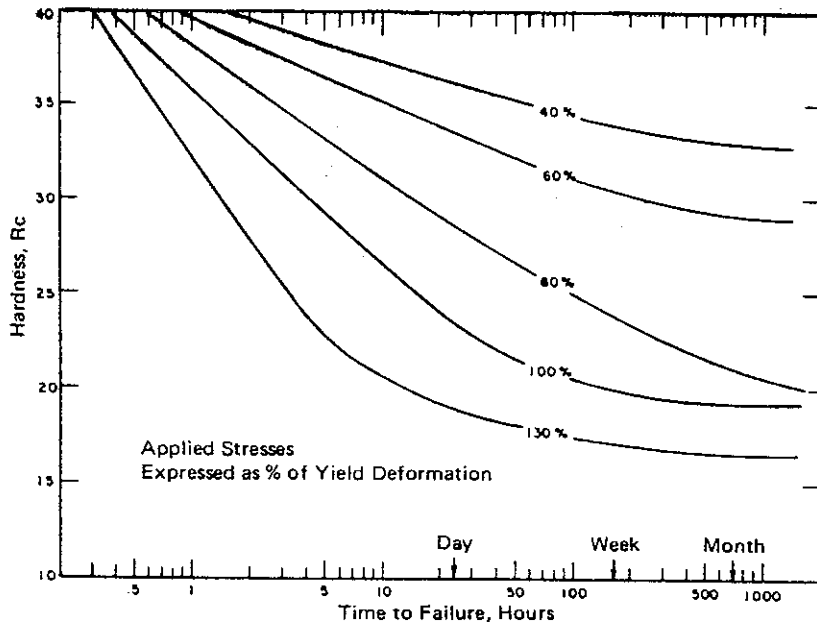
Predicted long-term corrosion rates (mpy) of low chromium steels as a function of temperature and hydrogen sulfide pressure.

Phosphoric Acid vs Type 316 Steel



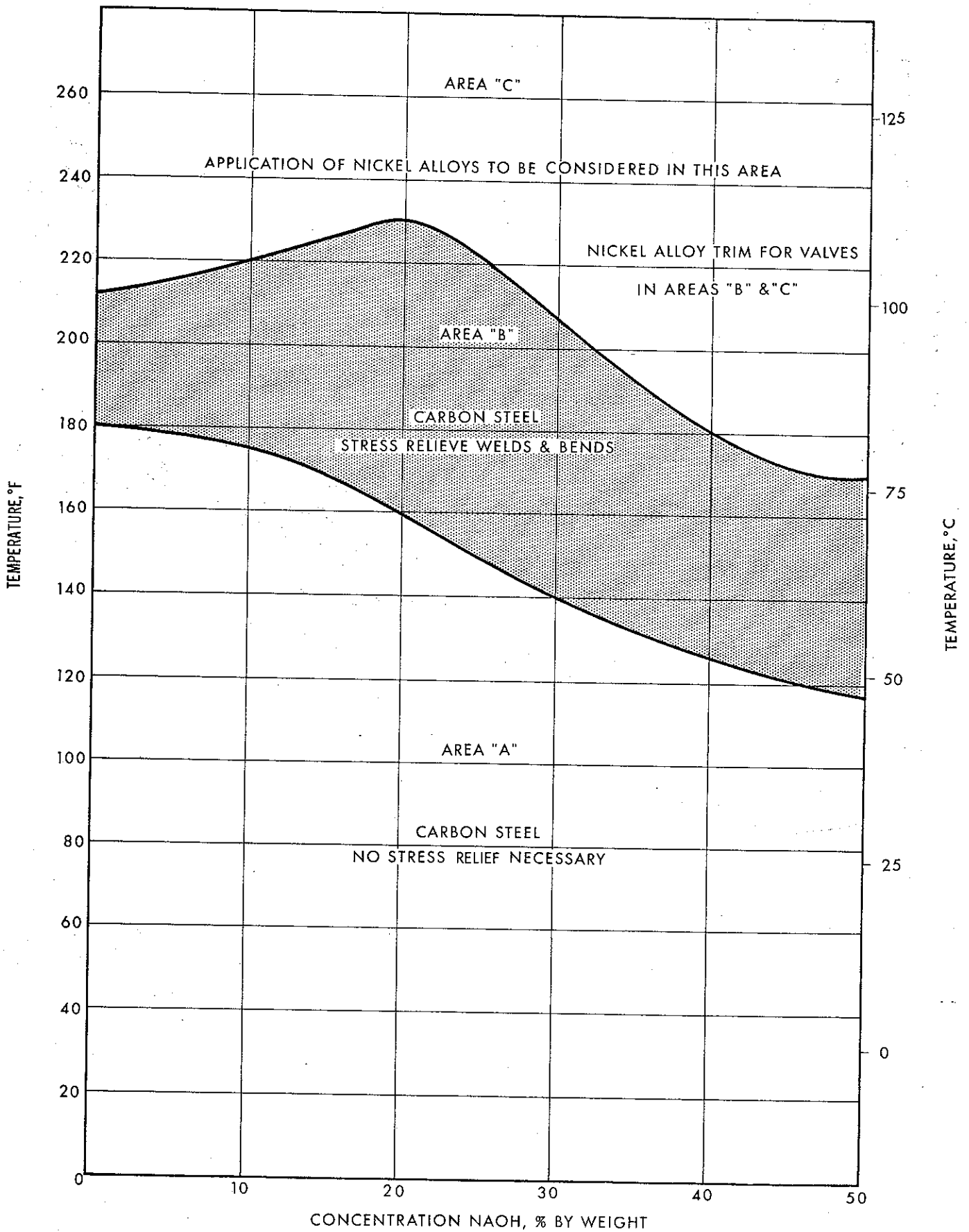
Isocorrosion of Type 316 steel in furnace grade phosphoric acid under mildly agitated conditions. Mills per year averages: 1 = 0 to 1. 2 = 1 to 10. 3 = 10 to 50. 4 = >50. 5 = Boiling point curve.

Carbon Steels vs 3000 ppm Hydrogen Sulfide in 5% Sodium Chloride



Approximate correlation of hardness, time to failure, and applied stress for carbon steels (3000 ppm H_2S in 5% NaCl).

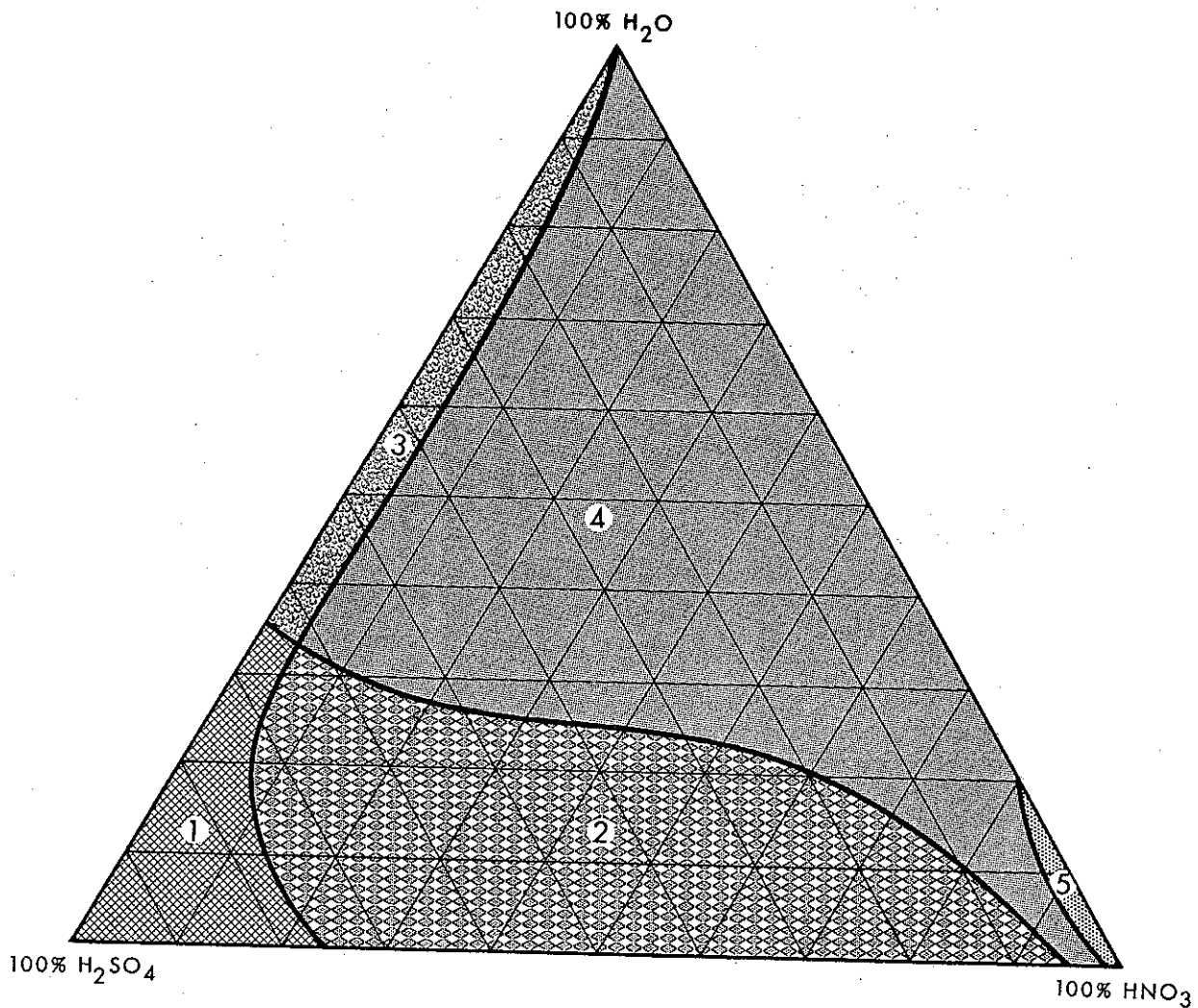
CAUSTIC SODA SERVICE GRAPH



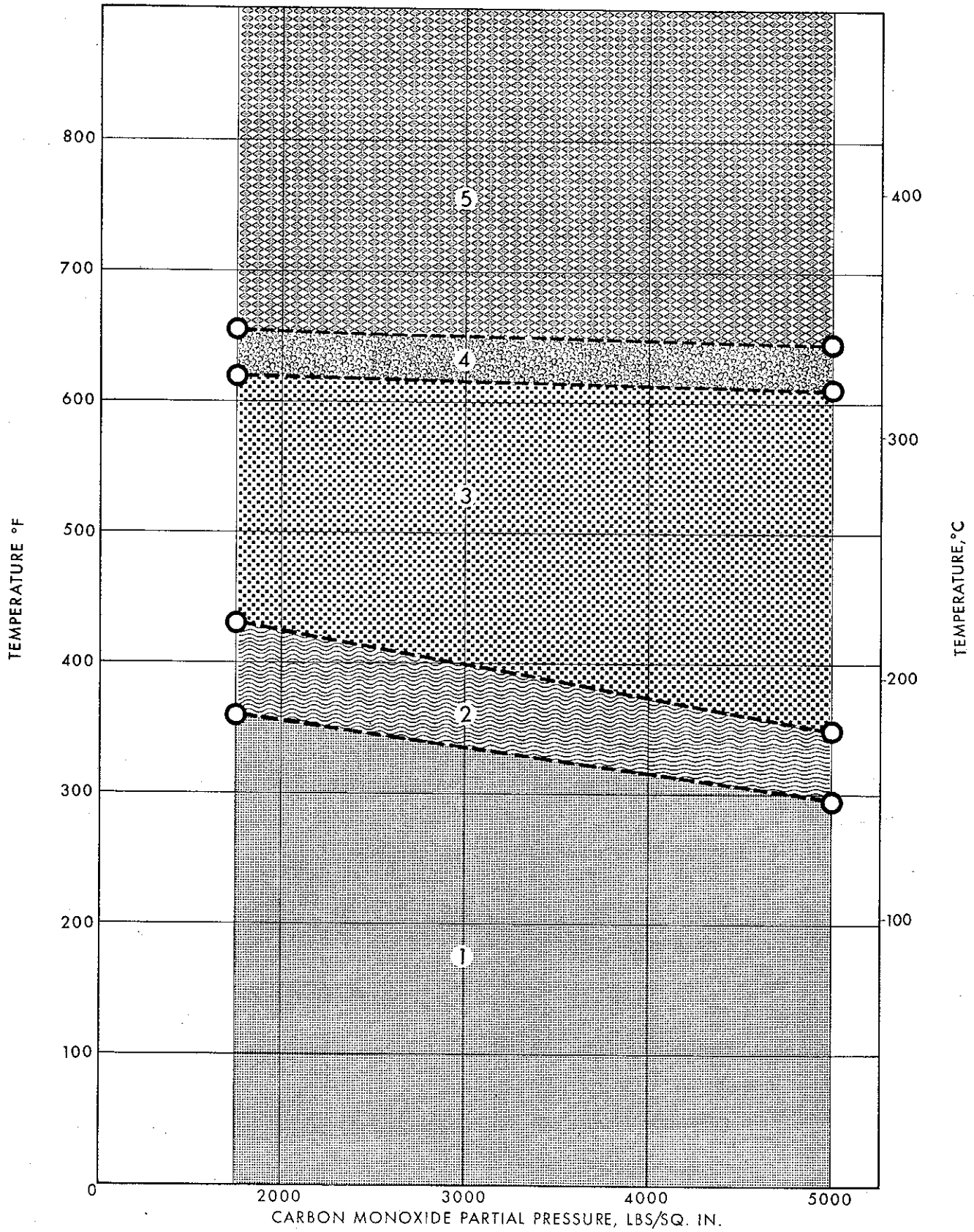
CODE FOR MIXED ACIDS GRAPH

Materials in shaded zones have reported corrosion rates of <20 mpy

ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 5
20Cr 30Ni	18Cr 8Ni	20Cr 30Ni	18Cr 8Ni	18Cr 8Ni
Gold	20Cr 30Ni	Gold	20Cr 30Ni	20Cr 30Ni
Lead	Cast Iron	Platinum	Gold	Aluminum
Platinum	Gold	Silicon Iron	Platinum	Gold
Silicon Iron	Lead	Tantalum	Silicon iron	Platinum
Steel	Platinum		Tantalum	Silicon Iron
Tantalum	Silicon Iron			Tantalum
	Tantalum			



CORROSION RESISTANCE OF MATERIALS TO MIXED ACIDS
AT ROOM TEMPERATURE



CODE FOR CARBON MONOXIDE GRAPH

Materials in shaded zones have reported corrosion rate <20 mpy

ZONE 1

5Cr 0.5Mo steel
12Cr, Types 405, 410
17Cr, Type 430
18Cr 8Ni, Types 321, 347
25 Cr 20Ni, Type 310
5Mn Bronze
Carbon Steel

ZONE 2

12Cr Steel, Type 405, 410
17Cr Steel, Type 430
27Cr Steel, Type 446
18Cr 8Ni, Types 321, 347
25Cr 20Ni Steel, Type 310
5% Manganese Bronze

ZONE 3

18Cr 8Ni, Types 321, 347
25Cr 20Ni, Type 310
27Cr, Type 446
5Mn Bronze

ZONE 4

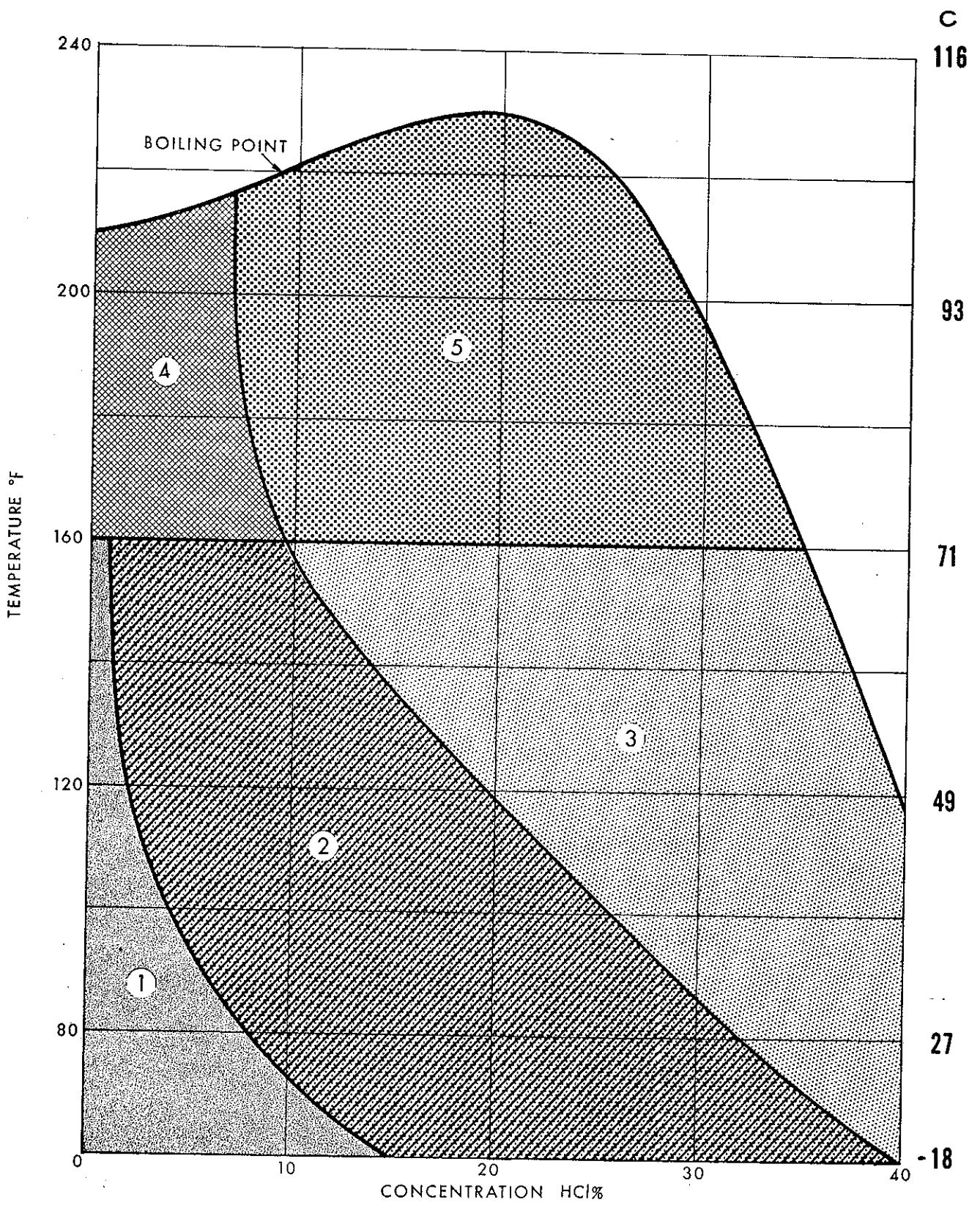
12Cr, Types 405, 410
17Cr, Type 430
18Cr 8Ni, Types 321, 347¹
25Cr, 20Ni, Type 310
27Cr, Type 446
5Mn Bronze

ZONE 5

5Cr 0.5Mo
12Cr, Types 405, 410
17Cr, Type 430
18Cr 8Ni, Types 321, 347¹
25Cr 20Ni, Type 310
27Cr, Type 446
5Mn Bronze
Carbon Steel

1. Low pressure end only.

2. (Ref: Technical Oil Mission—Reel 87, Bag 3979, Item 115, Pages 1846, 1860)



CODE FOR HYDROCHLORIC ACID GRAPH

Materials in shaded zones have reported corrosion rates of <20 mpy.

ZONE 1

20Cr 30Ni¹

66Ni 32Cu²

62Ni 28Mo

Copper²

Nickel²

Platinum

Silicon bronze²

Silicon cast iron³

Silver

Tantalum

Titanium⁴

Tungsten

Zirconium

ZONE 2

62Ni 32Cu

Molybdenum

Platinum

Silicon bronze²

Silicon cast iron³

Silver

Tantalum

Zirconium

ZONE 3

62Ni 28Mo⁵

Molybdenum

Platinum

Silver

Tantalum

Zirconium

ZONE 4

66Ni 32Cu^{2,6}

62Ni 28Mo⁵

Platinum

Silver

Tantalum

Tungsten

Zirconium

ZONE 5

62Ni 28Mo⁵

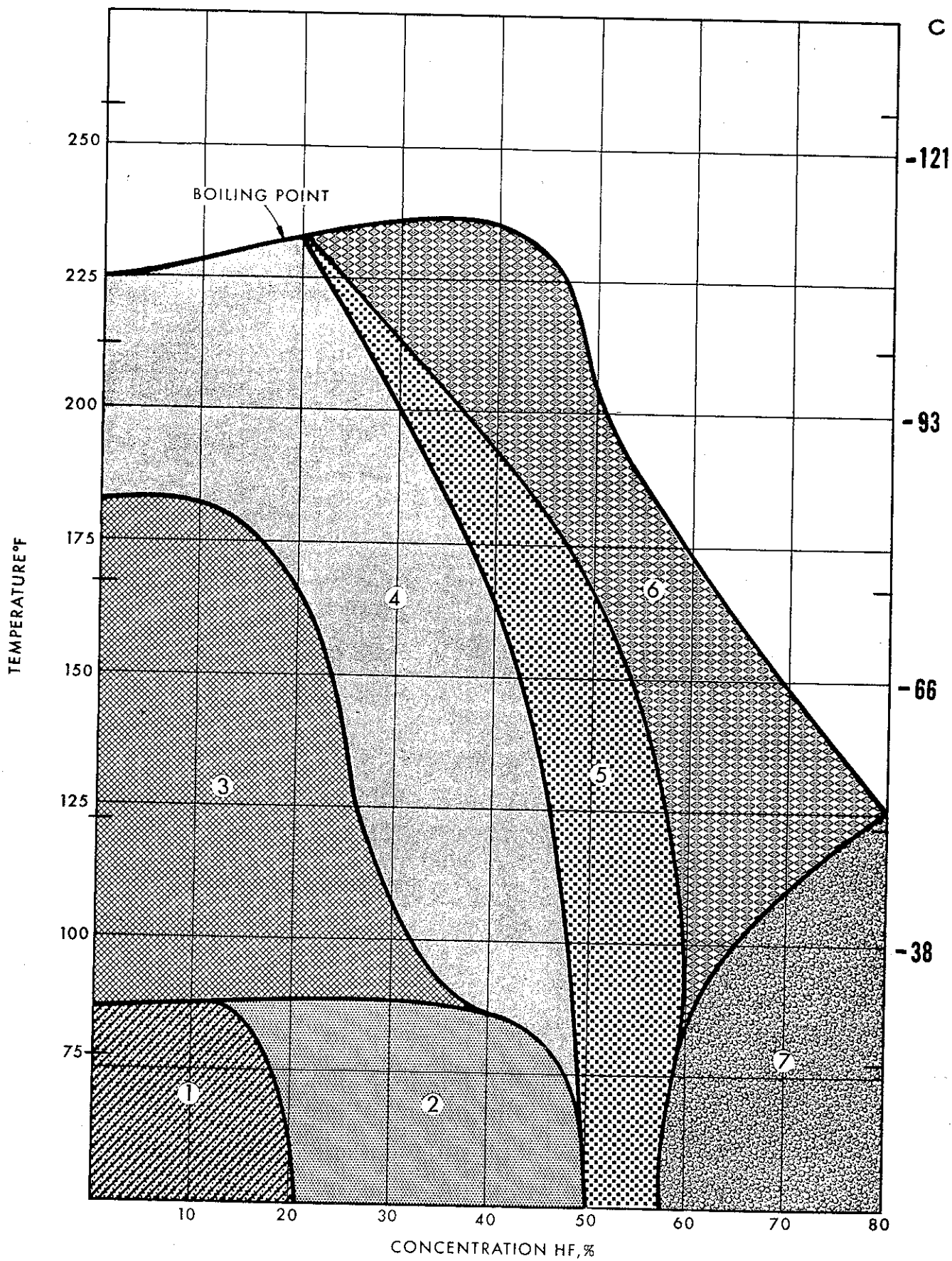
Platinum

Silver

Tantalum

Zirconium

1. <2% at 25 C
2. No air
3. No FeCl₃
4. <10% at 25 C
5. No chlorine



CODE FOR HYDROFLUORIC ACID GRAPH

Materials in shaded zone have reported corrosion rate of <20 mpy

ZONE 1

20Cr 30 Ni
 25Cr 20Ni Steel
 70Cu 30Ni¹
 66Ni 32Cu¹
 54Ni 15Cr 16Mo
 Copper¹
 Gold
 Lead¹
 Nickel¹
 Nickel cast iron
 Platinum
 Silver

ZONE 2

20Cr 30Ni
 70Cu 30Ni¹
 54Ni 15Cr 16Mo
 66Ni 32Cu¹
 Copper¹
 Gold
 Lead¹
 Nickel¹
 Platinum
 Silver

ZONE 3

20Cr 30Ni
 70Cu 30 Ni¹
 54Ni 15Cr 16Mo
 66Ni 32Cu¹
 Copper¹
 Gold
 Lead¹
 Platinum
 Silver

ZONE 4

70Cu 30Ni¹
 66Ni 32Cu¹
 54Ni 15Cr 16Mo
 Copper¹
 Gold
 Lead¹
 Platinum
 Silver

ZONE 5

70Cu 30Ni¹
 66Ni 32Cu¹
 54Ni 15Cr 16Mo
 Gold
 Lead¹
 Platinum
 Silver

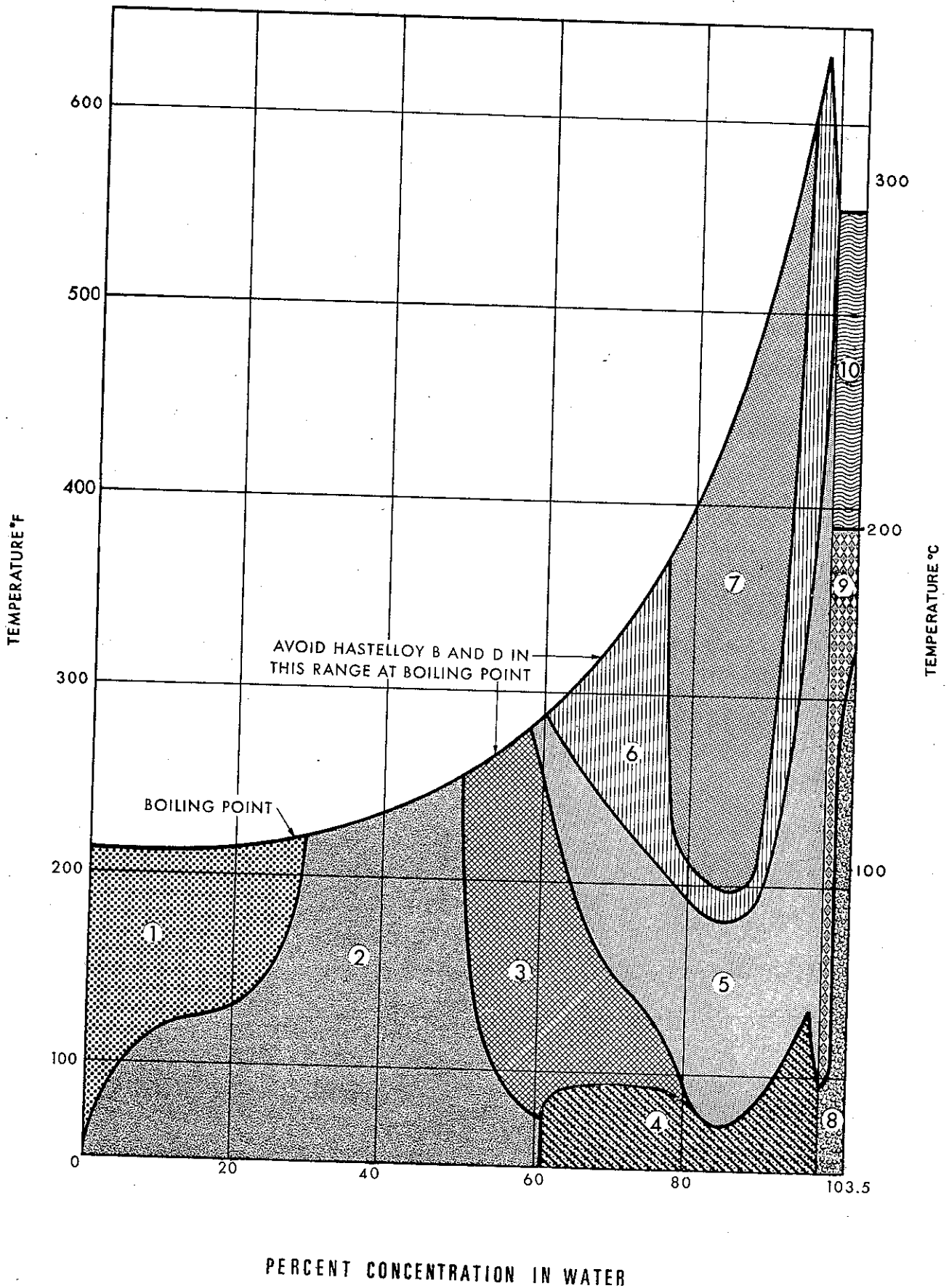
ZONE 6

66Ni 32Cu¹
 54Ni 15Cr 16Mo
 Gold
 Platinum
 Silver

ZONE 7

66Ni 32Cu¹
 54Ni 15Cr 16Mo
 Carbon steel
 Gold
 Platinum
 Silver

1. No air



PERCENT CONCENTRATION IN WATER

CODE FOR SULFURIC ACID GRAPH

Materials in shaded zones have reported corrosion rate <20 mpy

ZONE 1			ZONE 6
20Cr 30Ni			62Ni 28Mo ¹⁰
66Ni 32Cu ¹			Gold
62Ni 28Mo			Platinum
Type 316 ²			Silicon iron
Al bronze 10% ¹	ZONE 3	ZONE 4	Tantalum
Copper ¹	20Cr 30Ni ³	20Cr 30Ni	ZONE 7
Gold	66Ni 32Cu ¹	62Ni 28Mo	Gold
Lead	62Ni 28Mo	Type 316 ⁷	Platinum
Molybdenum	Gold	Gold	Silicon iron
Nickel cast iron	Lead	Lead ⁶	Tantalum
Platinum	Molybdenum	Nickel cast iron	ZONE 8
Silver	Platinum	Platinum	20Cr 30Ni
Tantalum	Silicon iron	Silicon iron	18Cr 8Ni
Zirconium	Tantalum	Steel	54Ni 15Cr 16Mo
	Zirconium	Tantalum	Gold
ZONE 2		Zirconium ⁸	Platinum
20Cr 30Ni ³		ZONE 5	Steel
66Ni 32Cu ¹	Silicon cast iron	20Cr 30Ni ³	ZONE 9
62Ni 28Mo	Silver	62Ni 28Mo	20Cr 30Ni
Type 316 ⁵	Tantalum	Gold	18Cr 8Ni
Al bronze 10% ¹	Zirconium	Lead ⁹	Gold
Copper ¹		Platinum	Platinum
Gold		Silicon iron	ZONE 10
Lead		Tantalum	Gold
Molybdenum			Platinum
Nickel cast iron ⁴			
Platinum			

1. No air
2. < 10% aerated
3. < 75 C
4. < 20% at 25 C
5. < 25% aerated at 25 C
6. < 96% concentration
7. > 80% concentration
8. < 80% aerated
9. < 75C, < 96%
10. 20 to 50 mpy



SUBJECT INDEX

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