



UNIVERSITÀ DI PARMA

DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA
CORSO DI LAUREA IN ARCHITETTURA E CITTA' SOSTENIBILI

**BUILDING INFORMATION MODELING:
DIGITAL MODELING OF ARCHITECTURE
DIGITAL VISUALIZATION OF PROJECT**

A.A. 2022-2023, Prof. Sandra Mikolajewska

TECHNICAL DRAWING - INTRODUCTION

THE TECHNICAL DRAWING IS A **CONVENTIONAL LANGUAGE** THAT HAS THE FUNCTION OF **DISSEMINATING INFORMATION**. IT IS ESSENTIAL FOR COMMUNICATING IDEAS IN INDUSTRY AND ENGINEERING.

TECHNICAL DRAWING DIFFERS FROM GEOMETRIC DRAWING BECAUSE IT NEEDS TO **PROVIDE PRECISE INDICATIONS** OF THE FUNCTION, DIMENSIONS, MATERIALS, CONSTRUCTION TECHNOLOGIES, ETC. OF THE OBJECT/BUILDING TO BE PRODUCED. TECHNICAL DRAWINGS SHOULD PROVIDE AS **UNAMBIGUOUS INFORMATION** AS POSSIBLE. TO THIS END, COMMON AND EXPLICIT STANDARDS SHOULD BE ADOPTED.

TECHNICAL DRAWING IS BASED ON **STANDARDIZED CONVENTIONS** ESTABLISHED BY NATIONAL AND INTERNATIONAL BODIES OF STANDARDIZATION. STANDARDS ARE ESSENTIAL FOR TECHNICAL DRAWING TO BECOME A **UNIVERSAL LANGUAGE** OF TECHNICAL REPRESENTATION AND COMMUNICATION.

STANDARDS REQUIRE VARIOUS ASPECTS: FROM THE ORGANIZATION OF THE DRAWINGS TO THEIR NAMING, FROM THE FORMAT TO THE REDUCTION SCALES, FROM THE THICKNESS OF THE LINES TO THE DIFFERENT SYMBOLOGIES AND SO ON.

IT IS NECESSARY TO POINT OUT THAT MOST STANDARDS ARE AIMED AT INDUSTRIAL DESIGN, WHICH ACTUALLY HAS MORE STRINGENT REQUIREMENTS FOR STANDARDIZATION. CONSTRUCTION AND ARCHITECTURAL DESIGN IS CONFIGURED AS A SPECIAL CASE.





ISO
International Organization
for Standardization



EN
European Committee for
Standardization



UNI
National Unification Body
[Ente italiano di normazione]

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION IS AN INTERNATIONAL STANDARD DEVELOPMENT ORGANIZATION.
(FOUNDED IN 1947).

EUROPEAN COMMITTEE FOR STANDARDIZATION IS A EUROPEAN PUBLIC STANDARDS ORGANIZATION.
(FOUNDED IN 1961).

NATIONAL UNIFICATION BODY IS A PRIVATE NON-PROFIT ITALIAN ASSOCIATION.
(FOUNDED IN 1921).



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UNI ISO



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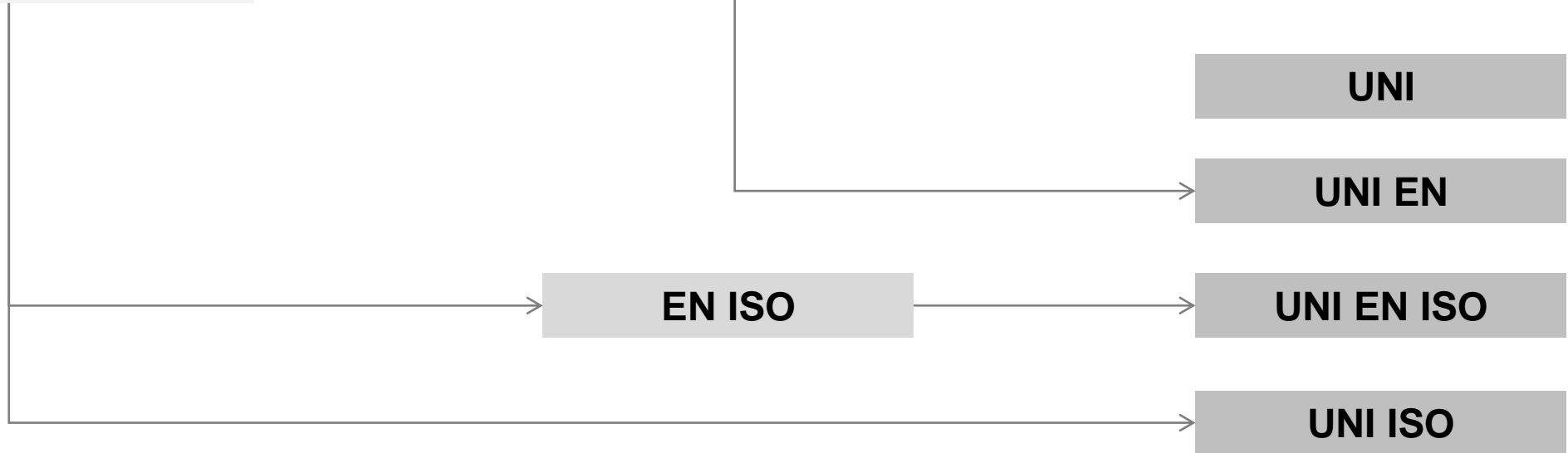




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TECHNICAL DRAWING - INTRODUCTION

TECHNICAL DRAWING MUST ALLOW FOR THE **OBJECTIVE** COMMUNICATION OF INFORMATION. IT SHOULD BE CHARACTERIZED BY THE **LOWEST DEGREE OF SUBJECTIVITY** SO THAT IT CAN BE UNDERSTOOD BY AS MANY PEOPLE AS POSSIBLE.

FOR THIS PURPOSE, IT MUST NECESSARILY HAVE SOME FUNDAMENTAL CHARACTERISTICS:

- UNAMBIGUOUSNESS AND CLARITY;
- FIDELITY;
- COMPLETENESS;
- TRANSFERABILITY.



PRINCIPAL STANDARDS FOR TECHNICAL DRAWINGS

PRINCIPALI NORME PER IL DISEGNO TECNICO

DESCRIPTION	STANDARD
SIZES AND LAYOUT OF DRAWING SHEETS FORMATI DEI FOGLI DA DISEGNO	UNI EN ISO 5457:2010
FOLDING OF DRAWING PRINTS PIEGATURA DEI FOGLI	UNI 938:1981
DATA FIELDS IN THE TITLE BLOCKS IL RIQUADRO DELLE ISCRIZIONI (CARTIGLIO)	UNI EN ISO 7200:2007
LETTERING FORMATO DELLE SCRITTE	UNI EN ISO 3098-0/5:2000
SCALES SCALE	UNI EN ISO 5455:1998
BASIC CONVENTIONS FOR LINES CONVENZIONI DI BASE DELLE LINEE (UNI EN ISO 128-20:2002, UNI EN ISO 128-24:2015 – Replaced)	UNI EN ISO 128-2:2021
DIMENSIONING SISTEMI DI QUOTATURA (UNI 3973-3974-3975:1989 – Replaced)	UNI ISO 129-1:2011
HATCHINGS TRATTEGGI	UNI 3972:1981
ROOFING COPERTURE	UNI 8091:1980
ORTHOGRAPHIC REPRESENTATIONS PROIEZIONI ORTOGONALI	UNI EN ISO 5456-2:2001
AXONOMETRIC REPRESENTATIONS PROIEZIONI ASSONOMETRICHE	UNI EN ISO 5456-3:2001
CENTRAL PROJECTION PROIEZIONI PROSPETTICHE	UNI EN ISO 5456-4:2001



PRINCIPAL STANDARDS FOR TECHNICAL DRAWINGS

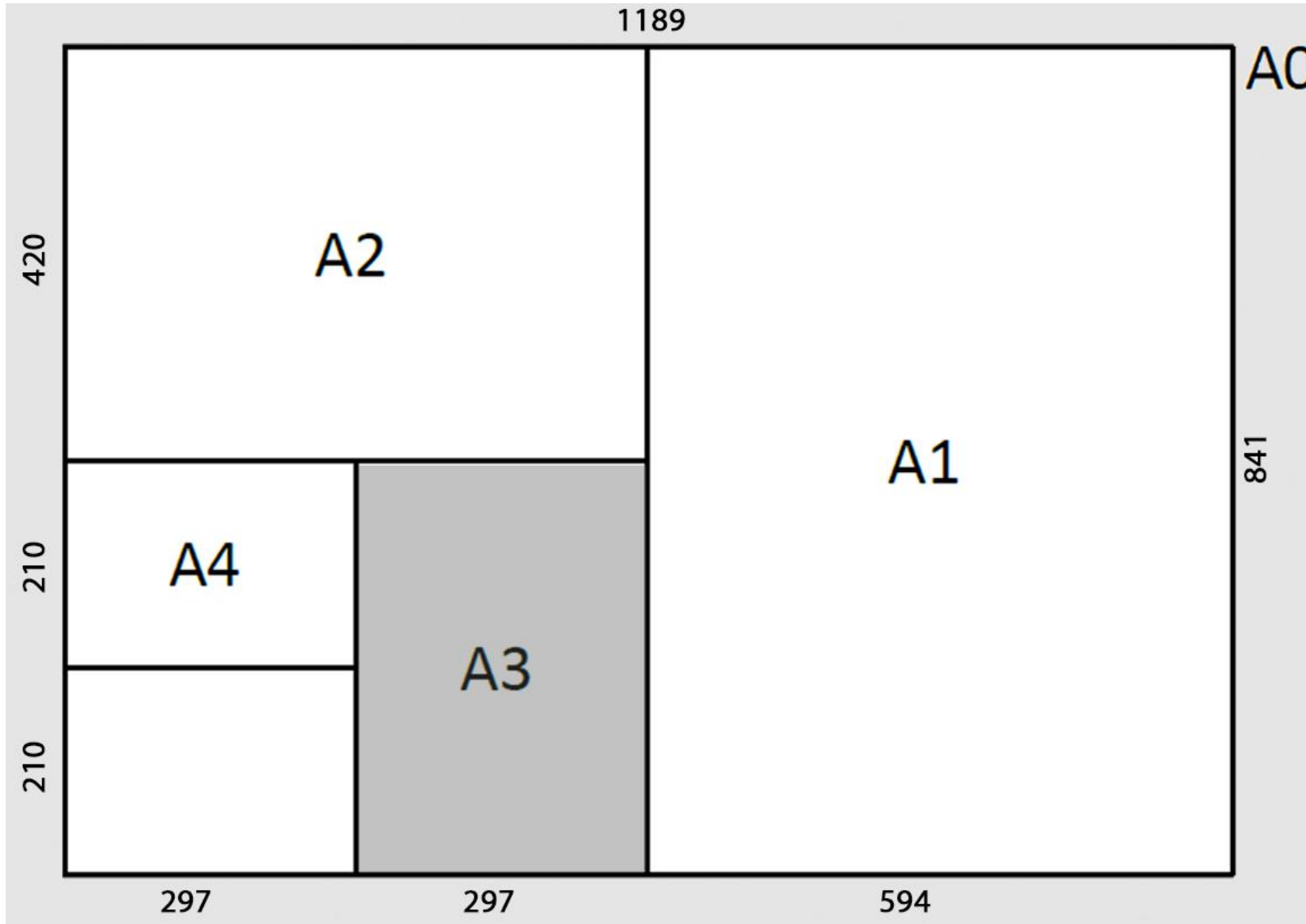
PRINCIPALI NORME PER IL DISEGNO TECNICO

DESCRIPTION	STANDARD
REFERENCE LINES GRIGLIA ORTOGONALE (WITHDRAWN)	UNI ISO 4068:1989
EXTERNAL DOORS AND WINDOWS SERRAMENTI ESTERNI (WITHDRAWN)	UNI 8370:1982
DOORS PORTE (WITHDRAWN)	UNI 7961:1987



TECHNICAL DRAWINGS – SIZES AND LAYOUT OF DRAWING SHEETS

UNI EN ISO 5457:2010



UNI EN ISO 5457:2010 SPECIFIES THE SIZE AND LAYOUT OF PREPRINTED SHEETS FOR TECHNICAL DRAWINGS IN ANY FIELD OF ENGINEERING, INCLUDING THOSE PRODUCED BY COMPUTER. THIS INTERNATIONAL STANDARD IS ALSO APPLICABLE TO OTHER TECHNICAL DOCUMENTS.

A0 = 841 x 1189 mm

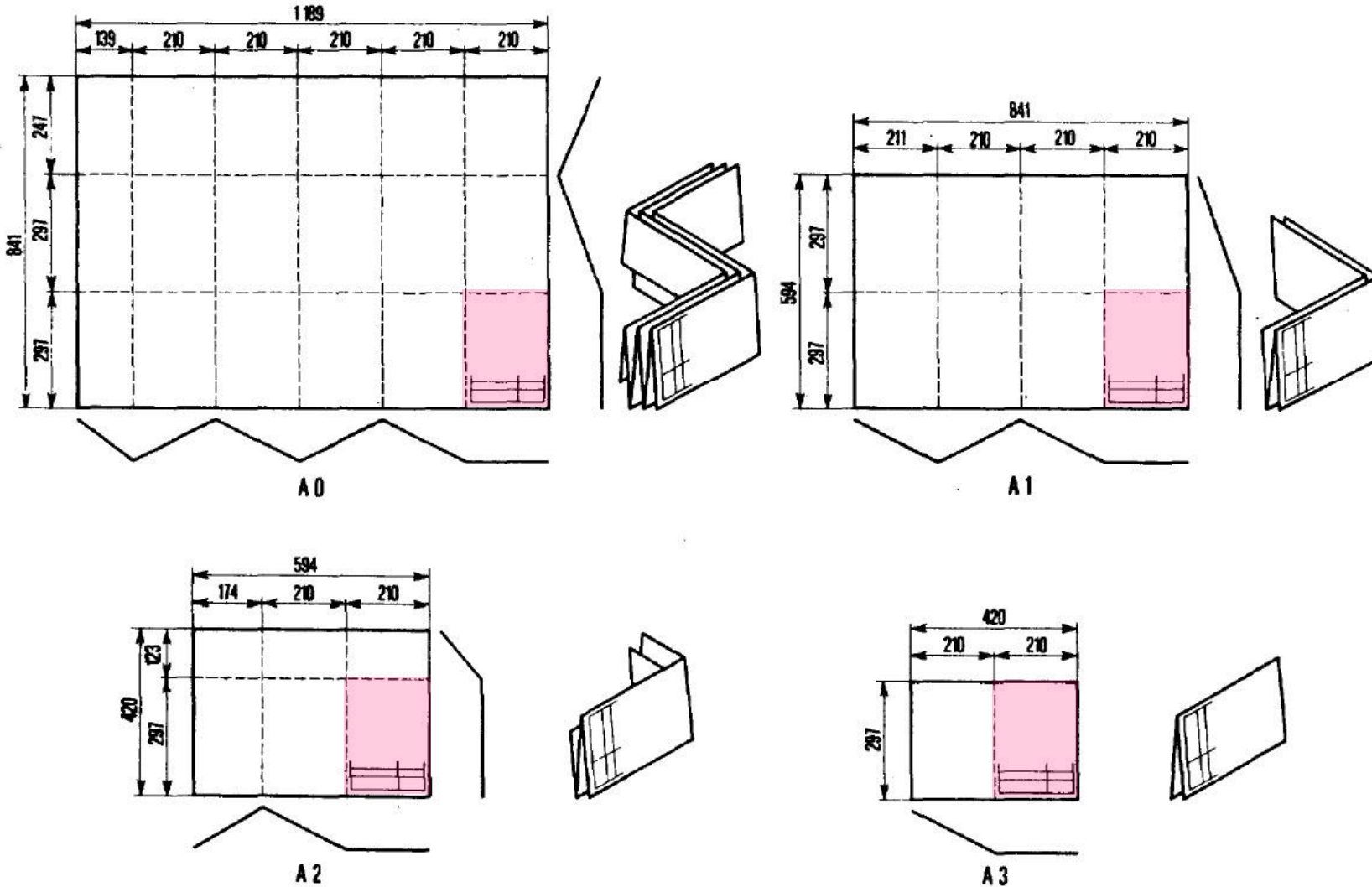
A1 = 594 x 841 mm

A2 = 420 x 594 mm

A3 = 297 x 420 mm

A4 = 210 x 297 mm





FOLDING OF DRAWING PRINTS IS
ESSENTIAL FOR ARCHIVAL ISSUES.

ONCE FOLDING IS COMPLETED ALL
DRAWING PRINTS SHOULD BE
REDUCED TO **A4 SIZE** AND SHOULD
HAVE THE TITLE BLOCK ON TITLE
PAGE, SO THAT IT IS CLEARLY VISIBLE.

TECHNICAL DRAWINGS – DATA FIELDS IN TITLE BLOCKS AND DOCUMENT HEADERS

UNI EN ISO 7200:2007

Table 1 — Identifying data fields in the title block

Subclause	Field name	Language-dependent	Recommended number of characters	Obligation
5.1.2	Legal owner	—	Unspecified	M
5.1.3	Identification number	No	16	M
5.1.4	Revision index	No	2	O
5.1.5	Date of issue	No	10	M
5.1.6	Segment/sheet number	No	4	M
5.1.7	Number of segments/sheets	No	4	O
5.1.8	Language code	No	4 per language	O

Table 2 — Descriptive data fields in the title block

Subclause	Field name	Language-dependent	Recommended number of characters	Obligation
5.2.2	Title	Yes	25/30 ^a	M
5.2.3	Supplementary title	Yes	2 × 25/30 ^a	O
M mandatory				
O optional				
^a 30 to support two-byte-character languages such as Japanese or Chinese.				

Table 3 — Administrative data fields in the title block

Subclause	Field name	Language-dependent	Recommended number of characters	Obligation
5.3.2	Responsible department	No/Yes ^a	10	O
5.3.3	Technical reference	No/Yes ^a	20	O
5.3.4	Approval person	No/Yes ^a	20	M
5.3.5	Creator	No/Yes ^a	20	M
5.3.6	Document type	Yes	30	M
5.3.7	Classification/key words	No/Yes ^a	Unspecified	O
5.3.8	Document status	Yes	20	O
5.3.9	Page number	No	4	O
5.3.10	Number of pages	No	4	O
5.3.11	Paper size	No	4	O

UNI EN ISO 7200:2007 SPECIFIES THE DATA FIELDS USED IN THE TITLE BLOCKS AND HEADERS OF TECHNICAL PRODUCT DOCUMENTS.

ITS PURPOSE IS TO FACILITATE THE EXCHANGE OF DOCUMENTS AND ENSURE COMPATIBILITY BY DEFINING FIELD NAMES, THEIR CONTENTS AND THEIR LENGTH (**IDENTIFYING DATA FIELDS, DESCRIPTIVE DATA FIELDS, ADMINISTRATIVE DATA FIELDS**).

TITLE BLOCK:

THE TOTAL WIDTH IS **180 MM** TO FIT AN A4 SHEET (IN THE LOWER RIGHT CORNER OF THE SHEET), WITH THE LEFT MARGIN BEING 20 MM AND THE RIGHT MARGIN 10 MM. THE SAME TITLE BLOCK IS USED FOR ALL PAPER SIZES.



Table 2 — Dimensioning of lettering type B

Dimensions in millimetres

Characteristic		Multiple of h	Dimensions							
Lettering height	h	$(10/10)h$	1,8	2,5	3,5	5	7	10	14	20
Height of lower-case letters (x-height)	c_1	$(7/10)h$	1,26	1,75	2,5 ^d	3,5	5 ^d	7	10 ^d	14
Tail of lower-case letters	c_2	$(3/10)h$	0,54	0,75	1,05	1,5	2,1	3	4,2	6
Stem of lower-case letters	c_3	$(3/10)h$	0,54	0,75	1,05	1,5	2,1	3	4,2	6
Area of diacritical marks (upper-case letters)	f	$(4/10)h$	0,72	1	1,4	2	2,8	4	5,6	8
Spacing between characters	a	$(2/10)h$	0,36	0,5	0,7	1	1,4	2	2,8	4
Minimum spacing between baselines ^a	b_1	$(19/10)h$	3,42	4,75	6,65	9,5	13,3	19	26,6	38
Minimum spacing between baselines ^b	b_2	$(15/10)h$	2,7	3,75	5,25	7,5	10,5	15	21	30
Minimum spacing between baselines ^c	b_3	$(13/10)h$	2,34	3,25	4,55	6,5	9,1	13	18,2	26
Spacing between words	e	$(6/10)h$	1,08	1,5	2,1	3	4,2	6	8,4	12
Line width	d	$(1/10)h$	0,18	0,25	0,35	0,5	0,7	1	1,4	2
<p>^a Lettering style: upper-case and lower-case letters with diacritical marks (see Figure 1).</p> <p>^b Lettering style: upper-case and lower-case letters without diacritical marks (see Figure 2).</p> <p>^c Lettering style: upper-case letters only (see Figure 3).</p> <p>^d Rounded values.</p>										

GENERAL REQUIREMENTS: **LEGIBILITY**
AND SUITABILITY FOR THE GENERALLY
USED COPYING PROCESSES.

THE TYPES OF LETTERING
ARE AS FOLLOWS:
- LETTERING TYPE A;
- LETTERING TYPE B.

THE RANGE OF NOMINAL SIZES
IS SPECIFIED AS FOLLOWS:
1,8 ; 2,5; 3,5; 5; 7; 10; 14; 20 MM.

UNI EN ISO 5455:1998 SPECIFIES **RECOMMENDED SCALES** (FULL SIZE, ENLARGEMENT SCALE, REDUCTION SCALE) AND THEIR DESIGNATION FOR USE ON ALL TECHNICAL DRAWINGS IN ANY FIELD OF ENGINEERING.

SCALE: RATIO OF THE LINEAR DIMENSION OF AN ELEMENT OF AN OBJECT AS REPRESENTED IN THE ORIGINAL DRAWING TO THE REAL LINEAR DIMENSION OF THE SAME ELEMENT OF THE OBJECT ITSELF.

NOTE - THE SCALE OF A PRINT MAY BE DIFFERENT FROM THAT OF THE ORIGINAL DRAWING.

THE COMPLETE DESIGNATION OF A SCALE SHALL CONSIST OF THE WORD “SCALE” (METRIC SCALE) FOLLOWED BY THE INDICATION OF ITS RATIO, AS FOLLOWS:

SCALE 1:1 FOR FULL SIZE

(A SCALE WITH THE RATIO 1 : 1);

SCALE X:1 FOR ENLARGEMENT SCALES

(A SCALE WHERE THE RATIO IS LARGER THAN 1 : 1).

SCALE 1:X FOR REDUCTION SCALES

(A SCALE WHERE THE RATIO IS SMALLER THAN 1 : 1).

THE SCALE TO BE CHOSEN FOR A DRAWING WILL DEPEND UPON THE **COMPLEXITY OF THE OBJECT** TO BE DEPICTED AND THE **PURPOSE OF THE REPRESENTATION**.

IN ALL CASES, THE SELECTED SCALE SHALL BE LARGE ENOUGH TO PERMIT **EASY AND CLEAR INTERPRETATION** OF THE INFORMATION DEPICTED.

DESIGN FIELD:

1:1, 1:2, 1:5, 1:10.

ARCHITECTURAL FIELD:

(DETAIL SCALE) 1:5, 1:10, 1:20

(ARCH. SCALE) 1:50, 1:100, 1:200, 1:500

(URBAN SCALE) 1:500, 1:1.000, 1:2.000

URBAN PLANNING FIELD:

1:500, 1:1.000, 1:2.000,

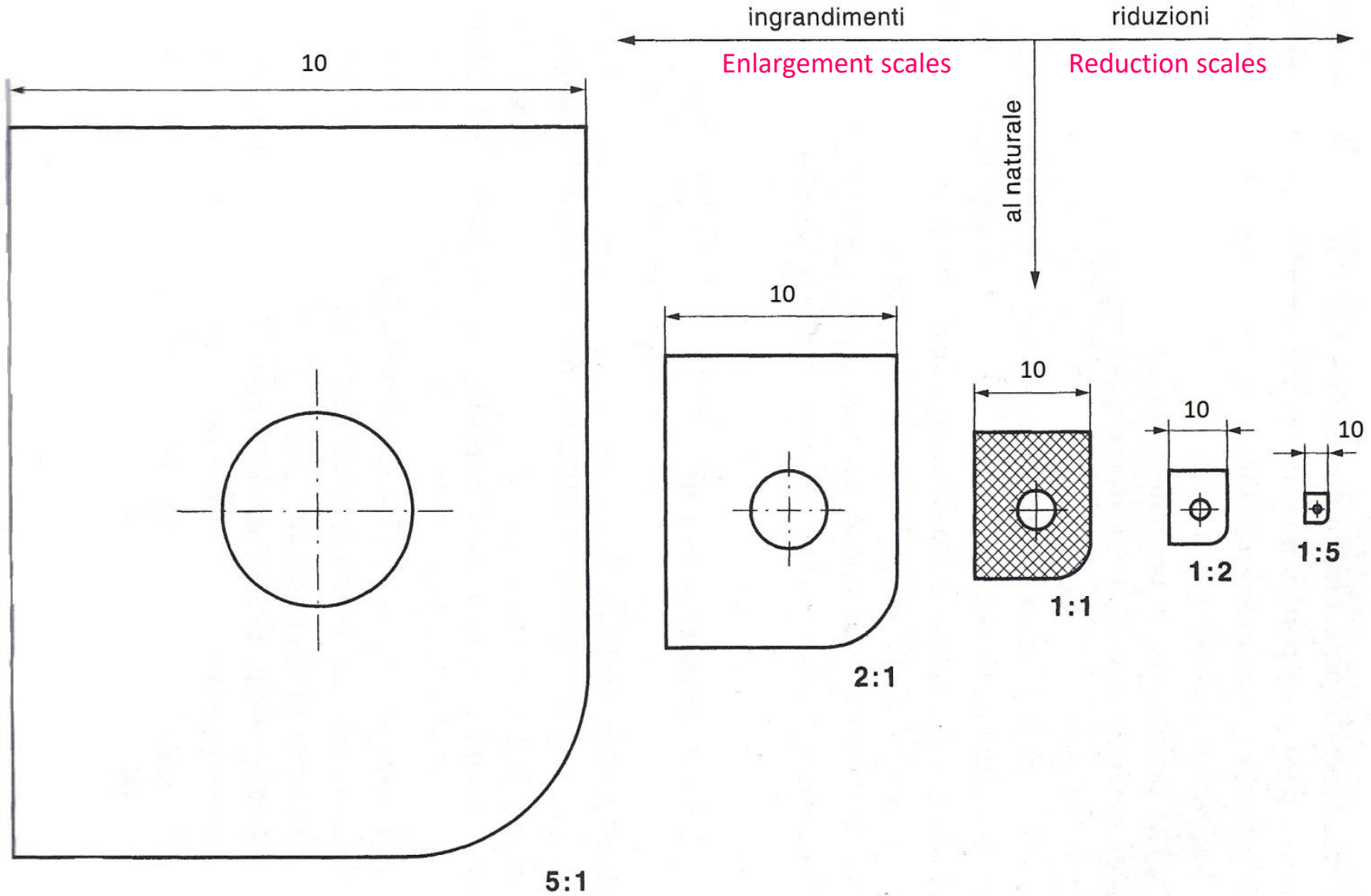
1:5.000, 1:10.000

CARTOGRAPHY FIELD:

1:5.000, 1:10.000, 1:20.000,

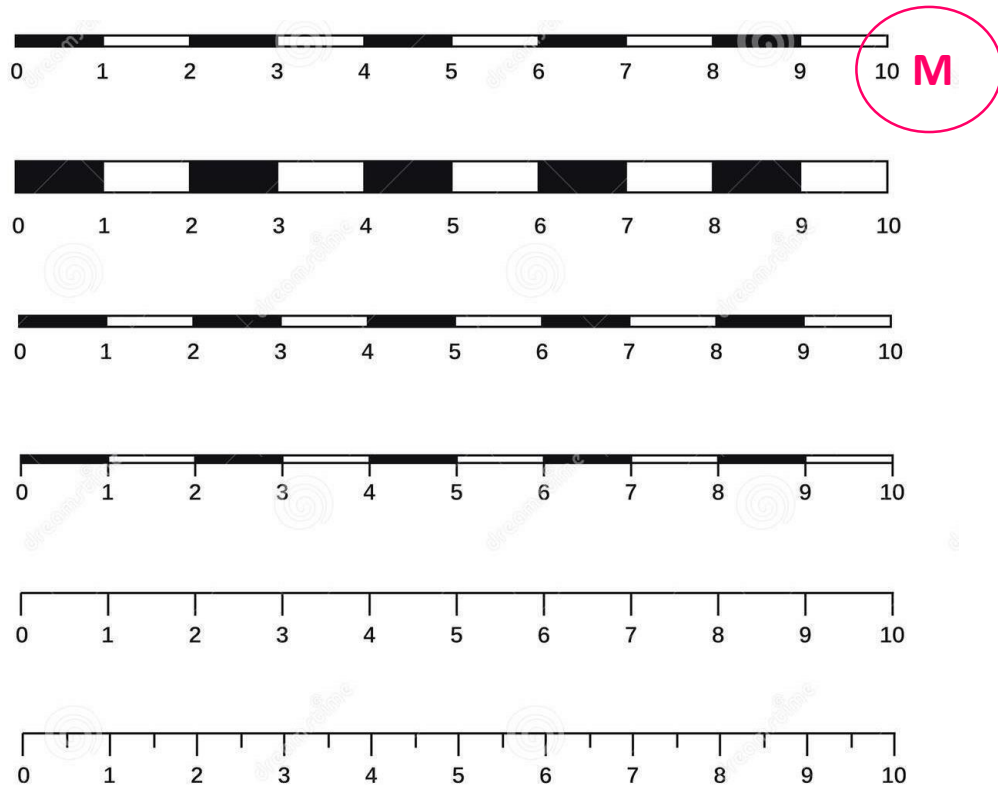
1:50.000, 1:100.000.

Categoria	Scale raccomandate <i>Recommended scales</i>		
Scale di ingrandimento <i>Enlargement scales</i>	50 : 1 5 : 1	20 : 1 2 : 1	10 : 1
Scala al naturale <i>Full size</i>	1 : 1		
Scale di riduzione <i>Reduction scales</i>	1 : 2 1 : 20 1 : 200 1 : 2 000	1 : 5 1 : 50 1 : 500 1 : 5 000	1 : 10 1 : 100 1 : 1 000 1 : 10 000

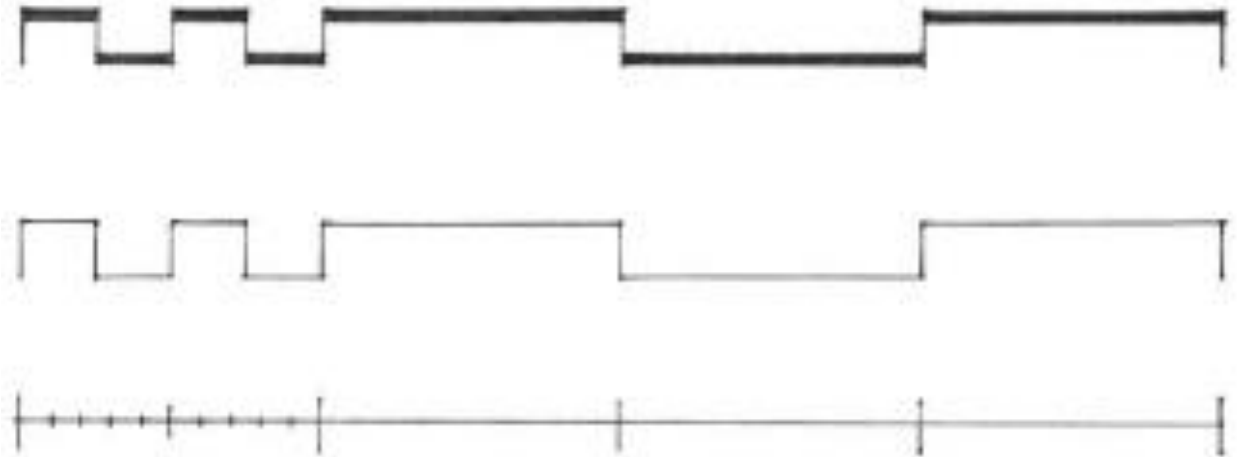










GRAPHIC SCALE





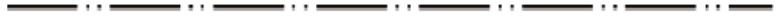



THE GRAPHIC SCALE IS GENERALLY REPRESENTED BY A **SEGMENT (ON THE DRAWING) DIVIDED INTO EQUAL PARTS**, EACH OF WHICH EQUALS A CERTAIN DISTANCE (IN REALITY).



OTHER EXAMPLES:



N°	Rappresentazione	Descrizione
01		linea continua
02		linea a tratti
03		linea a tratti distanziati
04		linea mista a punto e tratto lungo
05		linea mista a due punti e tratto lungo
06		linea mista a tre punti e tratto lungo
07		linea punteggiata
08		linea a tratto lungo e tratto breve


No.	Representation	Description
01		Continuous line
02		Dashed line
03		Dashed spaced line
04		Long-dashed dotted line
05		Long-dashed double-dotted line
06		Long-dashed triplicate-dotted line
07		Dotted line
08		Long-dashed short-dashed line








UNI EN ISO 128-20:2002
ESTABLISHES THE TYPES OF LINES,
THEIR DESIGNATIONS AND THEIR
CONFIGURATIONS, AS WELL AS
GENERAL RULES FOR DRAUGHTING OF
LINES USED IN TECHNICAL DRAWINGS.


LINE SUB-TYPES:


- EXTRA WIDE
- WIDE
- NARROW

THE RATIO OF THE THICKNESSES OF
EXTRA WIDE LINES, WIDE
AND NARROW IS 4:2:1.






09		linea a tratto lungo e due tratti brevi
10		linea mista a punto e tratto
11		linea mista a punto e due tratti
12		linea mista a due punti e un tratto
13		linea mista a due punti e due tratti
14		linea mista a tre punti e un tratto
15		linea mista a tre punti e due tratti



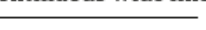

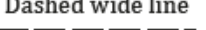
No.	Representation	Description
09		Long-dashed double-short-dashed line
10		Dashed dotted line
11		Double-dashed dotted line
12		Dashed double-dotted line
13		Double-dashed double-dotted line
14		Dashed triplicate-dotted line
15		Double-dashed triplicate-dotted line



N°	Linea Descrizione e rappresentazione	Applicazione
01.1		.1 intersezioni fittizie
		.2 linee di misura
		.3 linee di riferimento
		.4 linee di richiamo e linee di riferimento
		.5 tratteggi
		.6 contorni di sezioni ribaltate
		.7 assi brevi
		.8 fondi di filettature
		.9 origine ed estremità di linee di misura
		.10 diagonali indicanti superfici piane
		.11 linee di indicazione di spigoli fittizi e linee di piegatura
		.12 identificazione di dettagli
		.13 identificazione di dettagli ripetitivi
		.14 linee di definizione di elementi conici
		.15 collocazione di lamierini sottili
		.16 linee di proiezione
		.17 linee di griglia


No.	Line description and representation	Application	Application reference	Fig- ure E.54 key ^a
01.1		.1 imaginary lines of intersection	—	B 1
		.2 dimension lines	ISO 129-1	B 2
		.3 extension lines	ISO 129-1	B 3
		.4 leader lines and reference lines	ISO 128-2 ISO 2553 ISO 12671	B 4
		.5 hatching	ISO 128-3	B 5
		.6 outlines of revolved sections	ISO 128-3	B 6
		.7 short centre lines	—	B7
		.8 root of screw threads	ISO 6410-1	B 8
		.9 origin and terminations of dimension lines	ISO 129-1	B 9
		.10 diagonals for the indication of flat surfaces	ISO 128-3	B 10
		.11 bending lines on blanks and processed parts	ISO 128-3	B 11
		.12 framing of details	ISO 128-3	B 12
		.13 indication of repetitive details, e.g. root circle of gears	ISO 128-3 ISO 2203	B 13
		.14 dimensioning and tolerancing gauge lines (for cones and wedges)	ISO 3040 ISO 2538-2	B 14
		.15 location of laminations	ISO 128-3	B 15
		.16 projection lines	ISO 5456-4	B 16
		.17 grid lines (e.g. for graph, map)	—	B 17




^a Letters and numbers correspond to the balloons shown in Figures E.54 a) to p).
^b It is recommended that only one type of line is used per technical drawing.

	Linea continua fine irregolare 	.18 limiti, preferibilmente tracciati a mano libera, di viste e sezioni parziali o interrotte, quando non siano assi o tracce di piani di simmetria ^{a)}
	Linea continua fine con zig-zag 	.19 limiti, tracciati con sistemi assistiti dall'elaboratore, di viste e sezioni parziali o interrotte, quando non siano assi o tracce di piani di simmetria ^{a)}
01.2	Linea continua grossa 	.1 spigoli in vista .2 contorni in vista .3 creste di filettature .4 termine della filettatura a filetto completo .5 rappresentazioni principali in diagrammi e schemi .6 schemi di strutture di carpenteria metallica .7 tracce in vista generate dalla separazione degli stampi .8 frecce indicatrici di tagli e di sezioni
02.1	Linea a tratti fine 	.1 spigoli nascosti .2 contorni nascosti
02.2	Linea a tratti grossa 	.1 indicazione di superfici oggetto di particolare trattamento, per esempio trattamento termico

No.	Line description and representation	Application	Application reference	Figure E.54 key ^a
		.18 axis of coordinate system	ISO 16972 ISO 129-1	—
	Continuous narrow freehand / freeform curve line 	.19 preferably manually represented termination of partial or interrupted views, cuts and sections, if the limit is not a line of symmetry or a centre line ^b	ISO 128-3	C 1
	Continuous narrow line with zigzags 	.20 mechanically represented termination of partial or interrupted views, cuts and sections, if the limit is not a line of symmetry or a centre line ^b	ISO 128-3	D 1
01.2	Continuous wide line 	.1 visible edges	ISO 128-3	A 1
		.2 visible outlines	ISO 128-3	A 2
		.3 crests of screw threads	ISO 6410-1	A 3
		.4 limit of length of full depth thread	ISO 6410-1	A 4
		.5 main representations in diagrams, maps, graphs, flow charts	—	A 5
		.6 structural line (simplified representation of structural components)	ISO 5261	A 6
		.7 parting lines of moulds in views	ISO 10135	A 7
		.8 direction changes of lines of cuts and section arrows	ISO 128-3	A 8
02.1	Dashed narrow line 	.1 hidden edges	ISO 128-3	F 1
		.2 hidden outlines	ISO 128-3	F 2
02.2	Dashed wide line 	.1 indication of permissible areas of surface treatment, e.g. heat treatment, organic coatings, thermally sprayed coating	ISO 15787 ISO 12671	E 1

04.1	Linea mista fine a punto e tratto lungo 	.1 assi di simmetria
		.2 tracce di piani di simmetria
		.3 circonferenze primitive di ingranaggi
		.4 circonferenze su cui si trovano assi di fori
04.2	Linea mista grossa a punto e tratto lungo 	.1 indicazioni di porzioni di superfici soggette a trattamento, per esempio trattamento termico
		.2 posizione piani di taglio e di sezione

N°	Linea Descrizione e rappresentazione	Applicazione
05.1	Linea mista fine a due punti e tratto lungo 	.1 contorni di pezzi adiacenti
		.2 posizioni estreme di parti mobili
		.3 assi o luoghi baricentrici
		.4 contorni prima delle lavorazioni (sovrammetallo)
		.5 parti situate anteriormente al piano di sezione
		.6 contorni di possibili esecuzioni alternative
		.7 contorni di parti finite sovrapposte al disegno dei grezzi
		.8 riquadri indicativi di zone particolari
		.9 zona di tolleranza proiettata

04.1	Long-dashed dotted narrow line 	.1 centre lines	ISO 129-1	G 1
		.2 lines and planes of symmetry, situation features (as median features)	ISO 128-3 ISO 5459	G 2
		.3 pitch circle of gears	ISO 2203	G 3
		.4 pitch circle of holes	ISO 128-3 ISO 129-1	G 4
		.5 indication of expected or wished spread of surface-hardened areas, e.g. heat treatment	ISO 15787	G 5
		.6 cutting line	ISO 128-3	G 6
		.7 cutting plane	ISO 16792	H1
04.2	Long-dashed dotted wide line 	.1 datum target lines, indication of (limited) required areas of surface, e.g. heat treatment or restricted areas of a toleranced feature	ISO 15787 ISO 1101 ISO 129-1 ISO 10135 ISO 12671	J 1
		.2 position of cutting planes	ISO 128-3	J 2
05.1	Long-dashed double-dotted narrow line 	.1 outlines of adjacent parts, contacting features	ISO 128-3 ISO 5459	K 1
		.2 extreme positions of movable parts	ISO 128-3	K 2
		.3 centroidal lines	ISO 129-5	K 3
		.4 initial outlines prior to forming	ISO 128-3 ISO 129-1	K 4
		.5 parts situated in front of a cutting plane	—	K 5
		.6 outlines of alternative executions	—	K 6
		.7 outlines of the finished part within blanks	ISO 128-3 ISO 10135	K 7
		.8 framing of particular fields/limited areas for adhesive, brazing and soldering	ISO 15785 ISO 15787	K 8
		.9 projected tolerance feature	ISO 1101	K 9
		.10 optical axes	ISO 10110-1	K 10
		.11 indication of structural outlines used in mechanical processes	ISO 15787	K 11
		.12 outline of datum target areas	ISO 5459	K12

TO COMPLETE THE TECHNICAL REPRESENTATION OF AN OBJECT, IT IS NECESSARY TO ADD **QUANTITATIVE** INFORMATION. SUCH AN OPERATION IS ESSENTIAL TO AVOID GRAPHICAL ERROR CAUSED BY LINE THICKNESS.

ALL DIMENSIONS, GRAPHICAL SYMBOLS AND ANNOTATIONS SHALL BE INDICATED SUCH THAT THEY CAN BE READ FROM THE BOTTOM OR RIGHT-HAND SIDE (**MAIN READING DIRECTIONS**) OF THE DRAWING.

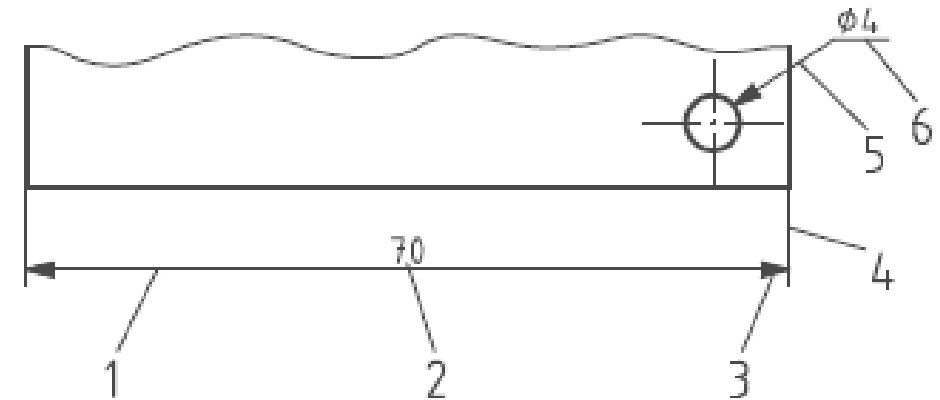
ALL DIMENSIONAL INFORMATION SHALL BE COMPLETE AND SHOWN DIRECTLY ON A DRAWING UNLESS THIS INFORMATION IS SPECIFIED IN RELATED ASSOCIATED DOCUMENTATION.

EACH FEATURE OR RELATION BETWEEN FEATURES SHALL BE DIMENSIONED ONLY ONCE.

DIMENSIONS SHALL BE INDICATED USING ONLY **ONE UNIT OF DIMENSION**. WHERE A VARIETY OF UNITS OF DIMENSION ARE USED WITHIN ONE DOCUMENT, THEY SHALL BE CLEARLY INDICATED.

THE ELEMENTS OF DIMENSIONING INCLUDE:

- **DIMENSION LINE** - STRAIGHT OR CURVED LINE ON A DRAWING BETWEEN TWO FEATURES, OR BETWEEN A FEATURE AND AN EXTENSION LINE, OR BETWEEN TWO EXTENSION LINES INDICATING THE DIMENSION GRAPHICALLY;
- **DIMENSIONAL VALUE** - NUMERICAL VALUE OF A DIMENSION EXPRESSED IN A SPECIFIC UNIT AND INDICATED ON DRAWINGS WITH LINES AND RELEVANT SYMBOLS;
- DIMENSION LINE **TERMINATION** - INDICATION SIGNIFYING THE EXTREMITIES OF A DIMENSION OR LEADER LINE;
- PROJECTION LINE (**EXTENSION LINE**) - LINE CONNECTING THE FEATURE(S) TO BE DIMENSIONED AND THE ENDS OF THE CORRESPONDING DIMENSION LINE;
- **LEADER LINE** - LINE CONNECTING INFORMATION OR REQUIREMENTS OR A REFERENCE LINE WITH A FEATURE OR A DIMENSION LINE;
- **REFERENCE LINE** - FEATURE WHICH IS USED AS THE ORIGIN FOR THE DETERMINATION OF ANOTHER FEATURE.

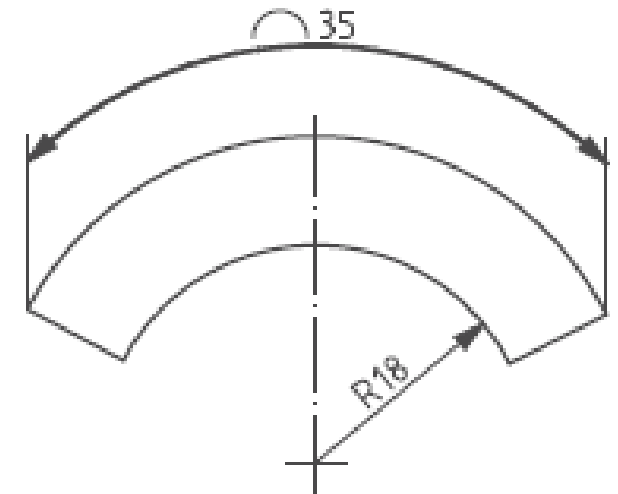
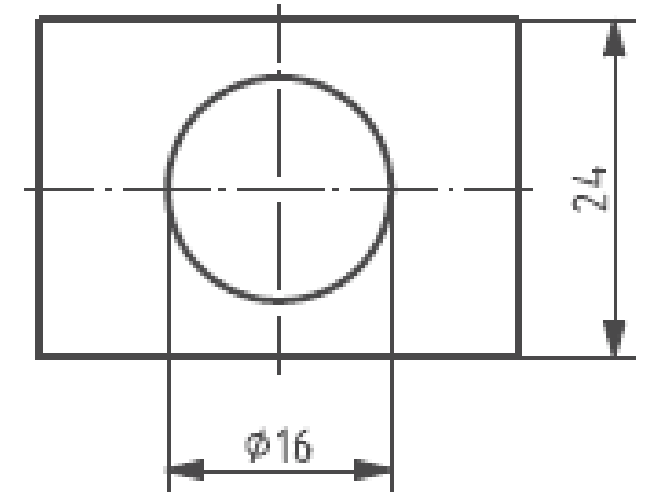


- 1 dimension line
- 2 dimensional value
- 3 terminator (in this case, an arrowhead)
- 4 extension line
- 5 leader line
- 6 reference line

DIMENSION LINE

DIMENSION LINES SHALL BE INDICATED IN THE CASE OF LINEAR DIMENSIONS **PARALLEL TO THE LENGTH TO BE DIMENSIONED**, ANGULAR DIMENSIONS OR DIMENSIONS OF AN ARC AS A CIRCULAR ARC AROUND THE VERTEX OF THE ANGLE OR THE CENTRE OF THE ARC, AND RADII GENERATED FROM THE GEOMETRICAL CENTRE OF THE RADIUS.

INTERSECTION OF DIMENSION LINES WITH ANY OTHER LINE SHOULD BE AVOIDED.



TERMINATORS AND ORIGIN INDICATION

THE TERMINATION OF DIMENSION LINES SHALL BE ACCORDING TO ONE OF THE REPRESENTATIONS SHOWN:



a) Arrowhead, closed and filled 30°



b) Arrowhead, closed 30°



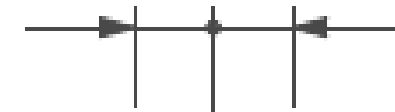
c) Arrowhead, open 30°



d) Arrowhead, open 90°



e) Oblique stroke

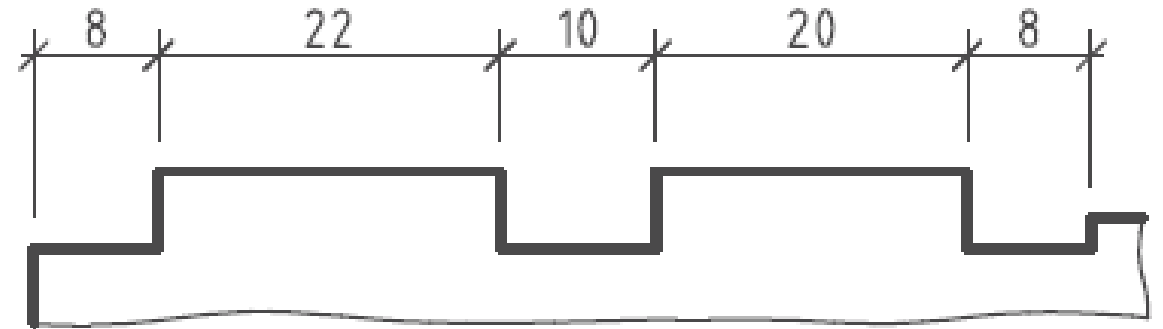
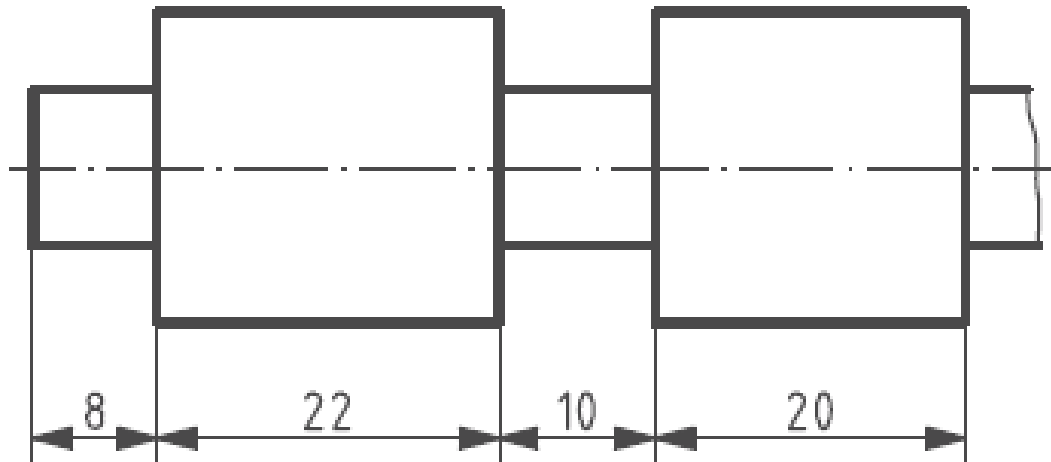


f) Point (used only if no place for arrowhead; the oblique stroke may also be used)

EXTENSION LINE

EXTENSION LINES SHALL EXTEND APPROXIMATELY 8 TIMES THE LINE WIDTH BEYOND THE RESPECTIVE DIMENSION LINE. EXTENSION LINES SHOULD BE DRAWN PERPENDICULAR TO THE CORRESPONDING PHYSICAL LENGTH.

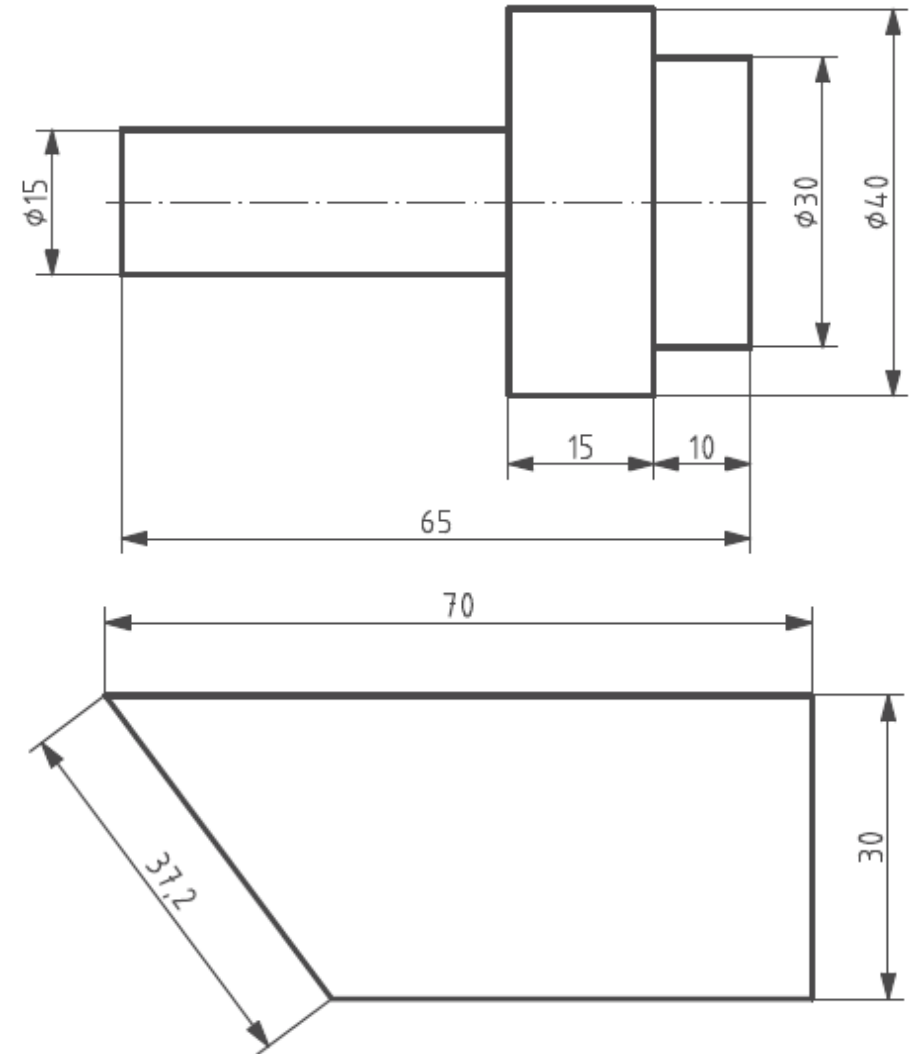
IT IS PERMISSIBLE TO HAVE A GAP (APPROXIMATELY 8 TIMES THE LINE WIDTH) BETWEEN THE FEATURE AND THE BEGINNING OF THE EXTENSION LINE IN CERTAIN TECHNICAL FIELDS.



DIMENSIONAL VALUES

DIMENSIONAL VALUES SHALL BE INDICATED ON DRAWINGS IN CHARACTERS OF SUFFICIENT SIZE TO ENSURE COMPLETE **LEGIBILITY** ON THE ORIGINAL DRAWING AS WELL AS ON REPRODUCTIONS MADE FROM MICROFILMS.

DIMENSIONAL VALUES SHALL BE PLACED **PARALLEL TO THEIR DIMENSION LINE** AND NEAR THE MIDDLE OF AND SLIGHTLY ABOVE THAT LINE.



INDICATIONS OF SPECIAL DIMENSIONS
THE FOLLOWING SYMBOLS SHALL BE USED WITH DIMENSIONS TO IDENTIFY THE SHAPE OF A DIMENSIONED FEATURE. THE FOLLOWING SYMBOLS SHALL PRECEDE THE DIMENSIONAL VALUE:

- \varnothing : Diameter;
- R: Radius;
- \square : Square;
- $S\varnothing$: Spherical diameter;
- SR: Spherical radius;
- \frown : Arc;
- t =: Thickness.

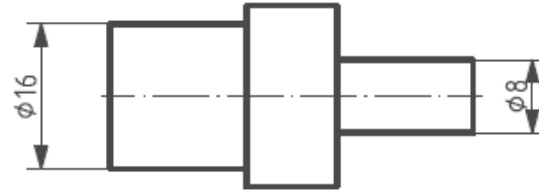


Figure 34

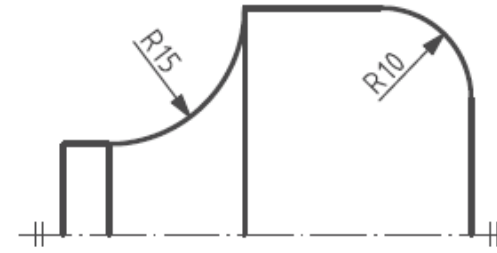


Figure 35

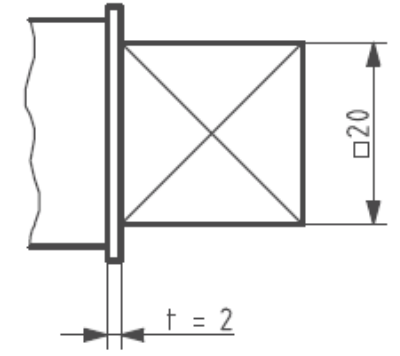


Figure 36

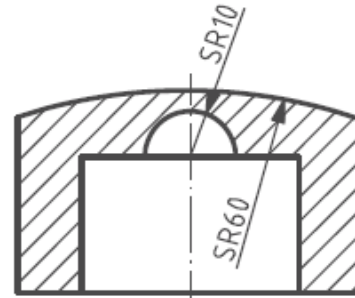


Figure 37

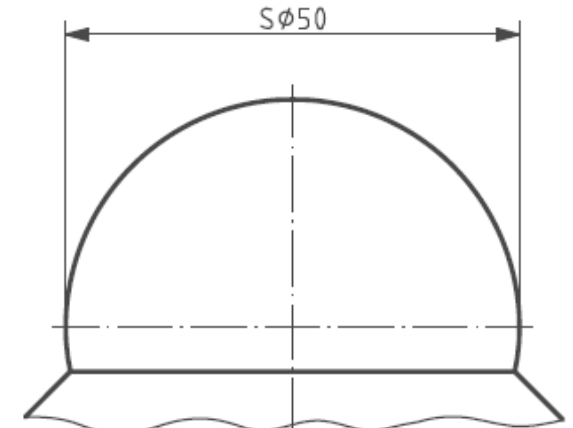


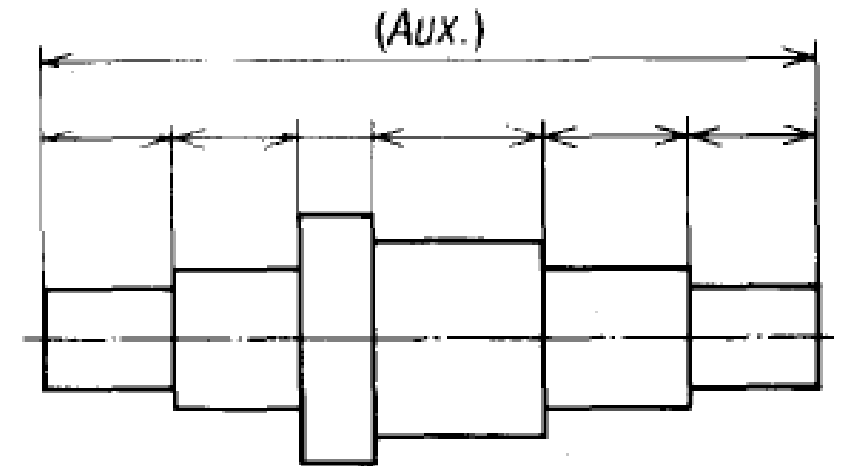
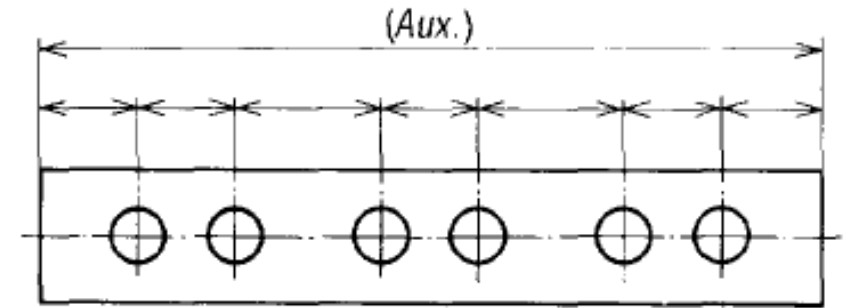
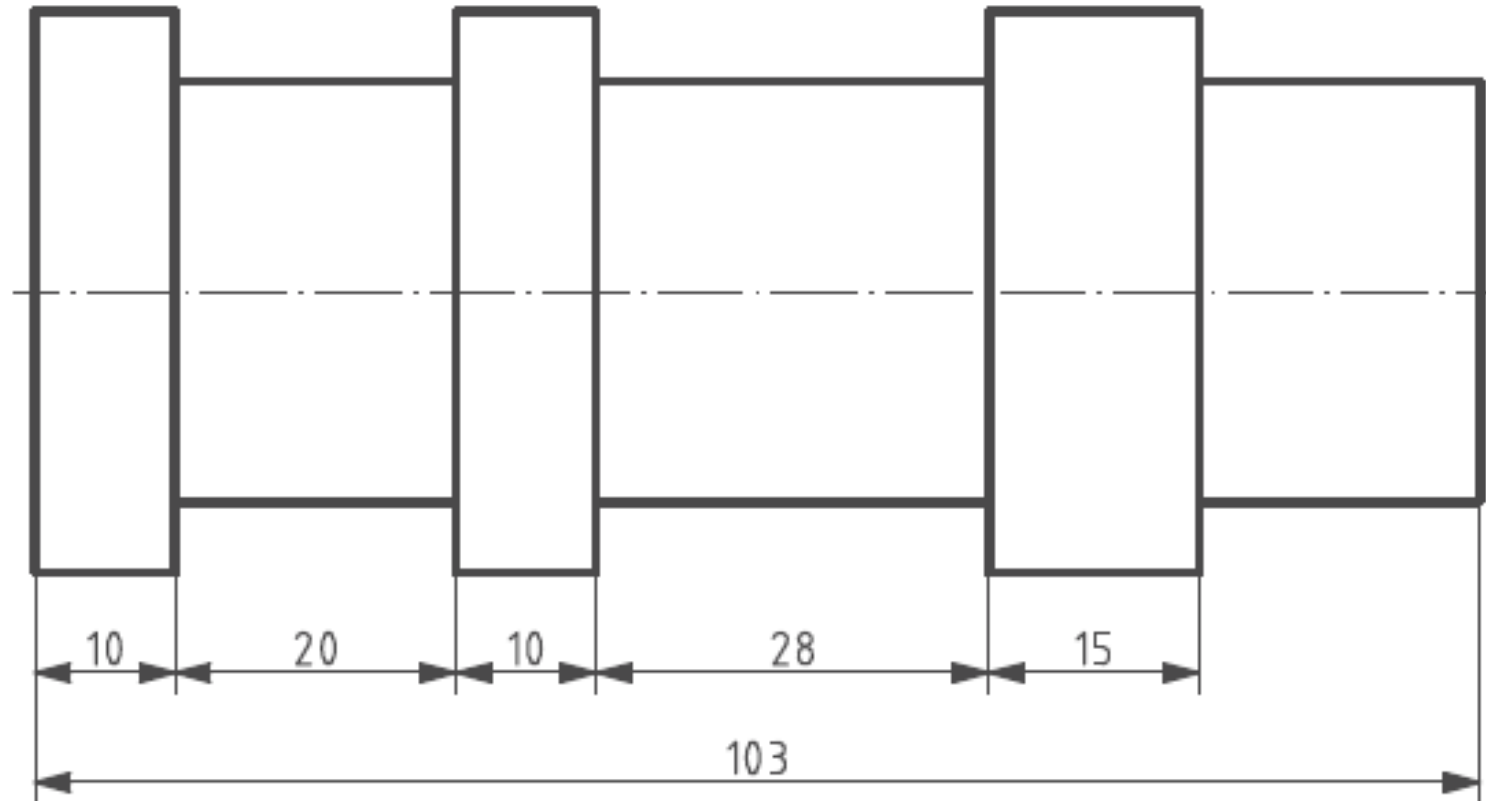
Figure 38

THE ARRANGEMENT OF DIMENSIONING ON A DRAWING SHALL INDICATE CLEARLY THE DESIGN PURPOSE.

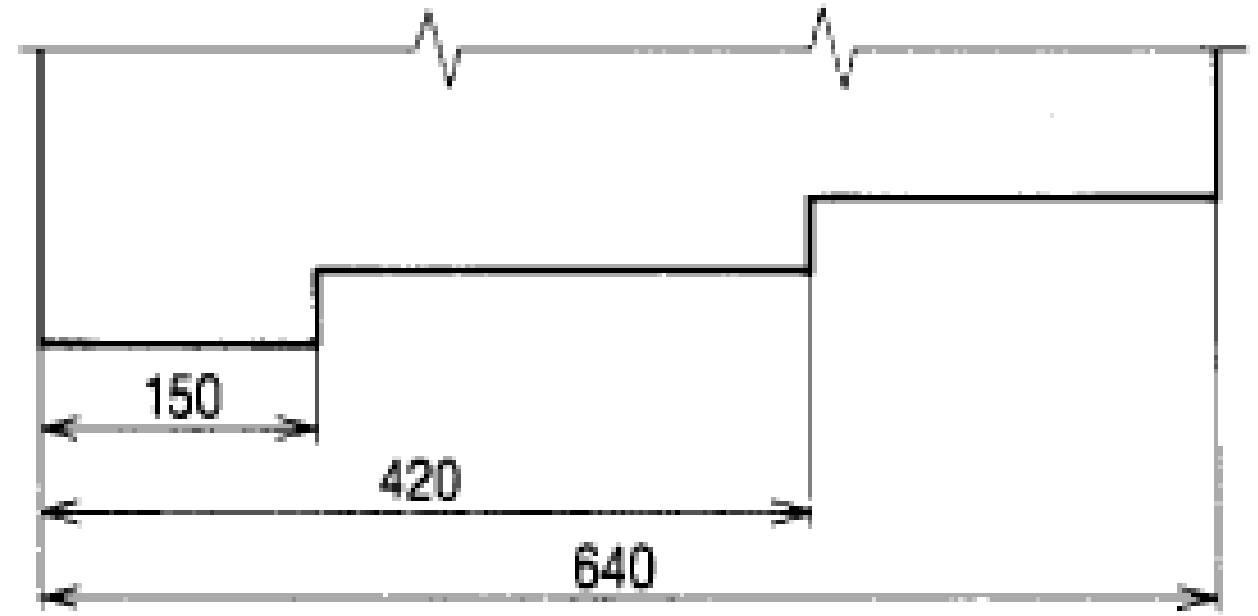
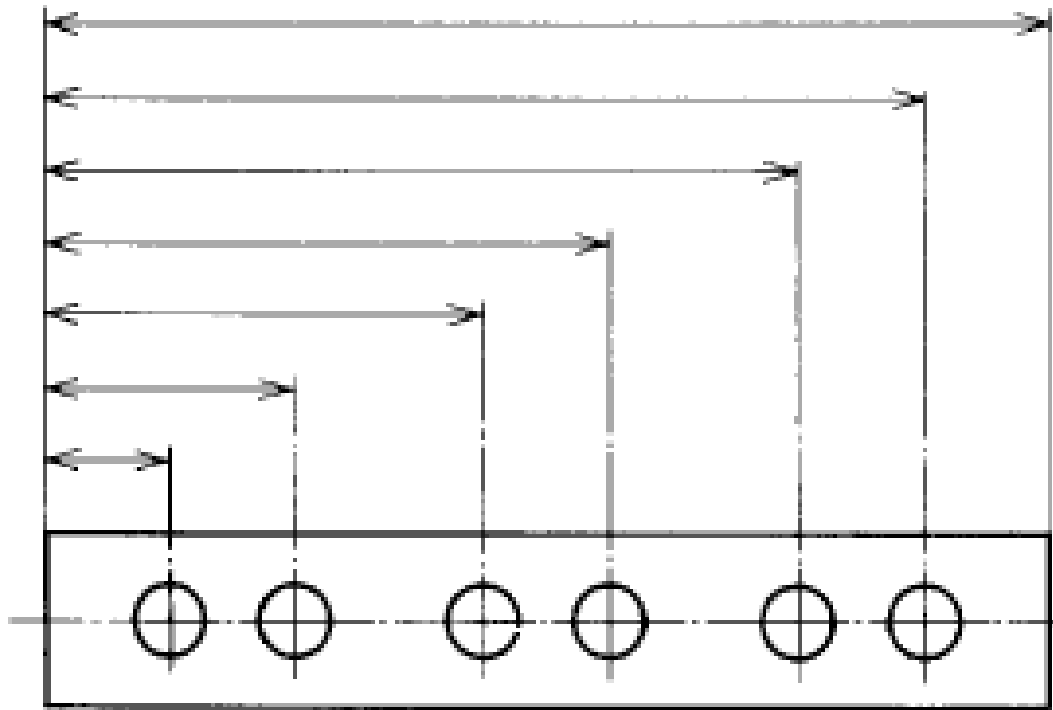
DIMENSION LINES SHALL BE ARRANGED AS PARALLEL, CHAIN OR RUNNING DIMENSIONING OR IN COMBINATION.

- **CHAIN DIMENSIONING** - METHOD OF DIMENSIONING WHERE SINGLE DIMENSIONS ARE ARRANGED IN A ROW;
- **PARALLEL DIMENSIONING** - METHOD OF DIMENSIONING IN WHICH EACH ELEMENT IS DIMENSIONED FROM A REFERENCE ELEMENT, WITH PARALLEL OR CONCENTRIC DIMENSION LINES;
- **RUNNING DIMENSIONING** - METHOD OF DIMENSIONING IN WHICH EACH ELEMENT IS DIMENSIONED FROM A REFERENCE ELEMENT, WITH “UNIQUE” DIMENSION LINE;
- **DIMENSIONING BY COORDINATES** - METHOD OF DIMENSIONING FROM A REFERENCE FEATURE IN A COORDINATE SYSTEM;
- **COMBINED DIMENSIONING.**

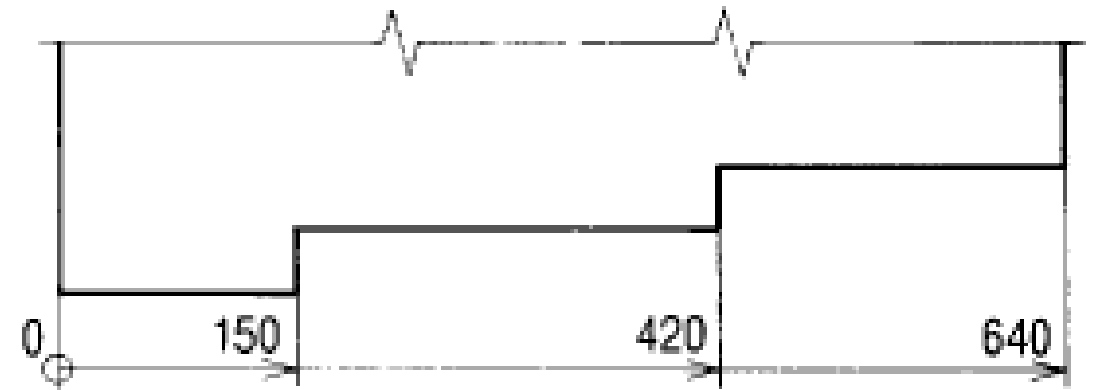
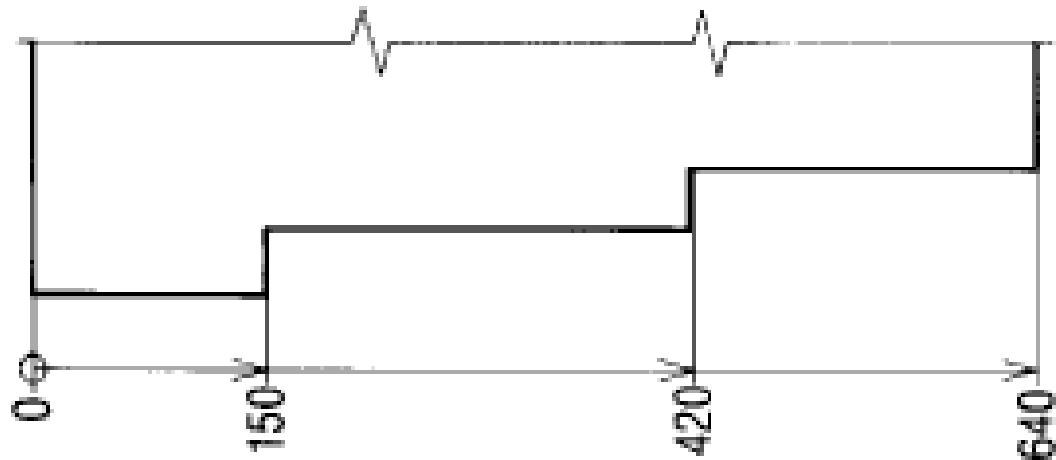
EXAMPLES OF **CHAIN** DIMENSIONING:



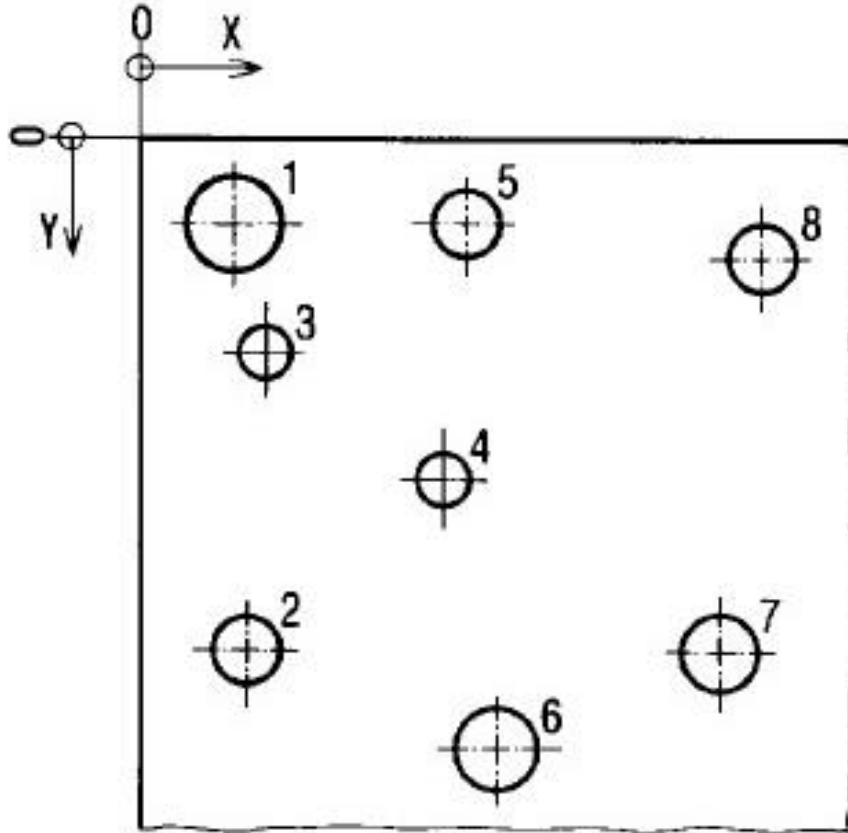
EXAMPLES OF **PARALLEL** DIMENSIONING:



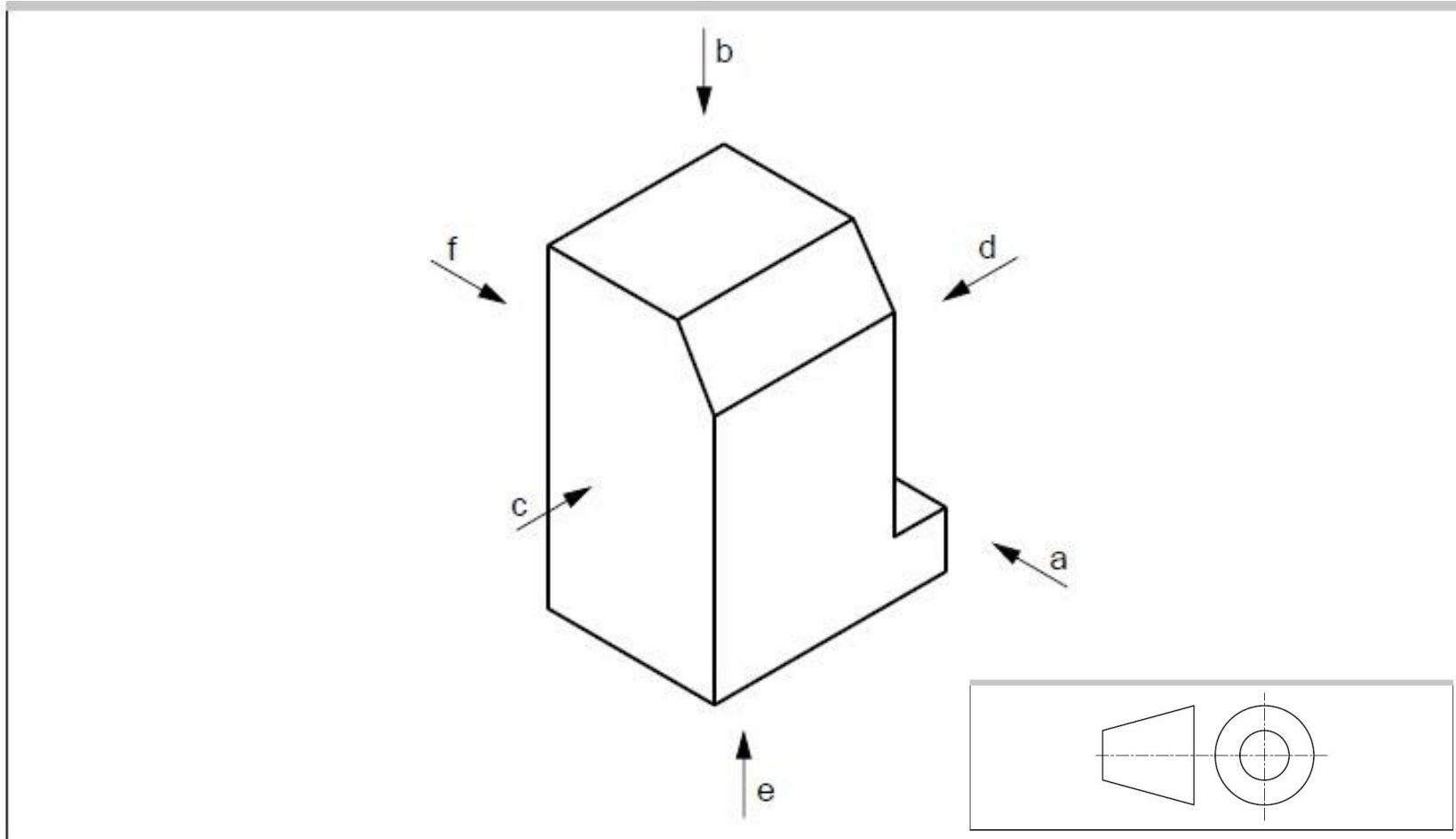
EXAMPLES OF **RUNNING** DIMENSIONING:



EXAMPLES OF DIMENSIONING BY COORDINATES:



	1	2	3	4	5	6	7	8
X	16	18	21	51	55	60	98	105
Y	14	86	36	57	14	103	86	20
∅	16	10,5	8,4	8,4	10,5	13	12	10,5

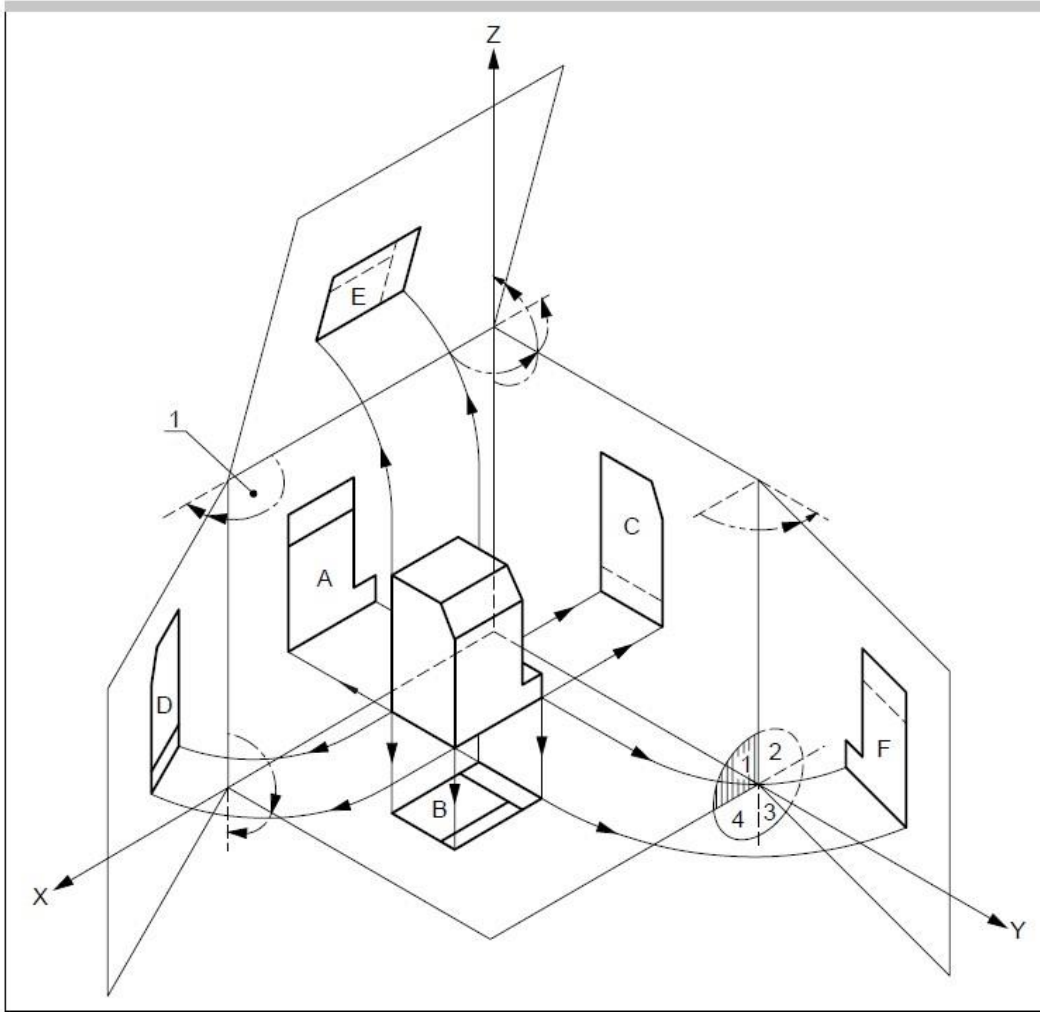


The identifying graphical symbol of this method.

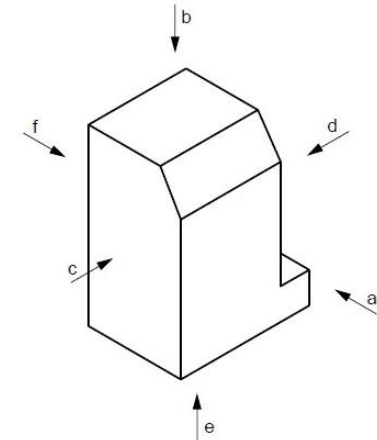
UNI EN ISO 5456-2:2001 SPECIFIES BASIC RULES FOR THE APPLICATION OF ORTHOGRAPHIC REPRESENTATION TO ALL TYPES OF TECHNICAL DRAWINGS IN ALL TECHNICAL FIELDS.

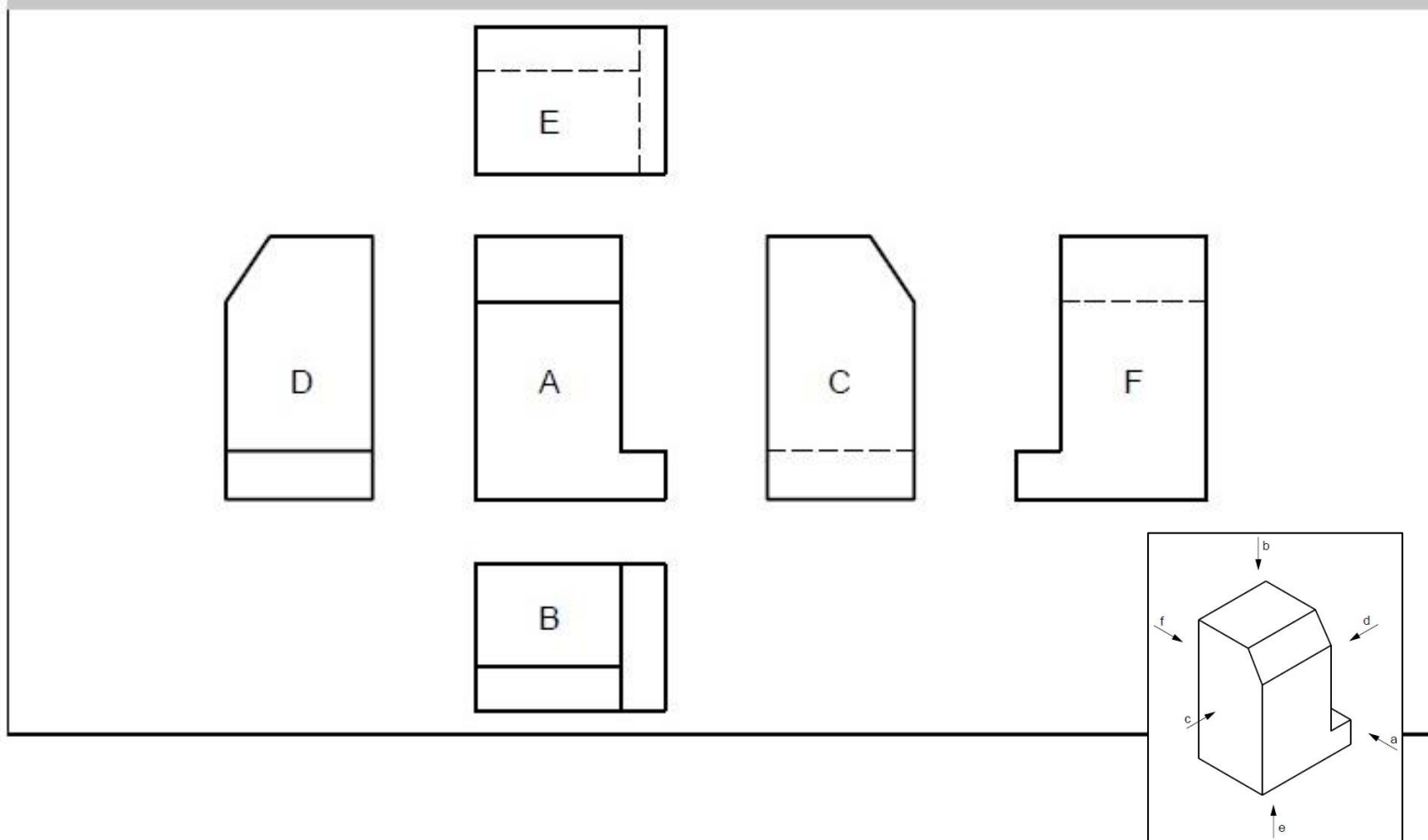
ORTHOGRAPHIC REPRESENTATION IS OBTAINED BY MEANS OF PARALLEL ORTHOGONAL PROJECTIONS AND RESULTS IN FLAT, TWO DIMENSIONAL VIEWS SYSTEMATICALLY POSITIONED RELATIVE TO EACH OTHER.

TO SHOW AN OBJECT COMPLETELY, THE SIX VIEWS IN THE DIRECTIONS A, B, C, D, E AND F MAY BE NECESSARY.



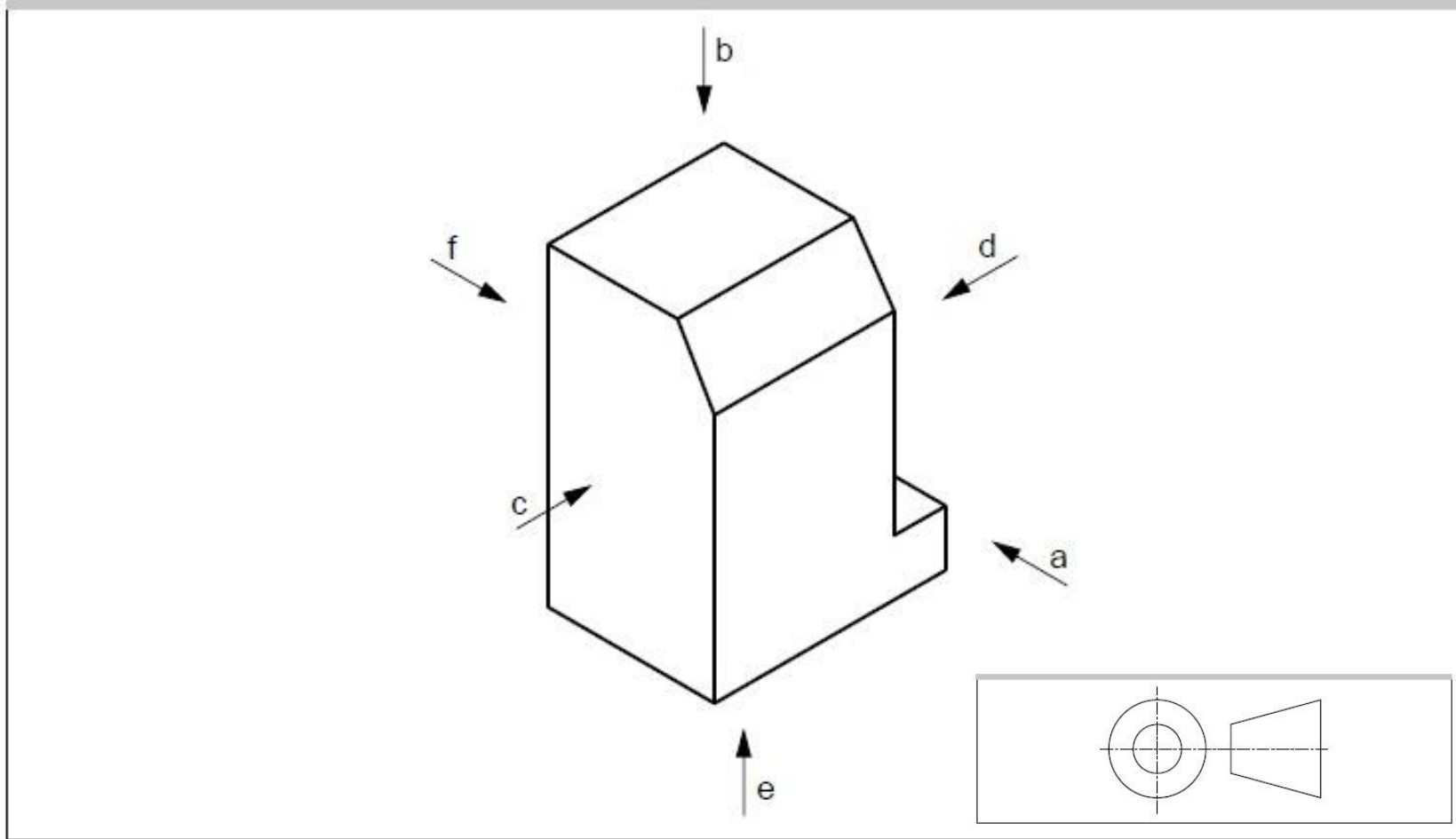
THE POSITIONS OF THE VARIOUS VIEWS RELATIVE TO THE PRINCIPAL (FRONT) VIEW (A) ARE DETERMINED BY **ROTATING** THEIR PROJECTION PLANES AROUND LINES COINCIDING WITH OR PARALLEL TO THE COORDINATE AXES ON THE COORDINATE PLANE (DRAWING SURFACE) ON WHICH THE FRONT VIEW A IS PROJECTED.





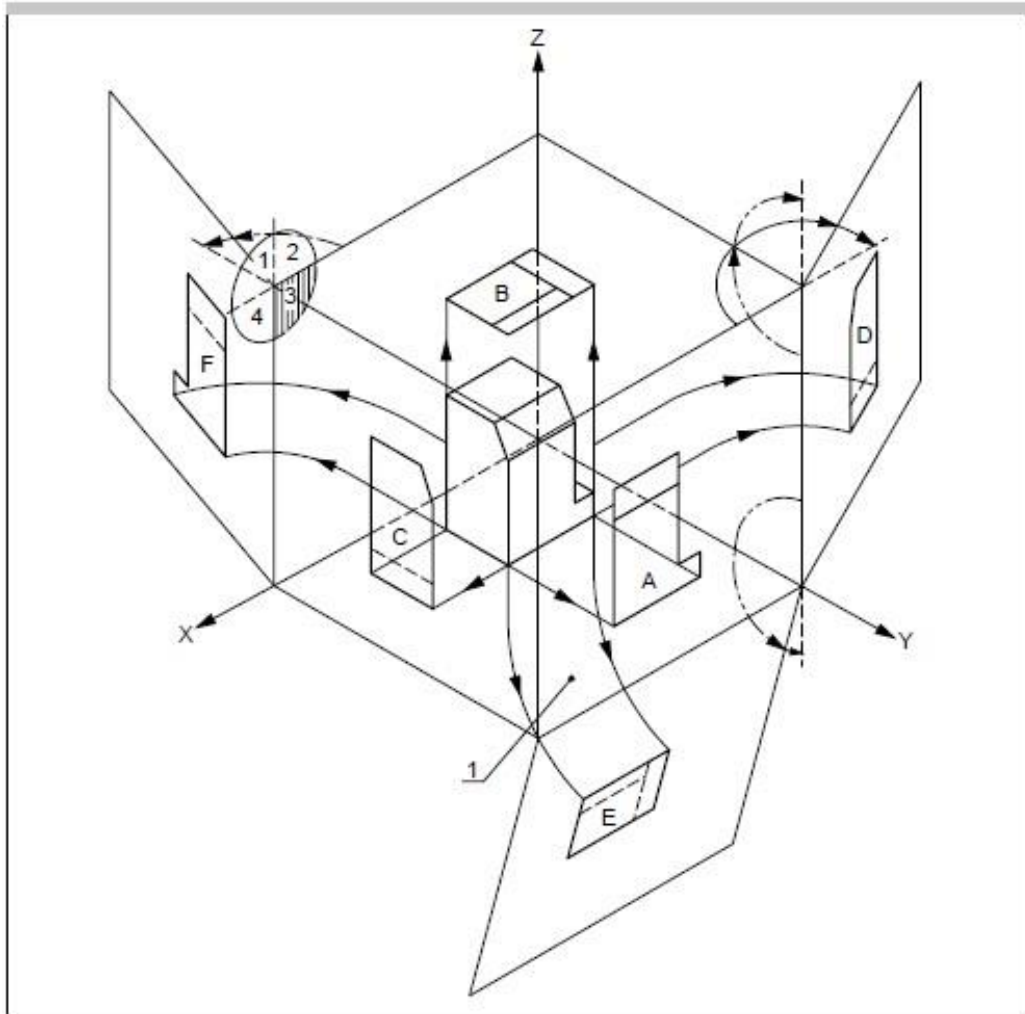
THEREFORE, IN THE DRAWING, WITH REFERENCE TO THE PRINCIPAL VIEW A, THE OTHER VIEWS ARE ARRANGED AS FOLLOWS:

- **VIEW B:** THE VIEW FROM ABOVE IS PLACED UNDERNEATH;
- **VIEW E:** THE VIEW FROM BELOW IS PLACED ABOVE;
- **VIEW C:** THE VIEW FROM LEFT IS PLACED ON THE RIGHT;
- **VIEW D:** THE VIEW FROM THE RIGHT IS PLACED ON THE LEFT;
- **VIEW F:** THE VIEW FROM THE REAR IS PLACED ON THE RIGHT OR ON THE LEFT, AS CONVENIENT.

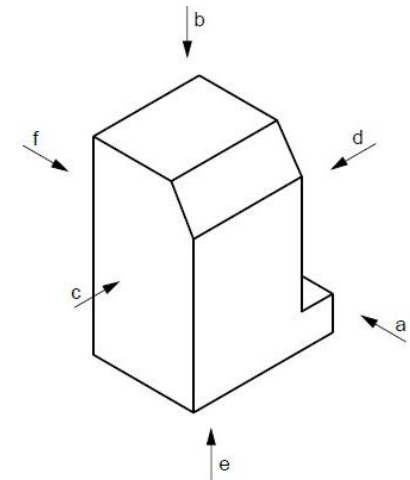


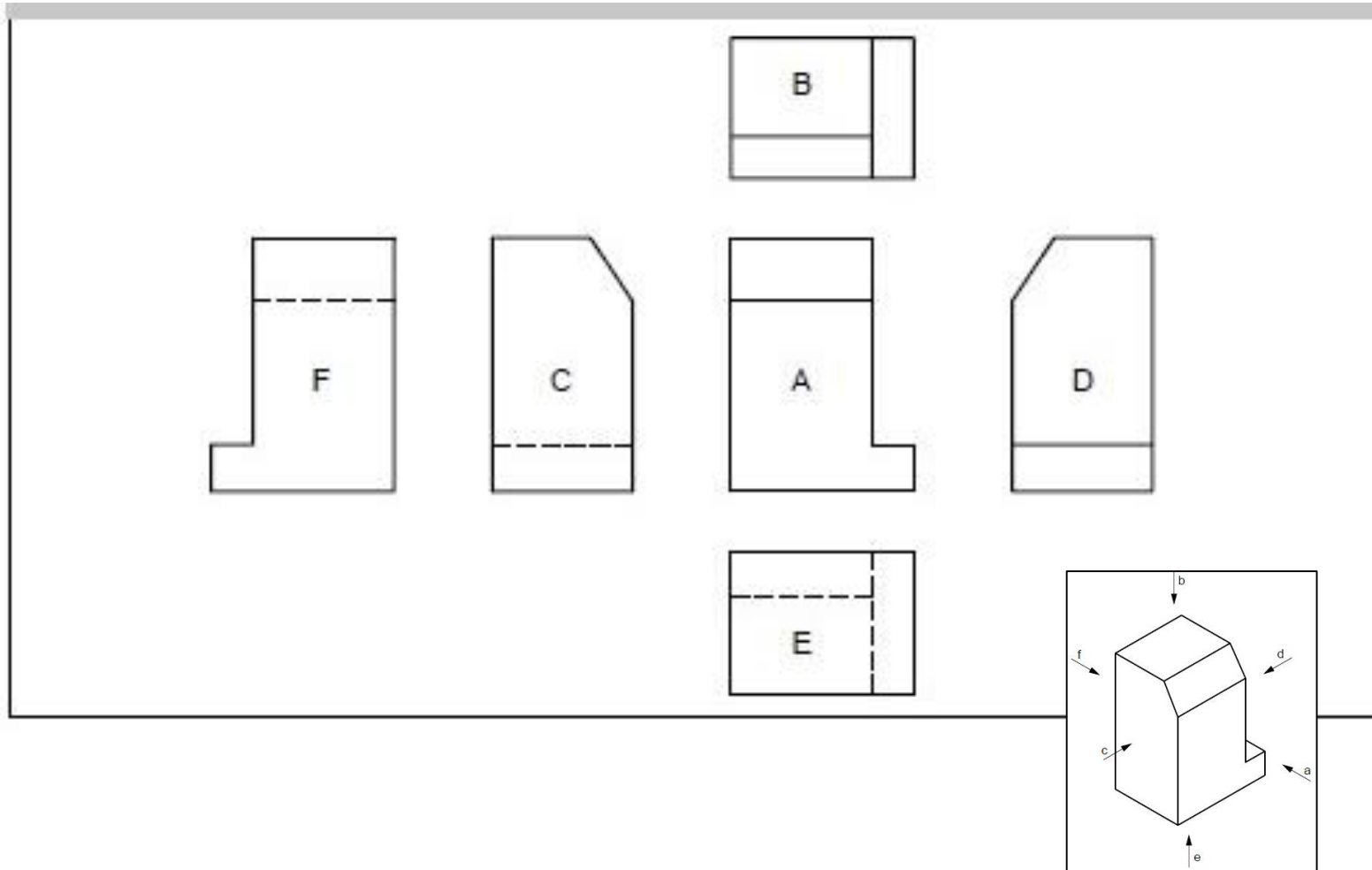
THE THIRD ANGLE PROJECTION METHOD IS AN ORTHOGRAPHIC REPRESENTATION IN WHICH THE OBJECT TO BE REPRESENTED, AS SEEN BY THE OBSERVER, APPEARS BEHIND THE COORDINATE PLANES ON WHICH THE OBJECT IS ORTHOGONALLY PROJECTED.

The identifying graphical symbol of this method.



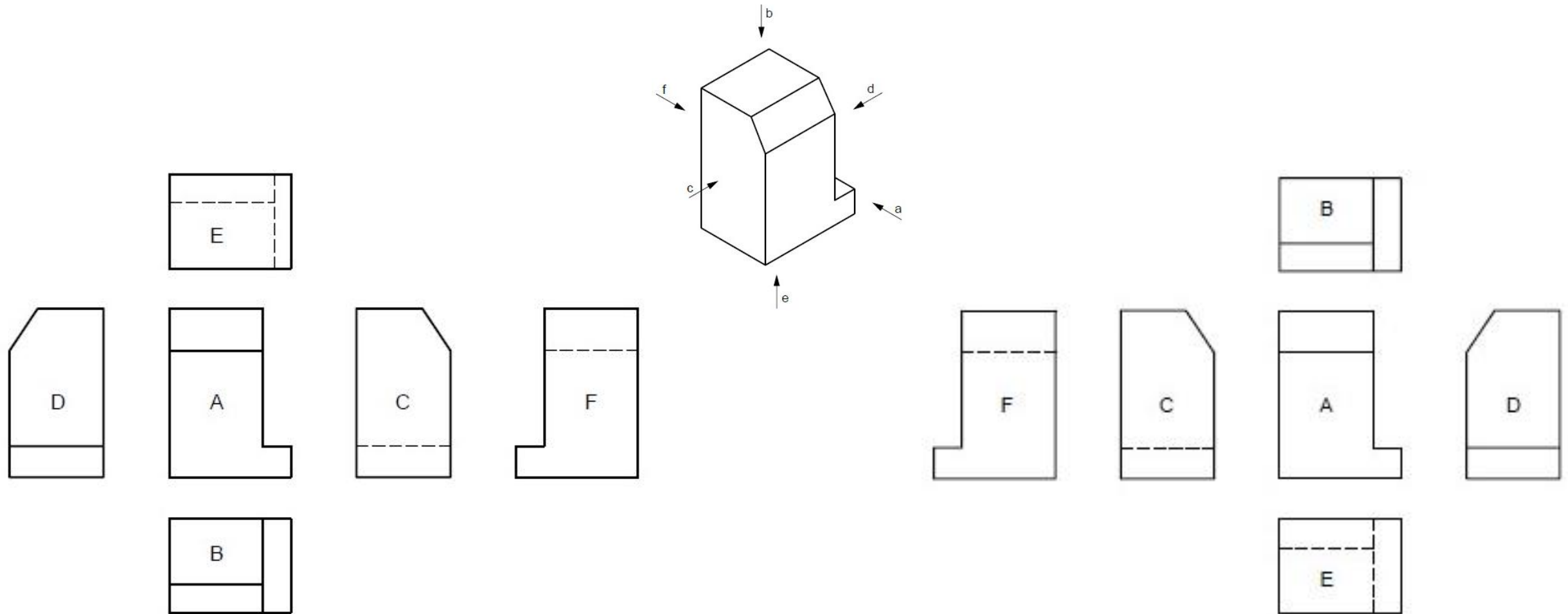
THE POSITIONS OF THE VARIOUS VIEWS RELATIVE TO THE PRINCIPAL (FRONT) VIEW A ARE DETERMINED BY **ROTATING** THEIR PROJECTION PLANES AROUND LINES COINCIDING WITH OR PARALLEL TO THE COORDINATE AXES ON THE COORDINATE PLANE (DRAWING SURFACE) ON WHICH THE FRONT VIEW A IS PROJECTED.



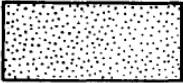

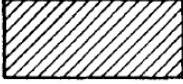



THEREFORE, IN THE DRAWING, WITH REFERENCE TO THE PRINCIPAL VIEW A, THE OTHER VIEWS ARE ARRANGED AS FOLLOWS:

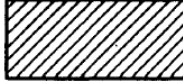
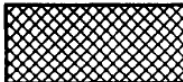
- **VIEW B:** THE VIEW FROM ABOVE IS PLACED ABOVE;
- **VIEW E:** THE VIEW FROM BELOW IS PLACED UNDERNEATH;
- **VIEW C:** THE VIEW FROM THE LEFT IS PLACED ON THE LEFT
- **VIEW D:** THE VIEW FROM THE RIGHT IS PLACED ON THE RIGHT;
- **VIEW F:** THE VIEW FROM THE REAR MAY BE PLACED ON THE LEFT OR ON THE RIGHT, AS CONVENIENT.



Prospetto I


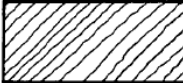
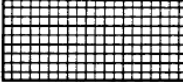
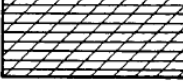
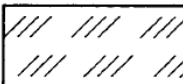
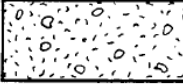
Numero d'ordine	Tratteggio	Natura del materiale
3.1.		Aeriformi e assimilabili (quando hanno importanza funzionale)
3.2.		Liquidi
3.3.		Solidi
3.4.		Terreno

Prospetto II

Numero d'ordine	Tratteggio	Natura del materiale
4.1.		Materiale predominante (per esempio: metallo in meccanica, laterizio in edilizia, vetro in ottica)
4.2.		Materiale da mettere in particolare evidenza (per esempio: parti a contatto con quelle individuate con il tratteggio 4.1)

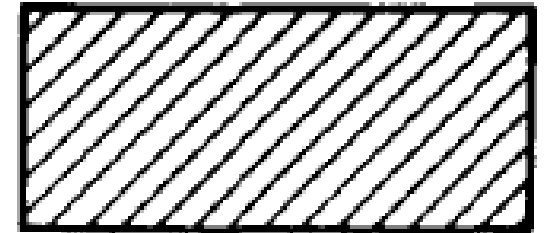
(segue)

(seguito del prospetto I)

Numero d'ordine	Tratteggio	Natura del materiale
4.3.		Materiali ausiliari (per esempio: materie plastiche in meccanica, pietre e marmi in edilizia)
4.4.		Legno
4.5.		Avvolgimenti elettrici
4.6.		Isolanti
4.7.		Materiali trasparenti
4.8.		Conglomerato cementizio

**HATCHINGS ARE USED TO IMPROVE
THE UNDERSTANDING AND
READABILITY OF DRAWINGS IN
WHICH THERE ARE
SECTIONED PARTS.**

GENERIC HATCHING OF
SECTIONED SURFACE:



GRAPHICAL SYMBOLS FOR THE REPRESENTATION OF MATERIALS IN SECTION

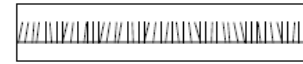
TERRENO



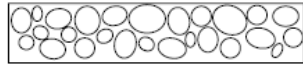
TERRENO VERGINE



TERRENO RIPORTATO



MANTO ERBOSO



CIOTTOLI PER
DRENAGGI

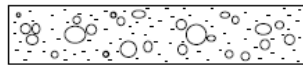


PIETRE A SECCO
PER VESPAI

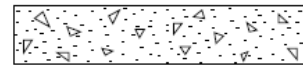


GHIAIA

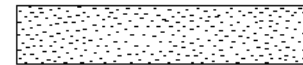
CEMENTO



GETTATO IN OPERA



LEGGERO



INTONACO
MALTA, SABBIA



RAPP. 1:500 - 1:100
C.L.S. PER C.A.

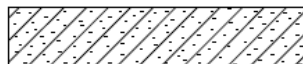


RAPP. 1:50 - 1:1
C.L.S. PER C.A.



RAPP. 1:50 - 1:1
C.L.S. LEGGERO

MURATURE



ADOBE



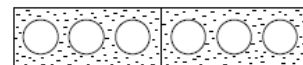
LATERIZI



MATTONI SMALTATI



BLOCCHI DI CEMENTO

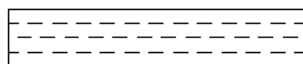


BLOCCHI DI GESSO



RIVESTIMENTO
STRUTTURALE

PIETRE NATURALI



ARDESIA, ECC.



IMPASTI DI PIETRISCO



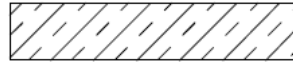
MARMO

GRAPHICAL SYMBOLS FOR THE REPRESENTATION OF MATERIALS IN SECTION

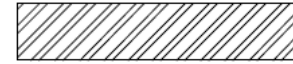
METALLI



ALLUMINIO

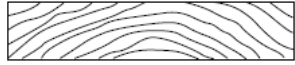


OTTONE, BRONZO

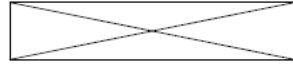


ACCIAIO

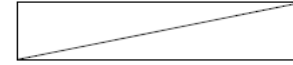
LEGNO



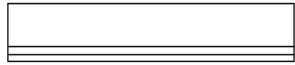
RIFINITO



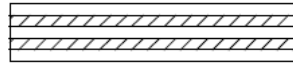
NON RIFINITO



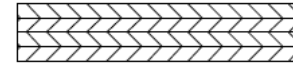
MASSELLO



RAPP. 1:5
COMPENSATO



RAPP. 1:1
COMPENSATO



LAMELLARE

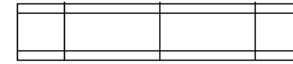
VETRO



LASTRE
RAPP. 1:5 - 1:1

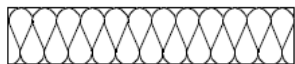


STRUTTURALE

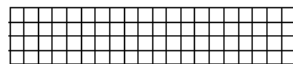


VETRO-CEMENTO

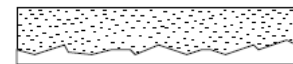
ISOLANTI



AGGREGATI DI FIBBRE

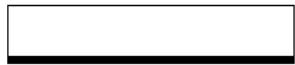


PANNELLO RIGIDO



SCHIUMA

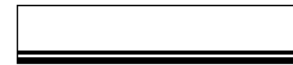
MEMBRANE SINTETICHE



RAPP. 1:20 - 1:10
ASFALTO, GUAINE

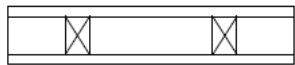


RAPP. 1:5 - 1:1
ASFALTO, GUAINE

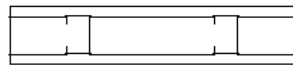


RAPP. 1:20 - 1:10
STRATI INCROCIATI

PARETI VERTICALI



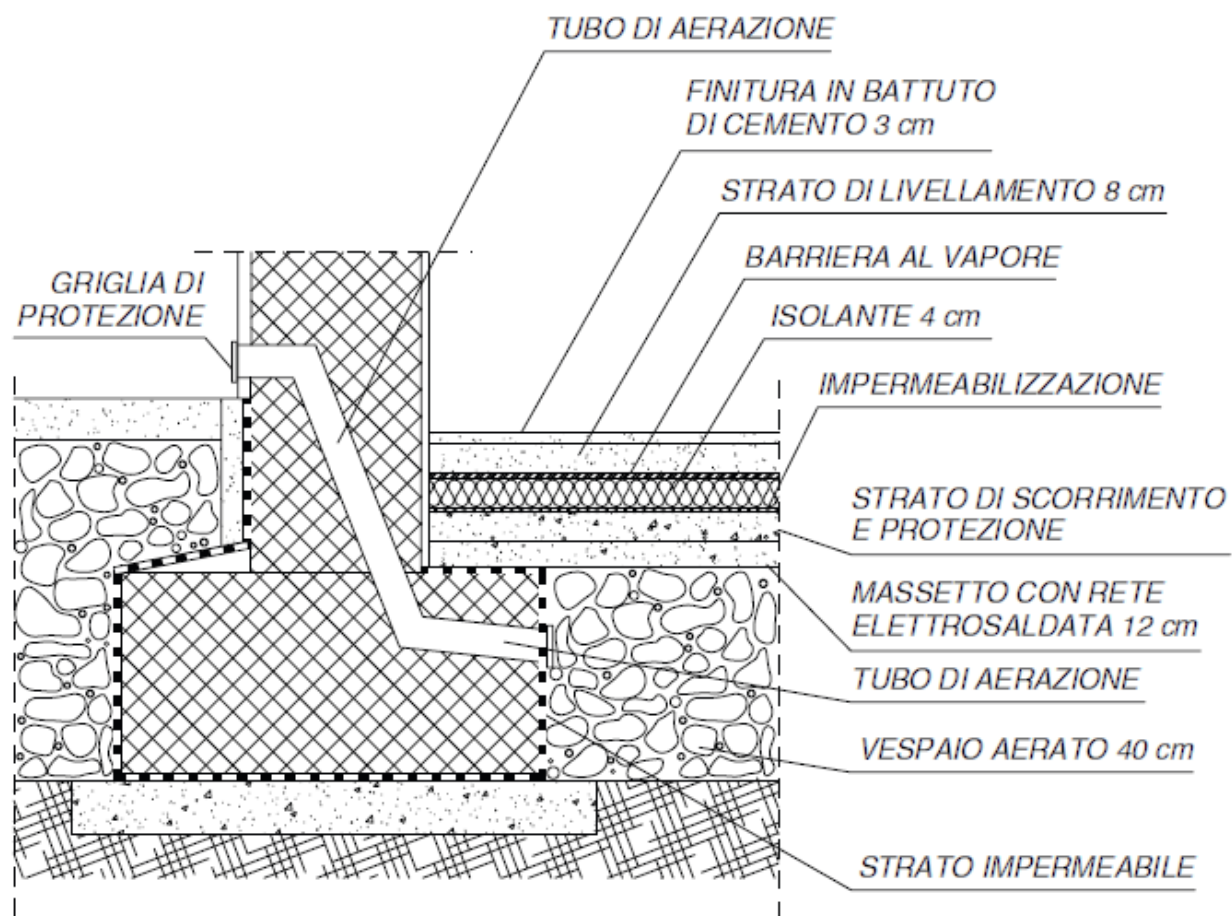
MONTANTI IN LEGNO



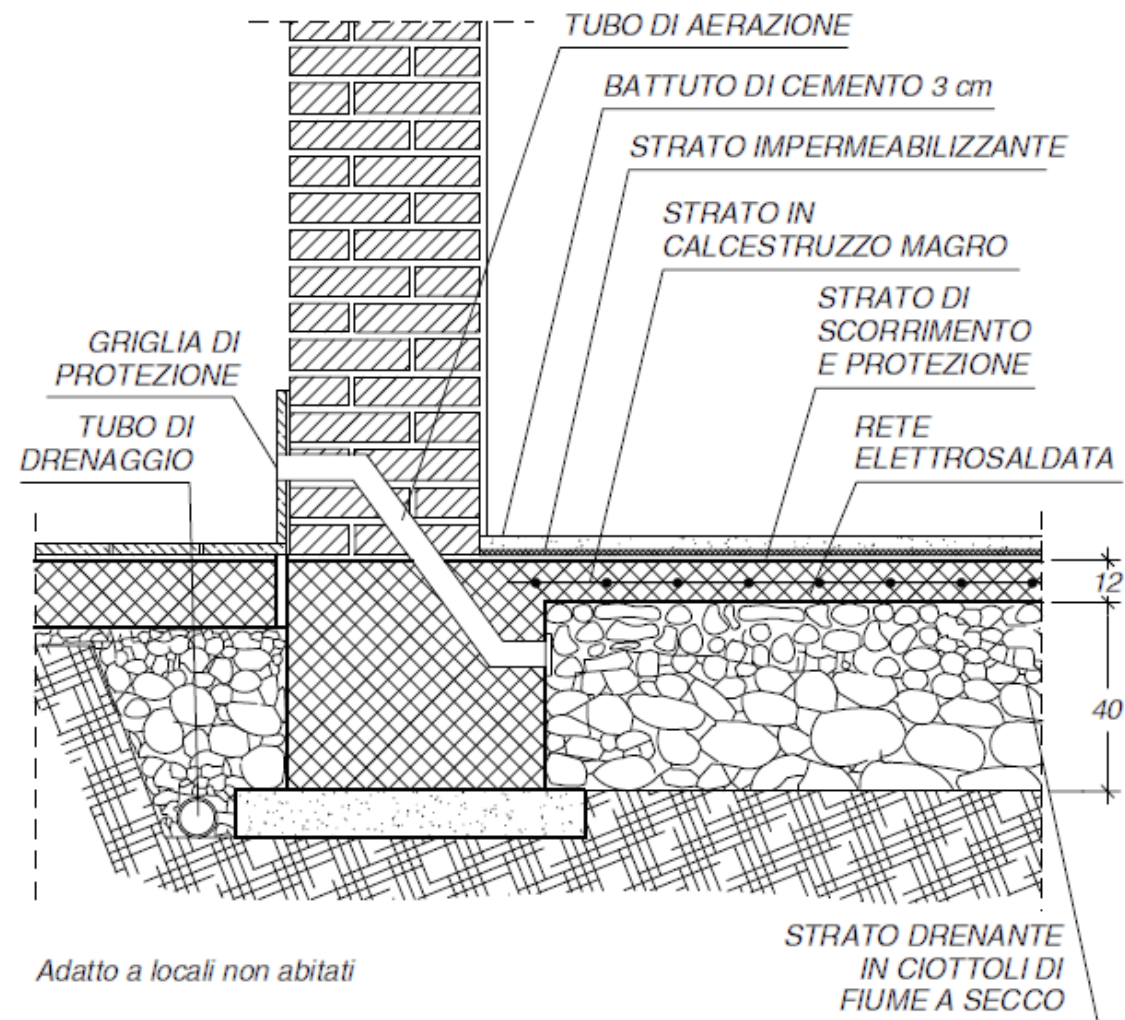
MONTANTI IN ACCIAIO



PARAMENTO
SPECIALE



Adatto a locali abitati

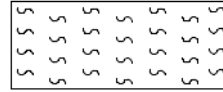


Adatto a locali non abitati

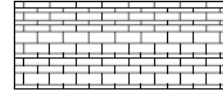
GRAPHICAL SYMBOLS FOR THE REPRESENTATION OF SOILS AND ROCKS



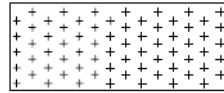
SABBIA LIEVEMENTE
CEMENTATA



LIMO



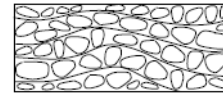
ARENARIE



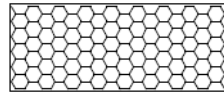
ROCCE IGNEE INTRUSIVE
(GRANITI, ECC.)



ARGILLA



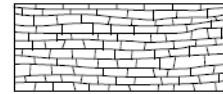
CONGLOMERATI



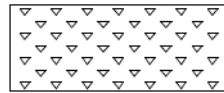
ROCCE IGNEE EFFUSIVE
(LAVE DI VARIO TIPO)



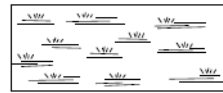
TORBA



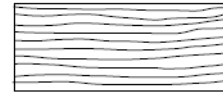
MARNE



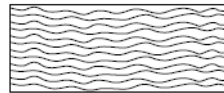
TUFFI VULCANICI



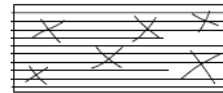
ARGILLA
ORGANICA



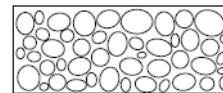
ARGILLE LAMINATE
ODINDURITE
(ARGILLITI)



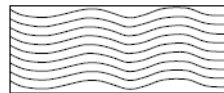
SCISTI CRISTALLINI
(MICASCISTI, FILLADI, ECC.)



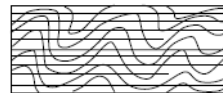
ARGILLA
CONSOLIDATA
FESSURATA



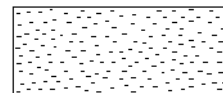
GHIAIA



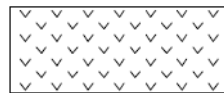
GNEISS



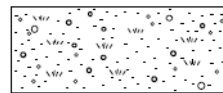
ARGILLE
SCAGLIOSE,
ARGILLOSCISTI



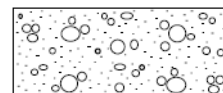
SABBIA



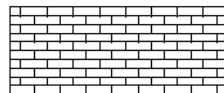
TERRENI PIROCLASTICI



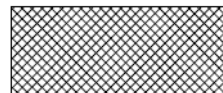
TERRENO
VEGETALE



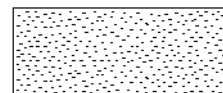
SABBIA E GHIAIA



ROCCE CALCAREE
(CALCARI, CALCARI
DOLOMITICI, DOLOMIE,
ECC.)



TERRENO
DI RIPORTO



SABBIA FINA

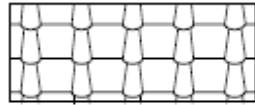
GRAPHICAL SYMBOLS FOR THE REPRESENTATION OF ROOFS MATERIALS

RAPP. 1:200 - 1:100

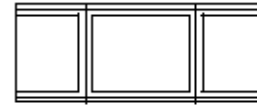
RAPP. 1:50 - 1:20

RAPP. 1:200 - 1:100

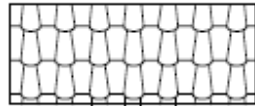
RAPP. 1:50 - 1:20



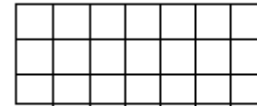
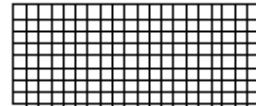
TEGOLE ALLA
ROMANA



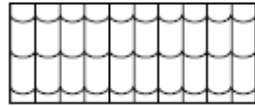
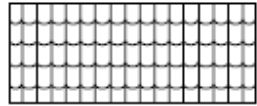
PANNELLI DI
VETRO CON
STRUTTURA
DI METALLO



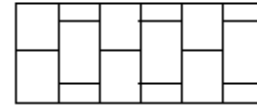
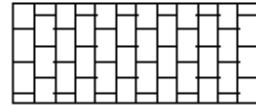
CANALI O
COPPI



TERRAZZA CON
PIASTRELLE DI
(GRANIGLIA,
GRES, ECC.)



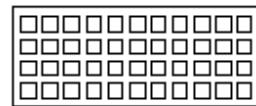
TEGOLE ALLA
MARSIGLIESE,
PORTOGHESE,
OLANDESE



TERRAZZA CON
LASTRE DI
MARMO



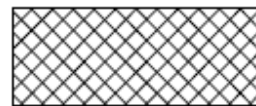
ETERNIT,
ONDULIT
E SIMILI



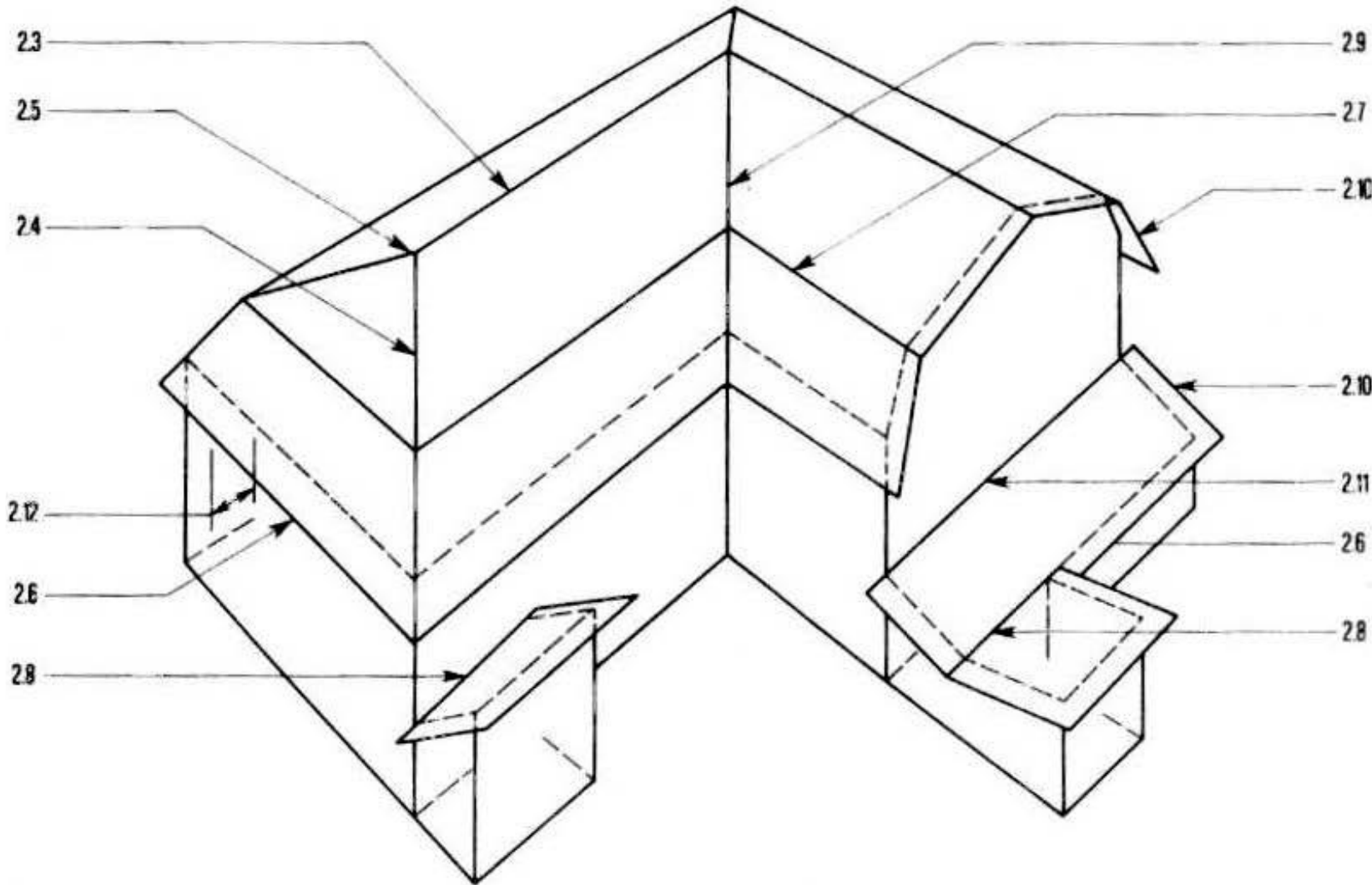
VETRO
CEMENTO



PANNELLI DI
LAMIERA
ZINCATA,
ALLUMINIO



ARDESIA -
LAVAGNA

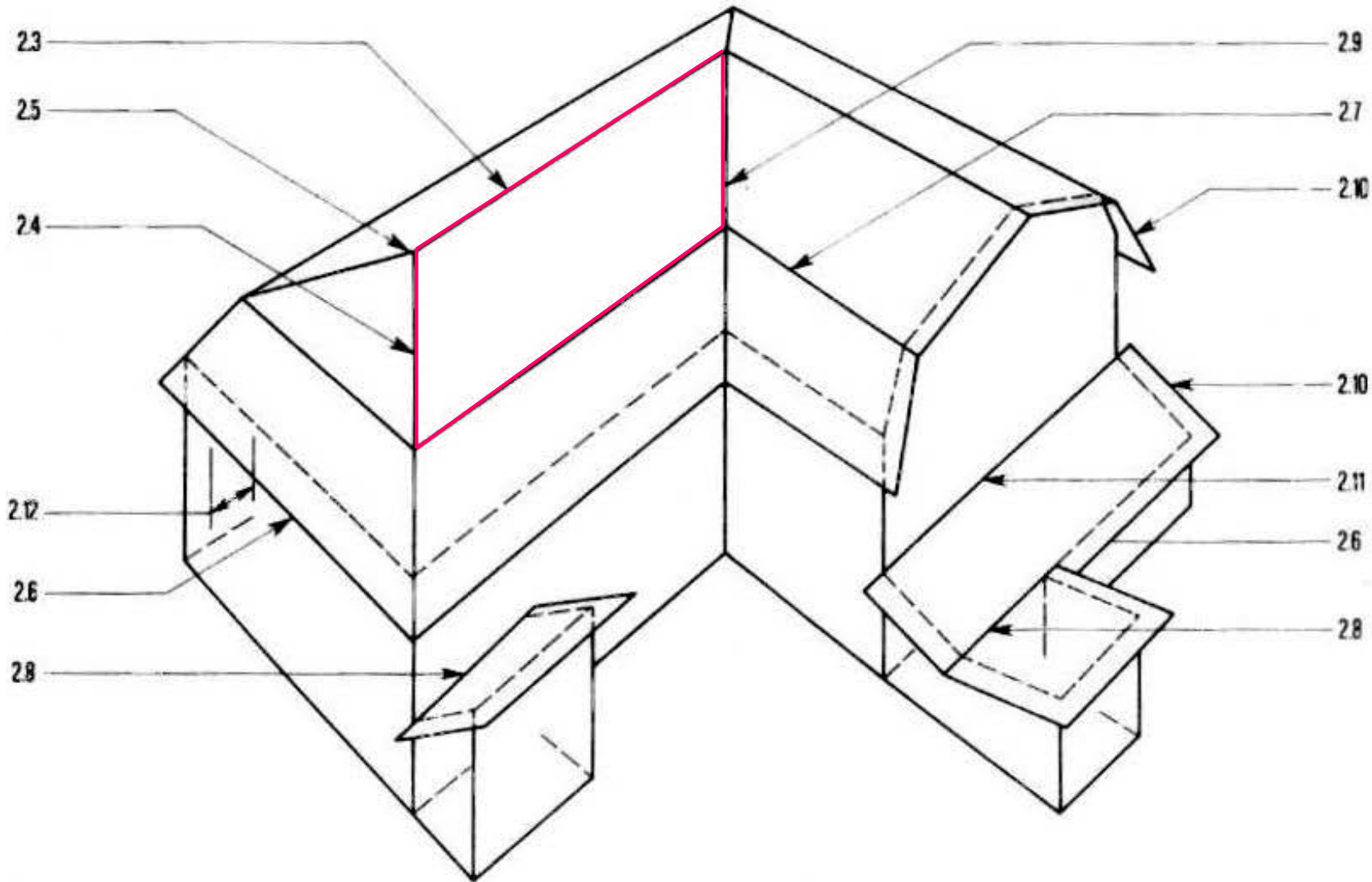


UNI 8091:1980

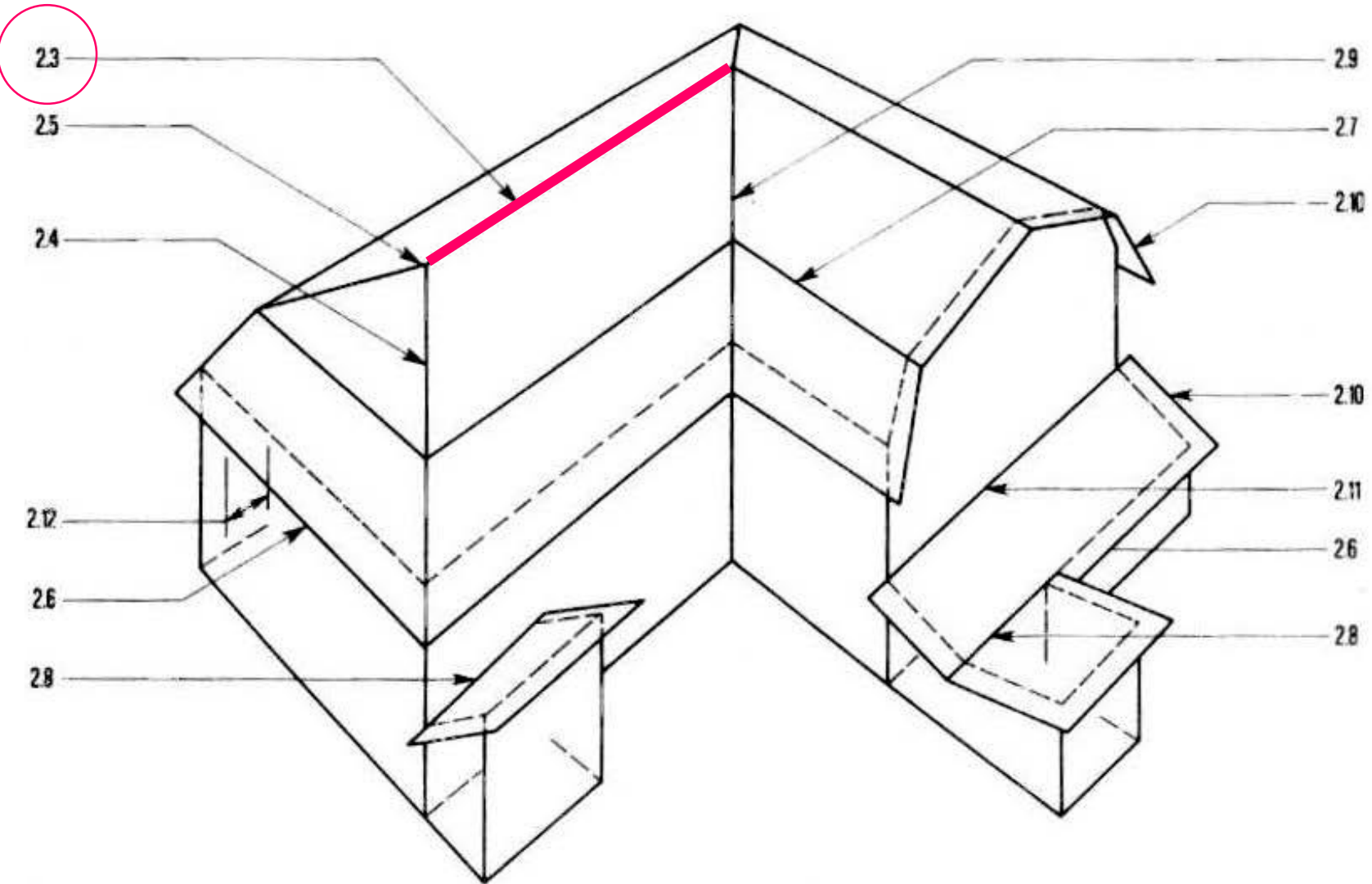
PROVIDES THE TERMINOLOGY
AND DEFINITION OF ROOFING
ELEMENTS:

2.1. ROOF SURFACE

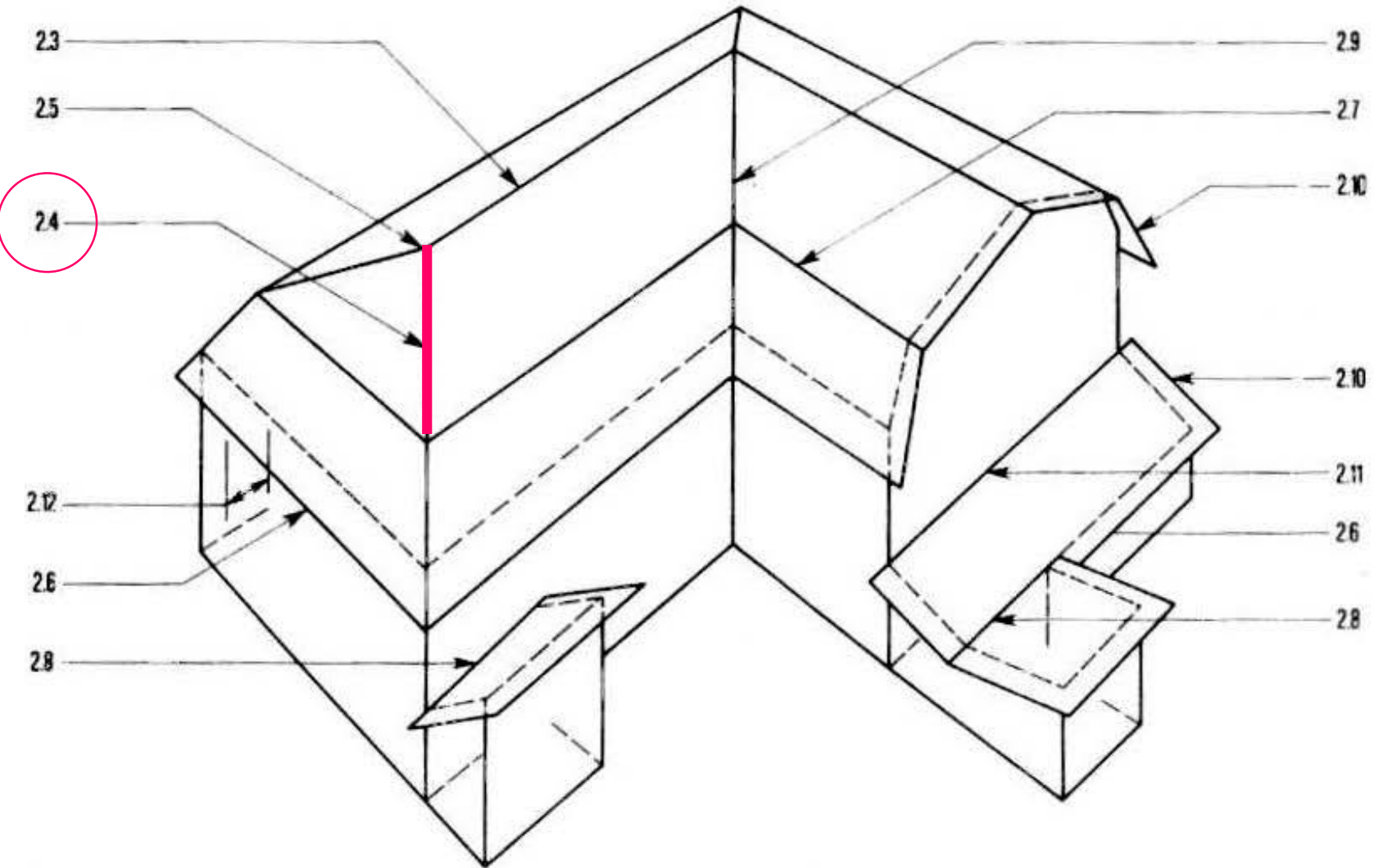
GEOMETRICALLY FLAT OR MORE
COMPLEX SURFACE EXPOSED
TO THE WEATHER



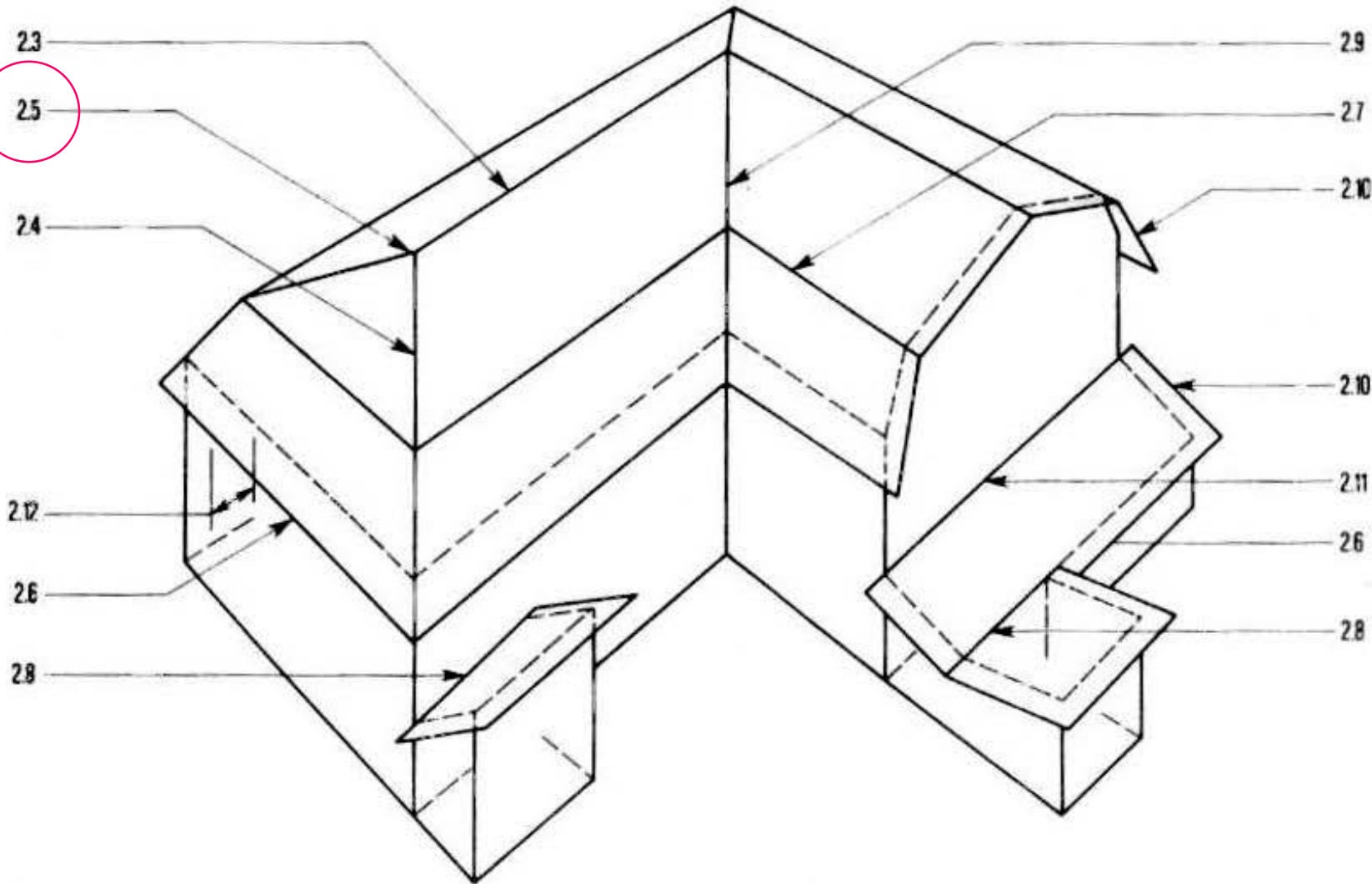
2.2 PITCH
SLOPING AND GEOMETRICALLY
FLAT SURFACE



2.3 HORIZONTAL RIDGE LINE
LINE, WITH PSEUDO-HORIZONTAL
ALIGNMENT, INTERSECTION OF
TWO SLOPING ROOF PLANES
HAVING OPPOSITE AND
DIVERGENT SLOPES.
IT PERFORMS THE FUNCTION
OF RAINWATER RUN-OFF.

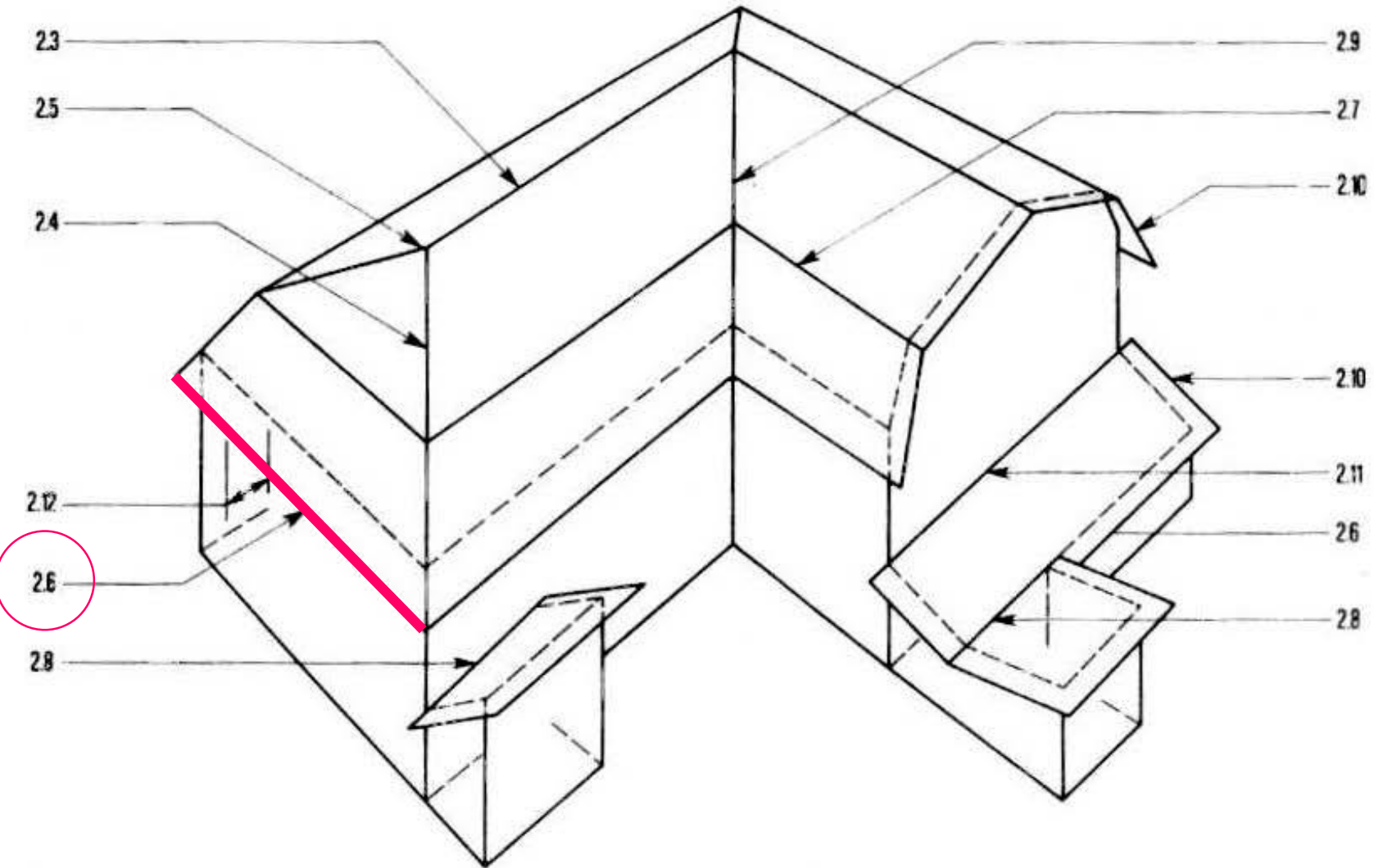


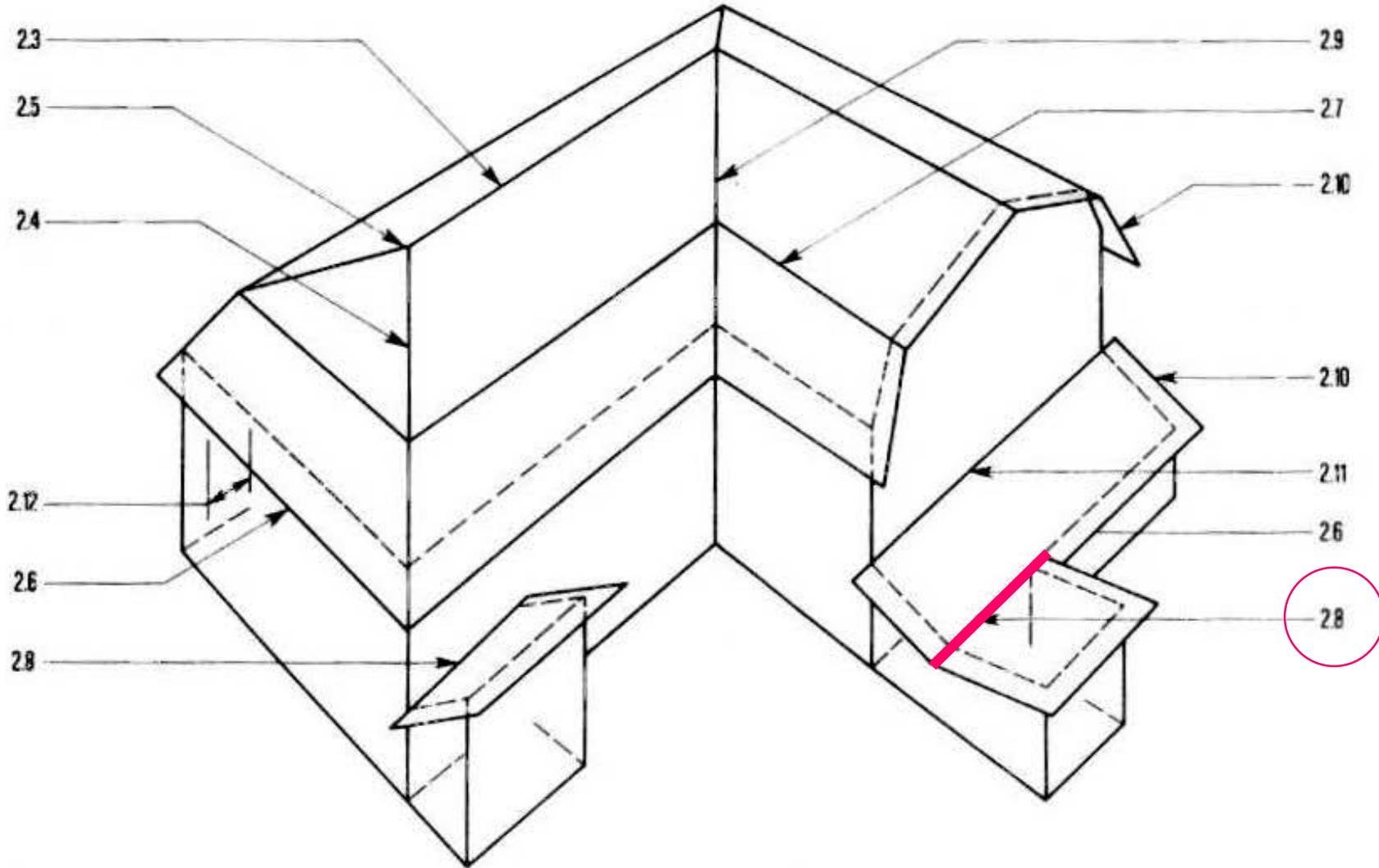
2.4 HIP LINE
SLOPING LINE, LATERAL
INTERSECTION OF TWO
CONTIGUOUS ROOF SURFACES,
NOT NORMAL TO THE LINES OF
MAXIMUM SLOPE.



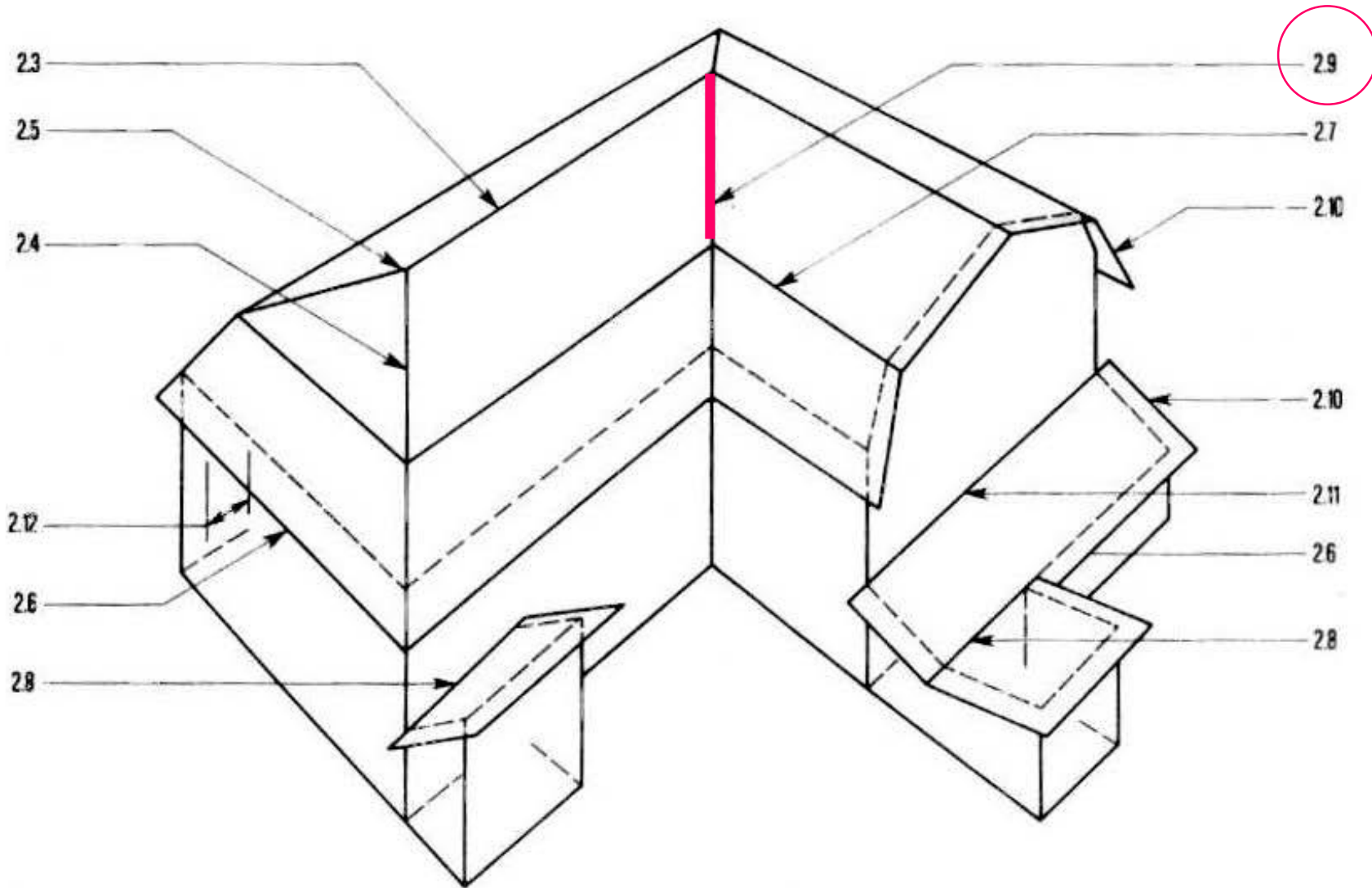
2.5 VERTEX
THE POINT OF INTERSECTION OF
THE HORIZONTAL AND/OR
SLOPING HIP LINES.

2.6 EAVE LINE
THE LOWER EDGE OF A
SLOPING ROOF



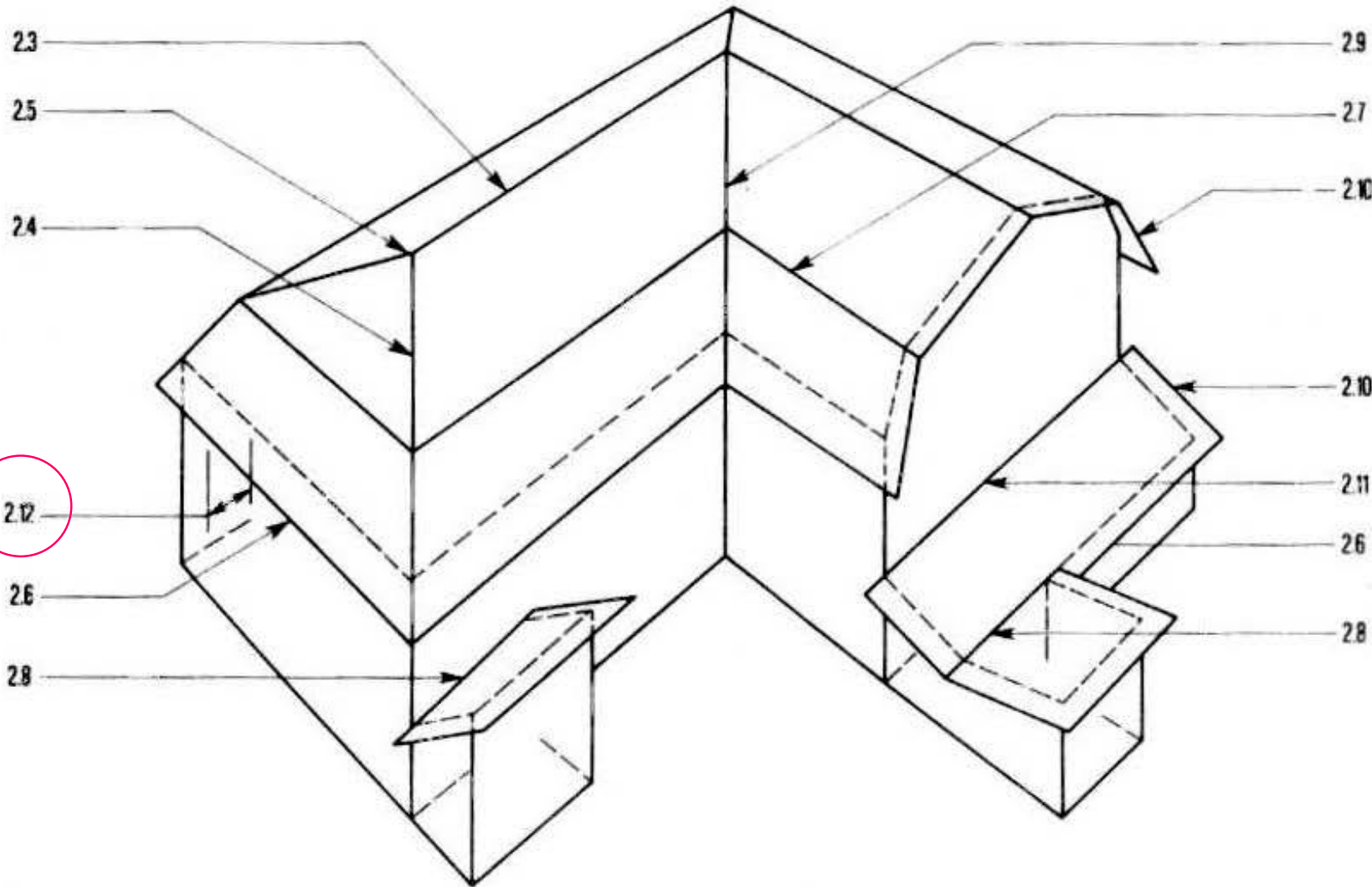


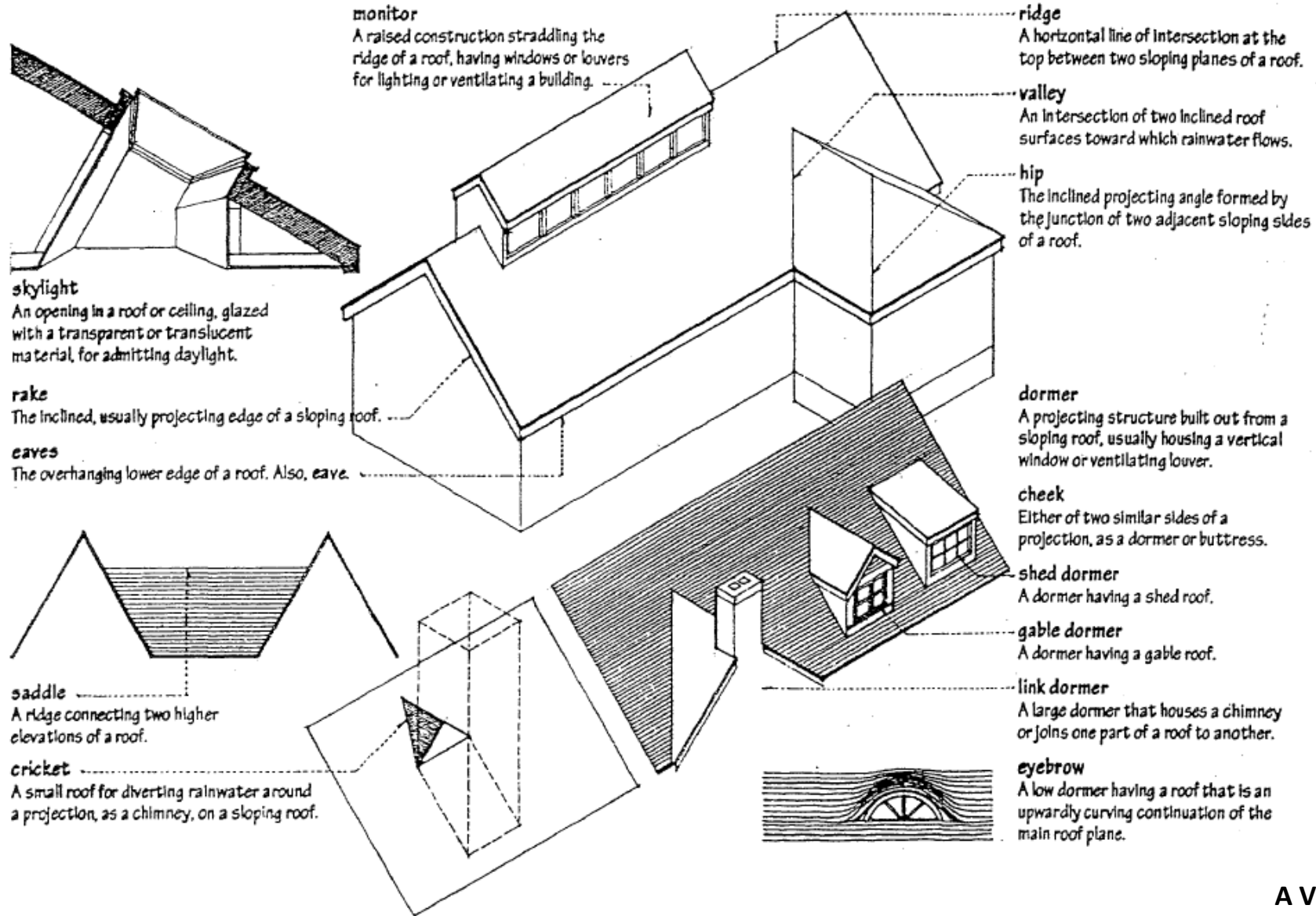
**2.8 HORIZONTAL «CONVERSE» LINE
PERFORMS THE FUNCTION OF
RAINWATER COMPLUVIUM.**



2.9 VALLEY LINE
IS CREATED WHERE TWO ROOF
SLOPES MEET. PERFORMS THE
FUNCTION OF RAINWATER
COMPLUVIUM.

2.12 ROOF OVERHANG
REFERS TO HOW MUCH THE EDGE
OF THE ROOF GOES BEYOND THE
HOUSE SIDING





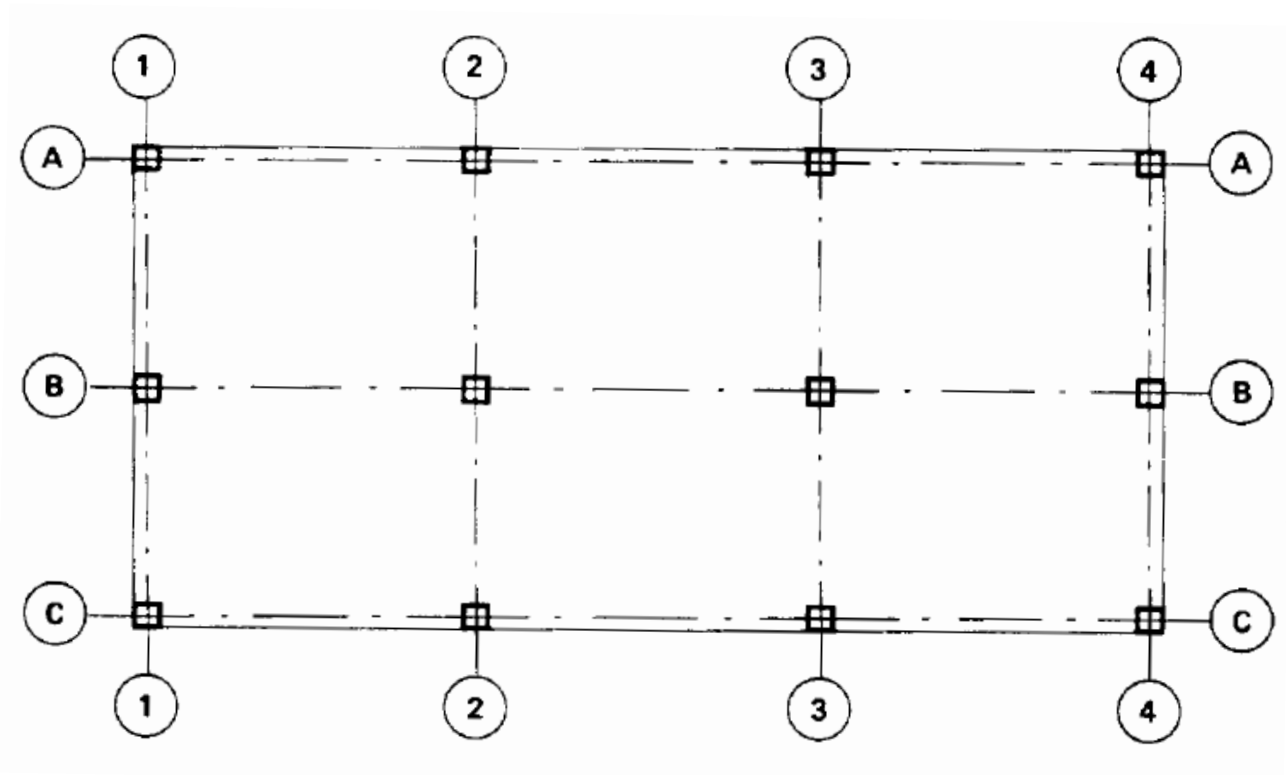
FRANCIS D.K. CHING,
A Visual Dictionary of Architecture

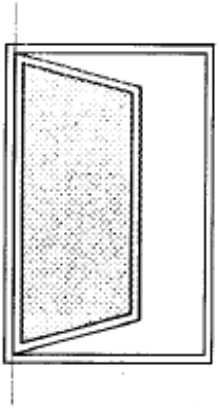
A **REFERENCE LINE** SHOULD BE REPRESENTED WITH A CONTINUOUS LINE; HOWEVER, WHEN NECESSARY FOR CLARITY, THE LINE MAY BE REPRESENTED WITH A **MIXED LINE**.

REFERENCE LINES MUST, IF NECESSARY FOR THEIR IDENTIFICATION, TERMINATE WITH ONE OR TWO **CIRCLES** DRAWN AT THE ENDS OF THE REFERENCE LINE.

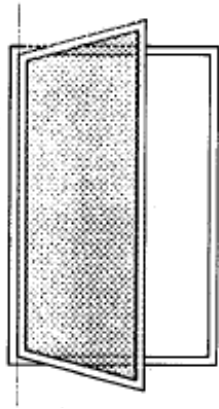
ON THE ORDINATES:
PROGRESSIVE SERIES BASED ON **LETTERS**.

ON THE ABSCISSAS:
PROGRESSIVE SERIES BASED ON **NUMBERS**.

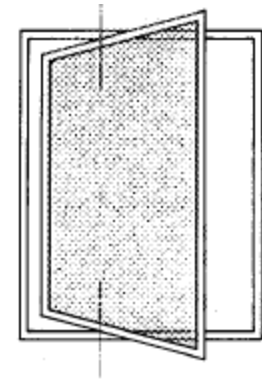
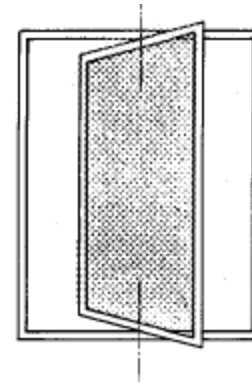




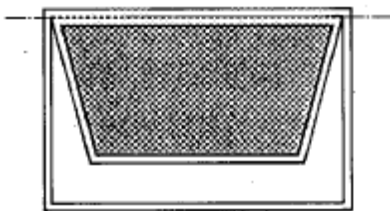
APERTURA ALL'INGLESE



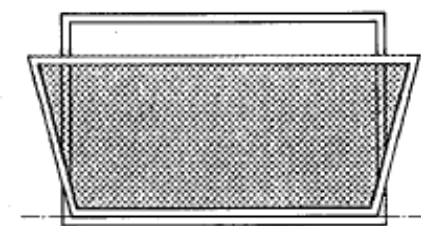
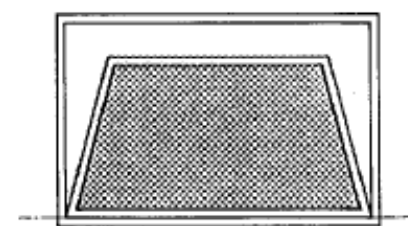
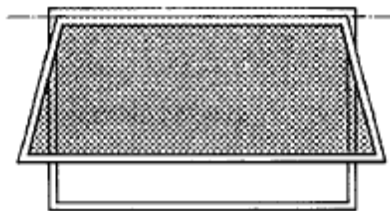
APERTURA ALLA FRANCESE



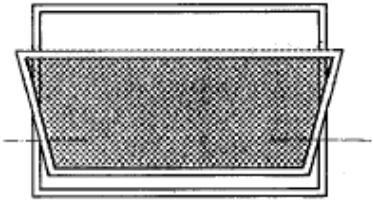
APERTURE GIREVOLI



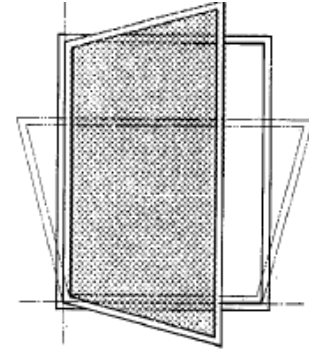
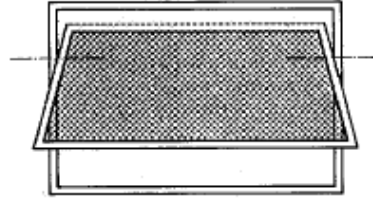
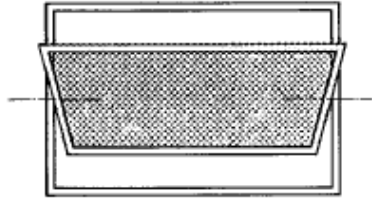
APERTURA A VISIERA ESTERNA/INTERNA



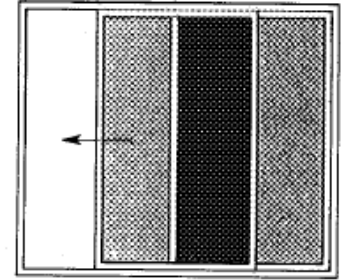
APERTURA A VASISTAS ESTERNO/INTERNO



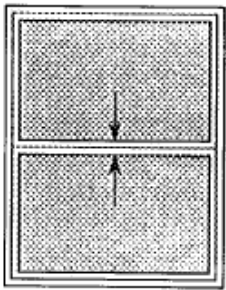
APERTURE A BILICO



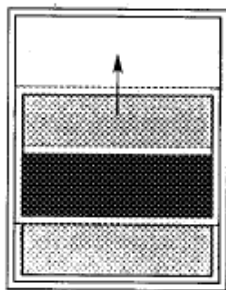
APERTURA OSCILLOBATTENTE



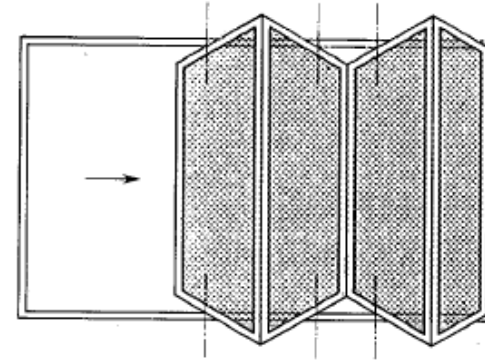
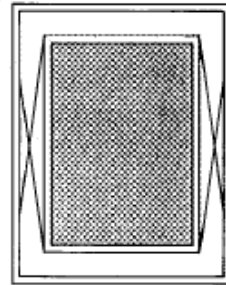
APERTURA SCORREVOLE



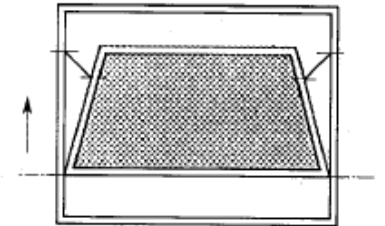
APERTURE SALISCENDI



APERTURA A PANTOGRAFO



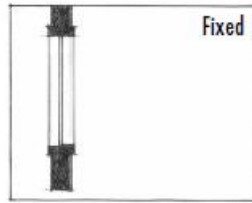
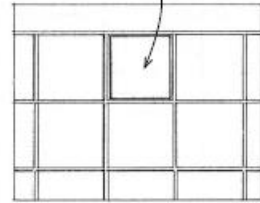
APERTURA A FISARMONICA



APERTURA BASCULANTE

WINDOW OPERATION

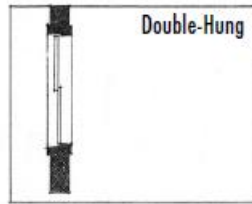
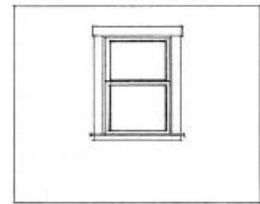
Glazing refers to the panes or sheets of glass set in the frame of a window.



Fixed

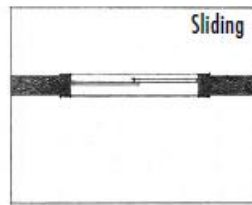
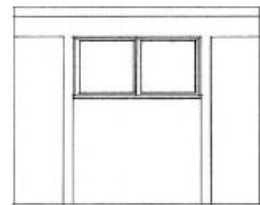
Windows can be categorized into two major groups: fixed and ventilating. Fixed windows cannot be opened and are often used in interiors. Both groups provide interior spaces with light and views, but fixed windows do not allow for the passage of air, as do ventilating windows, which can be opened and closed.

- Frame and glazed sash are stationary.
- No ventilation is possible.
- Hardware or screens are not required.
- Varied sizes and shapes are possible.



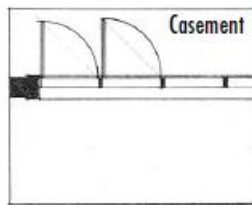
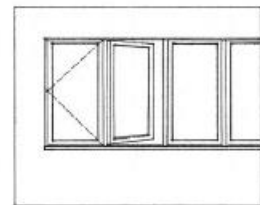
Double-Hung

- Two sashes travel vertically in separate tracks or grooves and are held in the desired position by friction or a balancing device.
- No rain protection is provided.
- Can be weatherproofed effectively.
- May be screened on outside.
- Provide maximum 50% ventilation.
- Difficult to paint and clean without pivoting sash.



Sliding

- May consist of either two sashes, of which one slides horizontally (50% ventilation), or three sashes, of which the middle is fixed while the other two slide (66% ventilation).
- No rain protection is provided.
- Screened on exterior.
- Sliding patio doors are similar to large sliding windows.



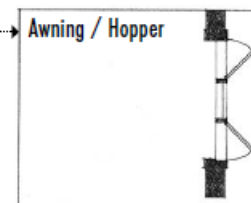
Casement

- Operating sash is side-hinged and usually swings outward.
- Provide 100% ventilation; can direct or deflect breezes.
- No rain protection.
- Projecting sash can be an obstruction.

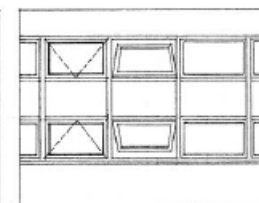
WINDOW OPERATION

Building codes regulate the minimum size of window openings that provide natural lighting and ventilation for habitable spaces, as well as the size of operable windows that serve as emergency exits from residential sleeping spaces.

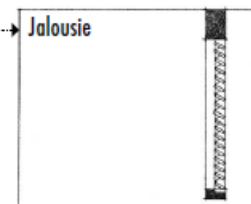
- Similar to casements but hinged at top (awning) or bottom (hopper).
- Provide 100% draft-free ventilation.
- Awning windows provide some rain protection.
- May be difficult to weatherproof.
- Require space for swing of sash.



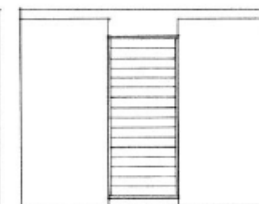
Awning / Hopper



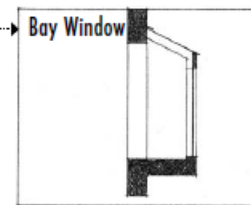
- Similar to awning windows, but with a series of narrow opaque or translucent strips.
- Able to direct flow of incoming air.
- Difficult to clean and weatherproof.
- Used for ventilation along with privacy.



Jalousie



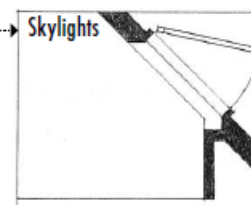
- Use a combination of fixed and operable windows and skylights.
- Project a portion of interior space outward into the surrounding landscape.



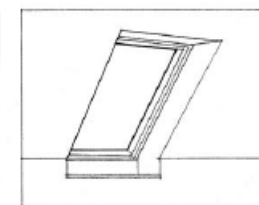
Bay Window

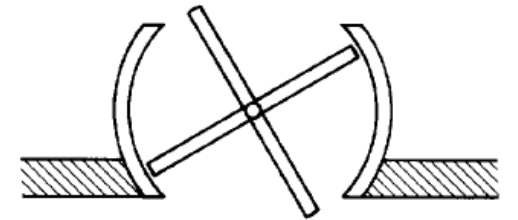
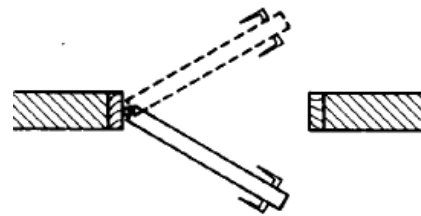
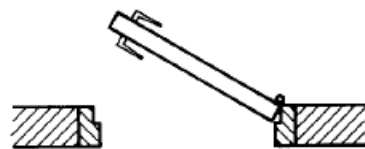
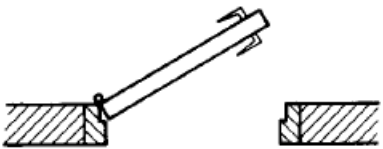
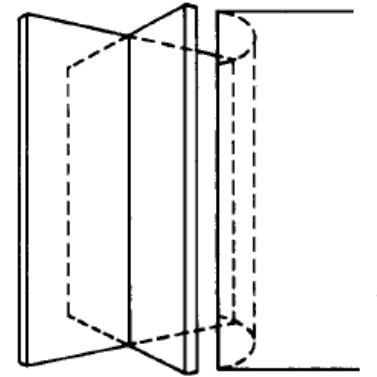
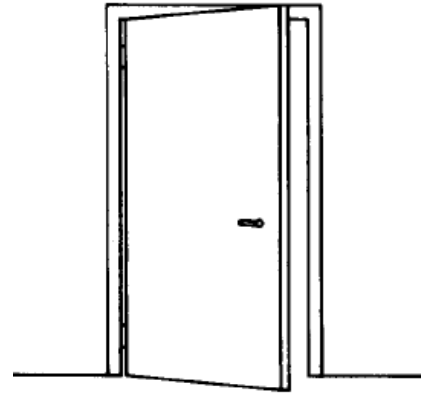
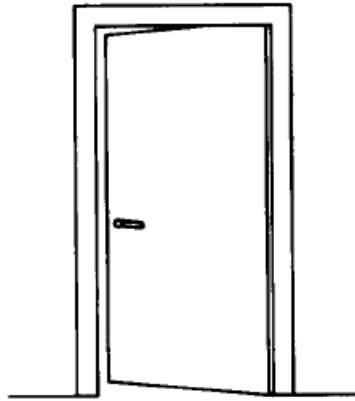
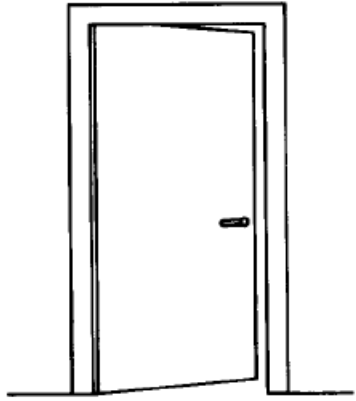


- May consist of fixed or ventilating units.
- Safety glazing is required.
- Provide daylighting.
- Ventilating skylights allow rising hot air to escape in warm weather.



Skylights



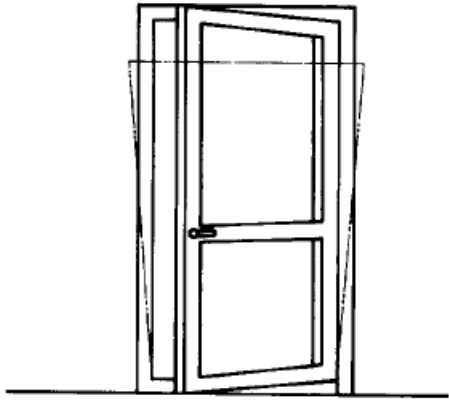


PORTA A ROTAZIONE (SINISTRA)

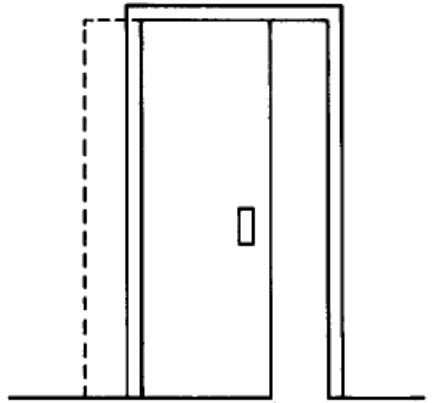
PORTA A ROTAZIONE (DESTRA)

PORTA A VENTOLA

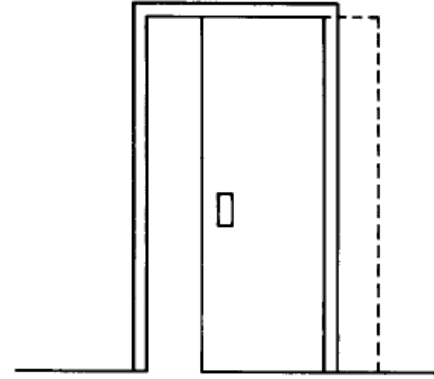
PORTA A TAMBURO



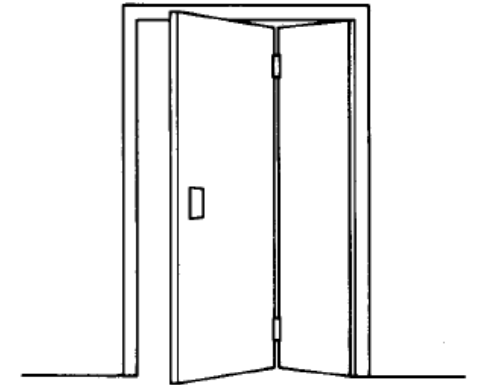
PORTA OSCILLOBATTENTE



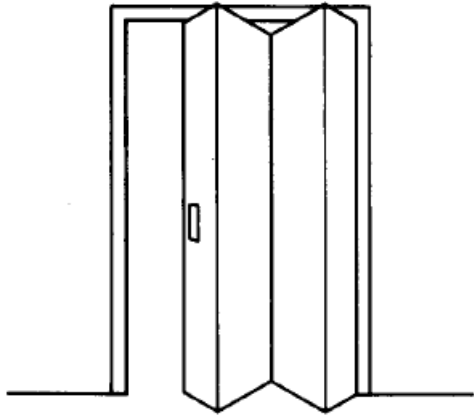
**PORTA SCORREVOLE
APPLICATA ALLA PARETE**



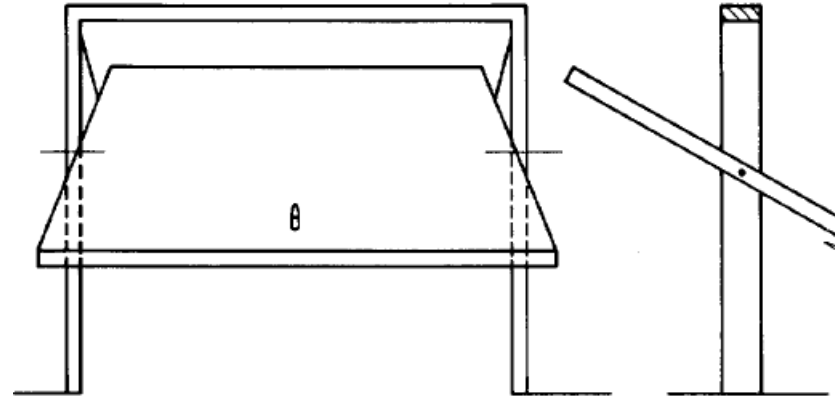
**PORTA SCORREVOLE
A SCOMPARSA**



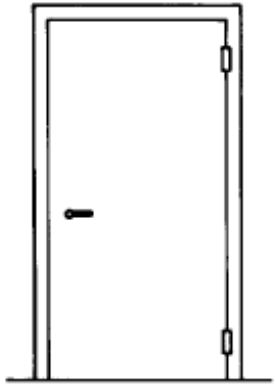
PORTA RIPIEGABILE



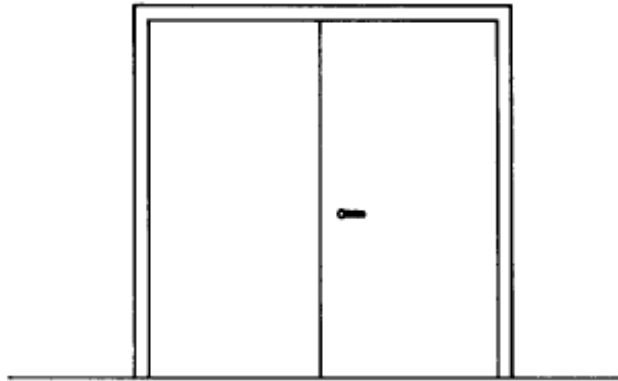
PORTA A FISARMONICA



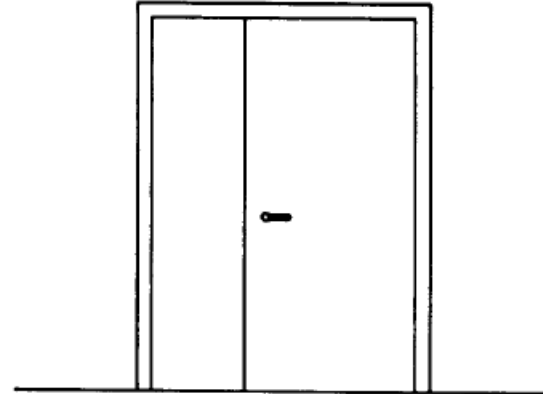
PORTA BASCULANTE



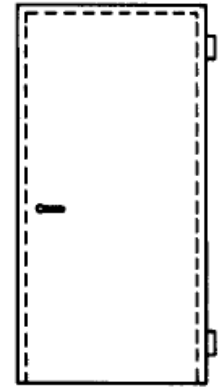
PORTA AD UNA ANTA



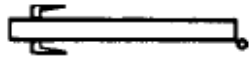
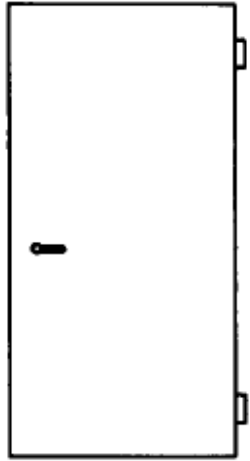
PORTA A 2 ANTE UGUALI



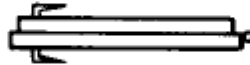
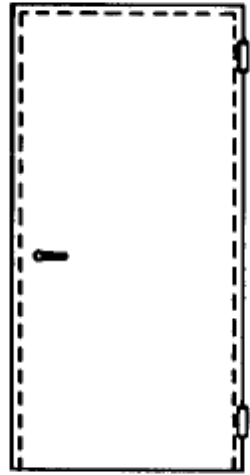
PORTA A 2 ANTE DIFFERENTI



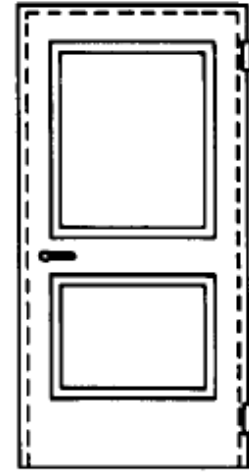
ANTA CON COPRIBATTUTA



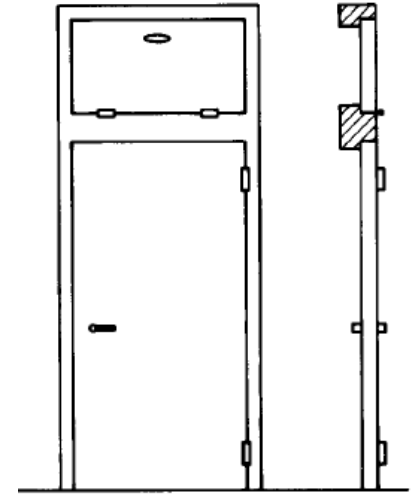
PORTA SENZA COPRIBATTUTA



ANTA PIANA



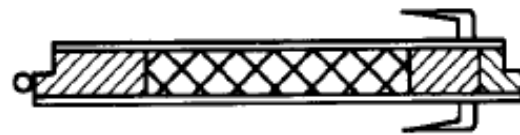
ANTA CON 2 RIQUADRI



PORTA CON SOVRAPPORTA



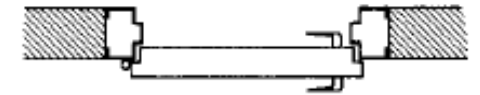
ANTA INTELAIATA



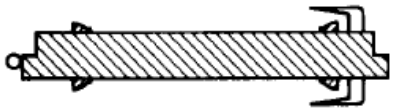
ANTA TAMBURATA



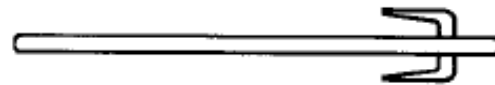
TELAIO FISSO ACCOSTATO



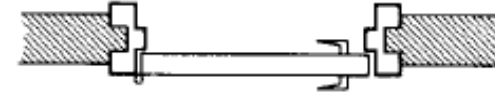
TELAIO FISSO



ANTA PIANA CON CORNICI
SOVRAPPOSTE



ANTA A LASTRA

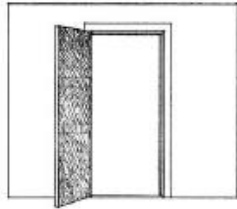


TELAIO FISSO AVVOLGENTE



TELAIO FISSO AVVOLGENTE

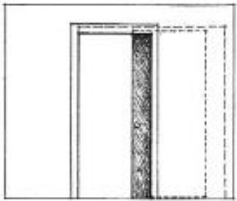
In addition to their design and construction, doors may be categorized according to the way they operate.



Swinging



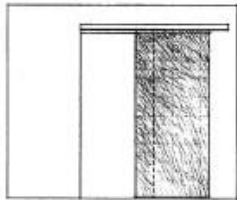
- Hinged on side jamb.
- Heavy or wide doors may pivot at head and sill.
- Most convenient for our entry and passage.
- Most effective type for isolating sound and for weathertightness.
- For exterior and interior use.
- Requires space for swing.



Pocket Sliding



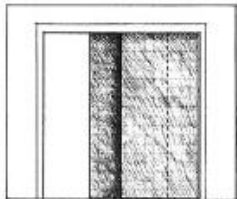
- Door is hung on track, and slides into pocket within width of wall.
- Used where normal door swing would interfere with use of space.
- Presents a finished appearance when open.
- For interior use only.



Surface Sliding



- Similar to pocket door, except that door is surface-hung from an exposed overhead track.
- Primarily for interior use.
- Difficult to weatherproof.



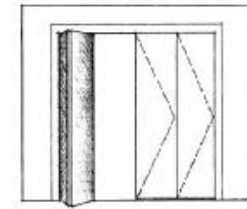
Bypass Sliding



- Doors slide along an overhead track and along guides or a track on the floor.
- Opens only to 50% of doorway.
- Used indoors primarily for visual screening.
- Used on the exterior as sliding glass doors.

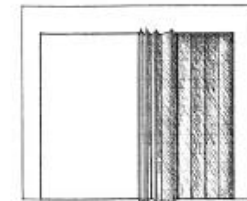
- Consists of hinged door panels that slide on an overhead track.
- For interior use only.
- Commonly used as a visual screen to close off storage and closet spaces.

Bifold



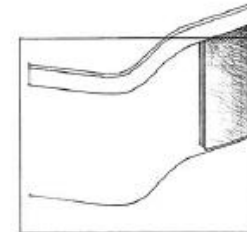
- Similar to bifold doors, except that panels are smaller.
- For interior use only.
- Used to subdivide large spaces into smaller rooms.

Accordion Folding



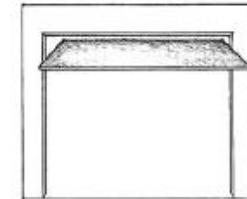
- Door panels slide on overhead tracks.
- Tracks can be configured to follow a curvilinear path.
- Panels can be stored in pocket or recess.
- For interior use.
- Exterior folding glass doors are available.

Special Folding



- Consist of hinged door sections that roll upward on an overhead track.
- Capable of closing off unusually tall or wide openings for exterior or interior use.
- Not for frequent use.

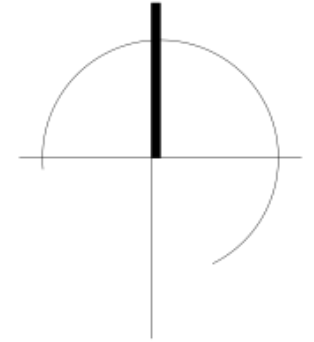
Overhead Doors



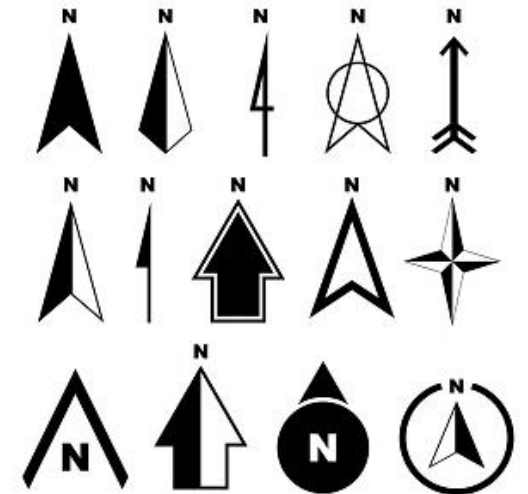
ARCHITECTURAL DRAWINGS - DIMENSIONS

ARCHITECTURAL DRAWINGS MUST BE DIMENSIONED.
THE FOLLOWING INFORMATION MUST BE PROVIDED:

- PLANIMETRIC DIMENSIONS;
- ELEVATION DIMENSIONS;
- SECTION PLANES REFERENCES;
- INDICATION OF NORTH;
- INDICATIONS OF THE USE OF EACH ROOM, ITS AREA AND THE AIR-TO-LIGHT RATIO (R.A.I.).



NORTH SYMBOLS



ARCHITECTURAL PLANS - PLAN DIMENSIONS

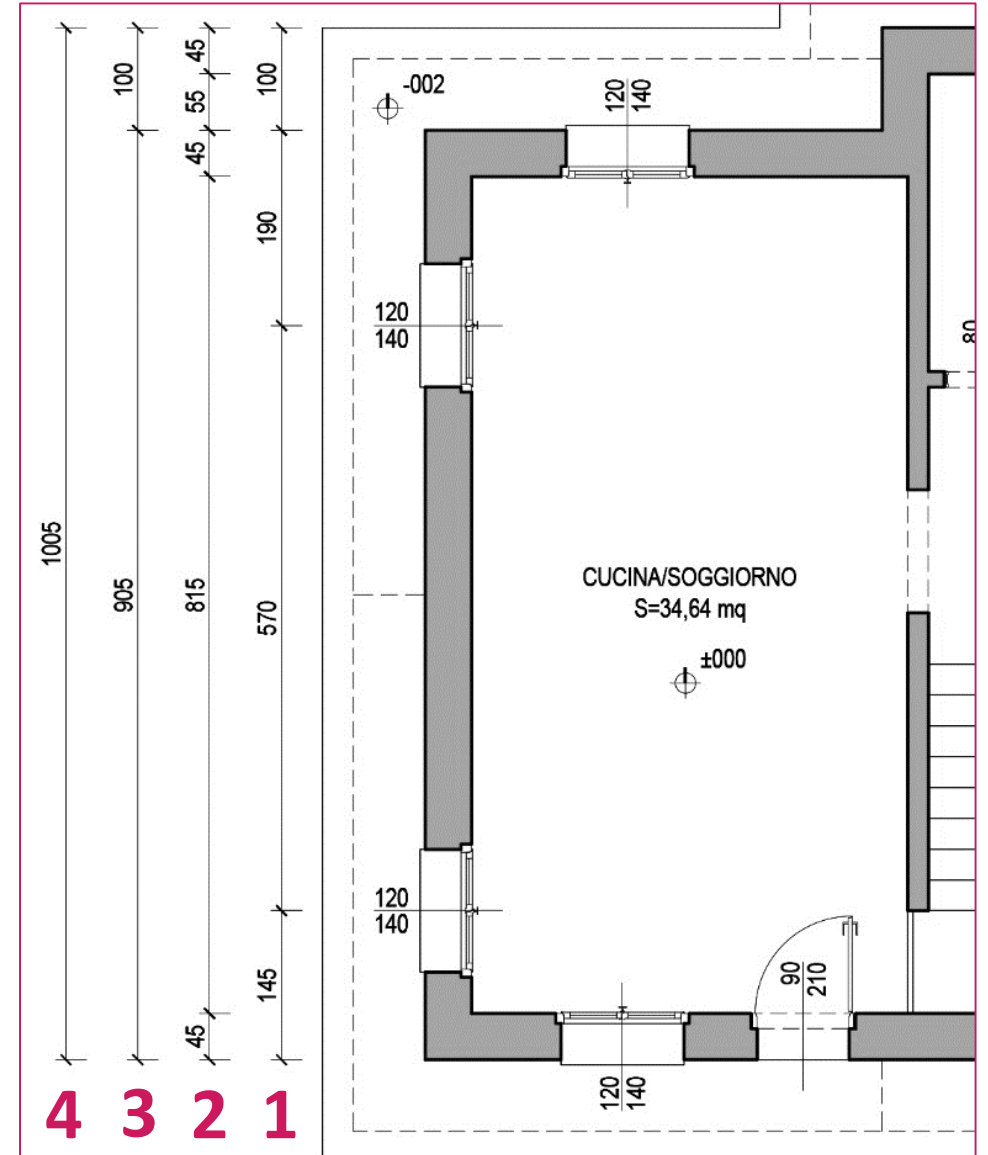
FOUR LEVELS OF DIMENSIONS:

- 1 – DOORS AND WINDOWS SPACING (INTERASSE SERRAMENTI);
- 2 – FULL AND EMPTY (PIENI E VUOTI);
- 3 – FACADES LENGTH (INGOMBRO VOLUMI);
- 4 – TOTAL LENGTH OF ELEVATION (TOTALE).

IN THE CASE WHERE THE BUILDING CONSISTS OF A SINGLE VOLUME, THE DIMENSIONING LEVELS REMAIN THREE.

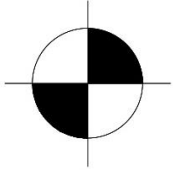
THE DIMENSIONS ARE CARRIED OUT ON ALL FOUR SIDES OF THE BUILDING.

PLANIMETRIC DIMENSIONS MAY BE EXPRESSED IN **CENTIMETRES** OR IN METRES.



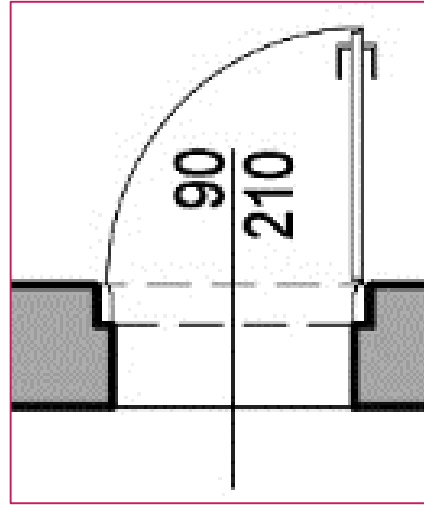
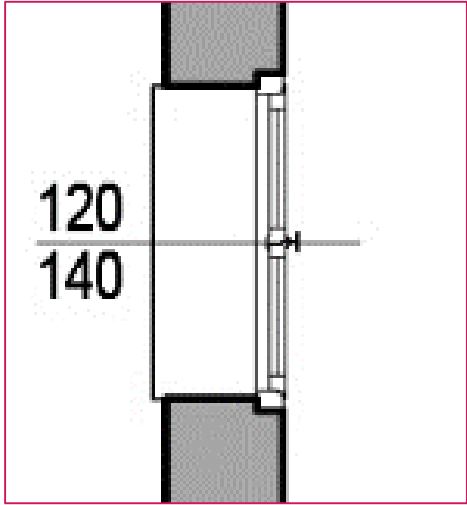
ARCHITECTURAL PLANS - ELEVATION DIMENSIONS - DOOR AND WINDOWS DIMENSIONS

SYMBOL:



±000

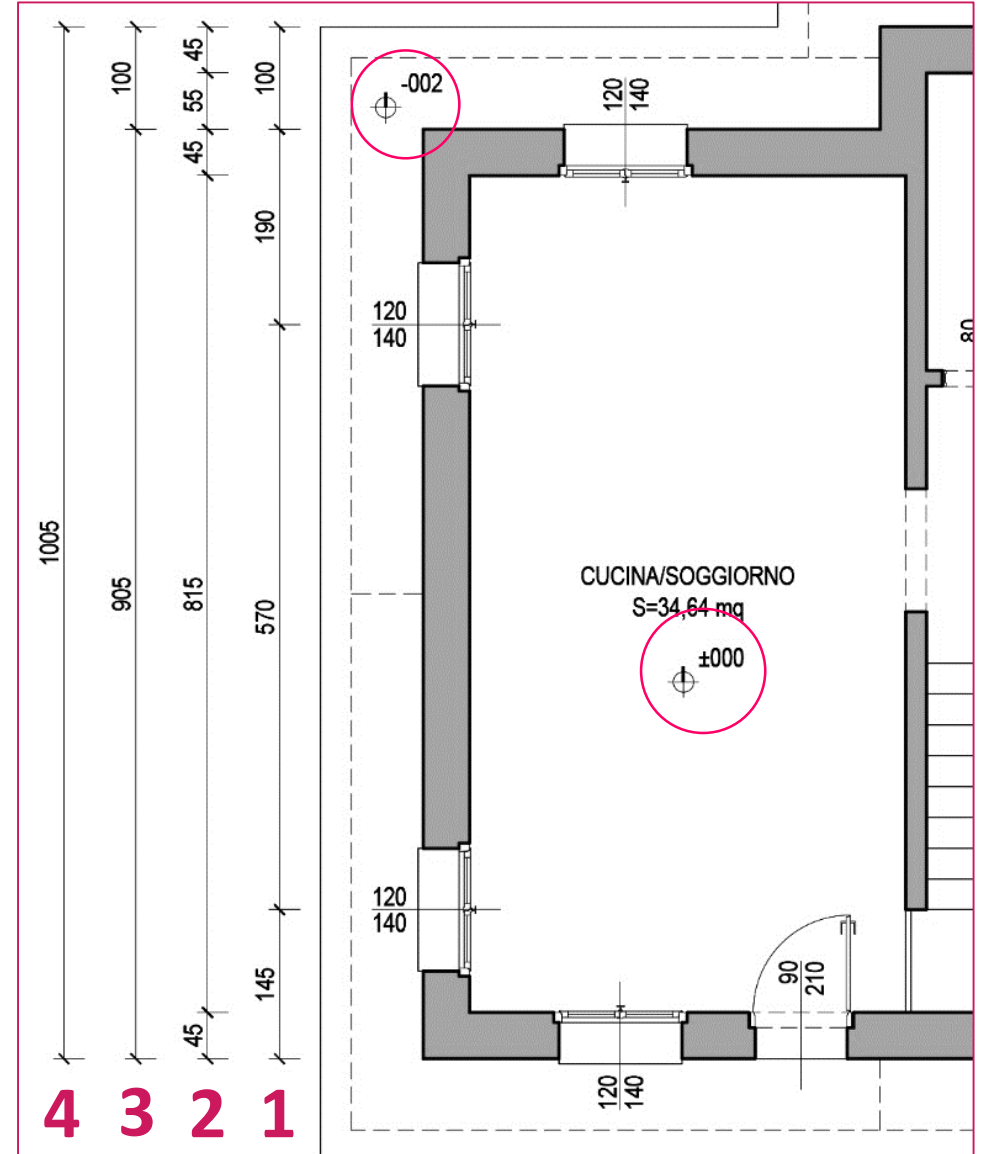
+310



ABOVE: WINDOW/DOOR WIDTH (net)

BELOW: WINDOW/DOOR HEIGHT (net)

DOOR AND WINDOWS DIMENSIONS ARE EXPRESSED IN CM.



DRAWING SYMBOLS

	DOOR NUMBER
	WINDOW NUMBER
	WALL TYPE NUMBER
	ELEVATION MARK
	REVISION NUMBER
	ROOM NAME & NUMBER

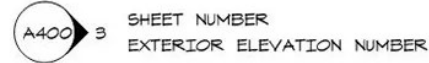
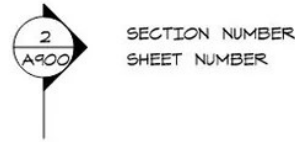
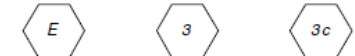


FIG: A.1.4./2 SIMBOLI GRAFICI DI DESIGNAZIONE E CORRELAZIONE – AMBITO EDILIZIO

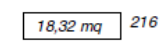
SIMBOLI DI DESIGNAZIONE DELLE FINESTRE
LETTERE E/O NUMERI INTERNI
INDICANO DESIGNAZIONI ADDIZIONALI DI TIPO



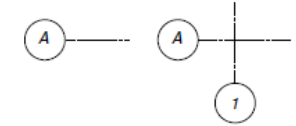
SIMBOLI DI DESIGNAZIONE DELLE PORTE
LETTERE E/O NUMERI INTERNI
INDICANO DESIGNAZIONI ADDIZIONALI DI TIPO



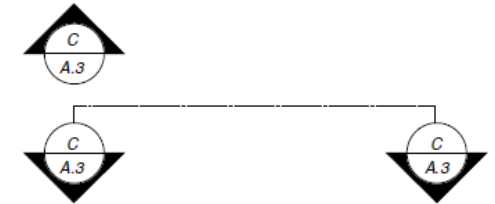
SIMBOLI DI DESIGNAZIONE DEI VANI
LA MISURA INTERNA RIPORTA LA SUPERFICIE
IL NUMERO ESTERNO DESIGNA IL VANO



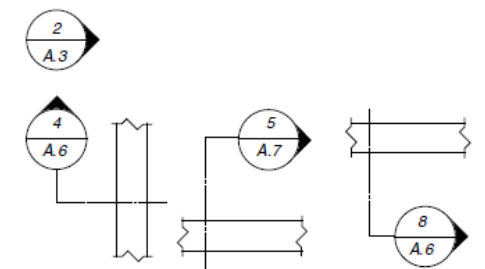
SIMBOLI DI DESIGNAZIONE DELLA GRIGLIA STRUTTURALE
LETTERE E NUMERI INTERNI DESIGNANO LE POSIZIONI
DEGLI ELEMENTI (PILASTRI, SETTI, ECC.)



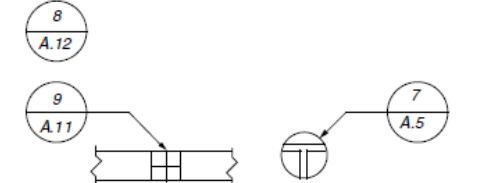
SIMBOLI DI DESIGNAZIONE DEI PIANI DI SEZIONE
LETTERE O NUMERI INTERNI SUPERIORI DESIGNANO
LA SEZIONE
LETTERE E NUMERI INFERIORI SONO DI CORRELAZIONE
CON GLI ELABORATI DI PROGETTO DI PERTINENZA:
NELL'ESEMPIO, E' DESIGNATA LA SEZIONE C,
RAPPRESENTATA NELLA TAV. A.3



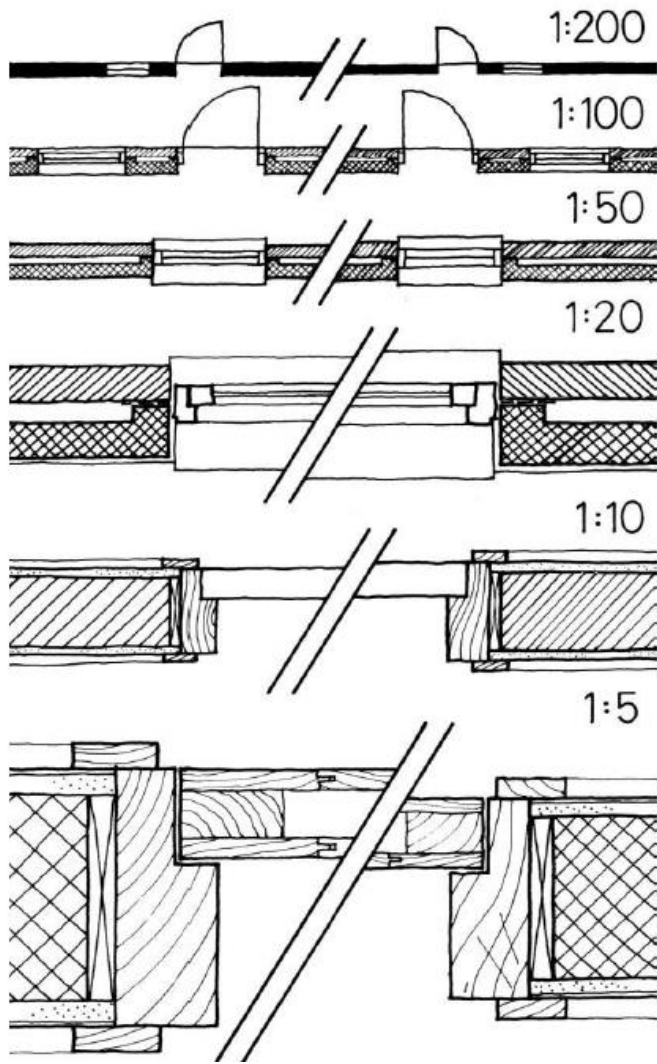
SIMBOLI DI DESIGNAZIONE DEI PARTICOLARI
LETTERE O NUMERI INTERNI SUPERIORI
DESIGNANO IL PARTICOLARE SVILUPPATO
LETTERE E NUMERI INFERIORI SONO DI CORRELAZIONE
CON GLI ELABORATI DI PROGETTO DI PERTINENZA:
NELL'ESEMPIO, SONO DESIGNATI I PARTICOLARI DI
SEZIONI DELLE MURATURE 4, 5, 8,
RAPPRESENTATI RISPETTIVAMENTE NELLE TAV. A.6, A.7.



SIMBOLI DI DESIGNAZIONE DEI DETTAGLI
LETTERE O NUMERI INTERNI SUPERIORI
DESIGNANO IL DETTAGLIO SVILUPPATO
LETTERE E NUMERI INFERIORI SONO DI CORRELAZIONE
CON GLI ELABORATI DI PROGETTO DI PERTINENZA:
NELL'ESEMPIO, SONO DESIGNATI I DETTAGLI 7, 9,
RAPPRESENTATI RISPETTIVAMENTE NELLE TAV. A.5, A.11

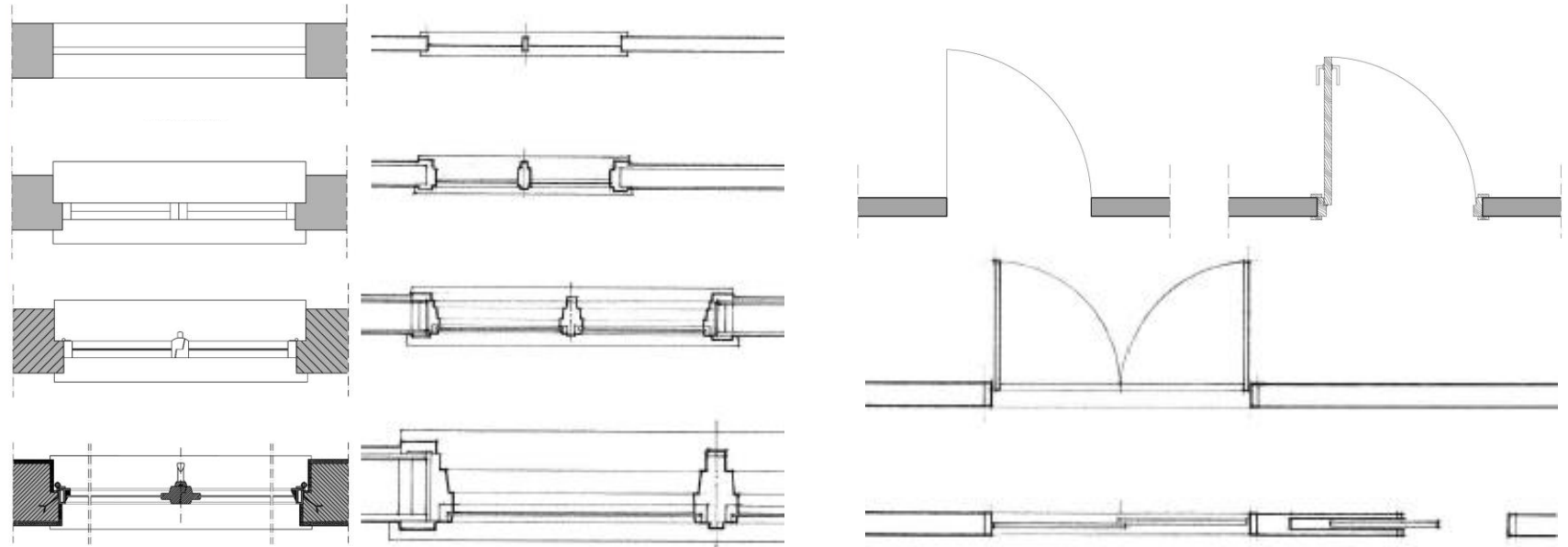


ARCHITECTURAL PLANS - DOORS AND WINDOWS



THE SCALE OF REPRESENTATION INFLUENCES THE DETAIL OF THE OBJECT REPRESENTED.

THE GREATER THE SCALE RATIO, THE GREATER THE NUMBER OF PARTS REQUIRED FOR THE DRAWING.



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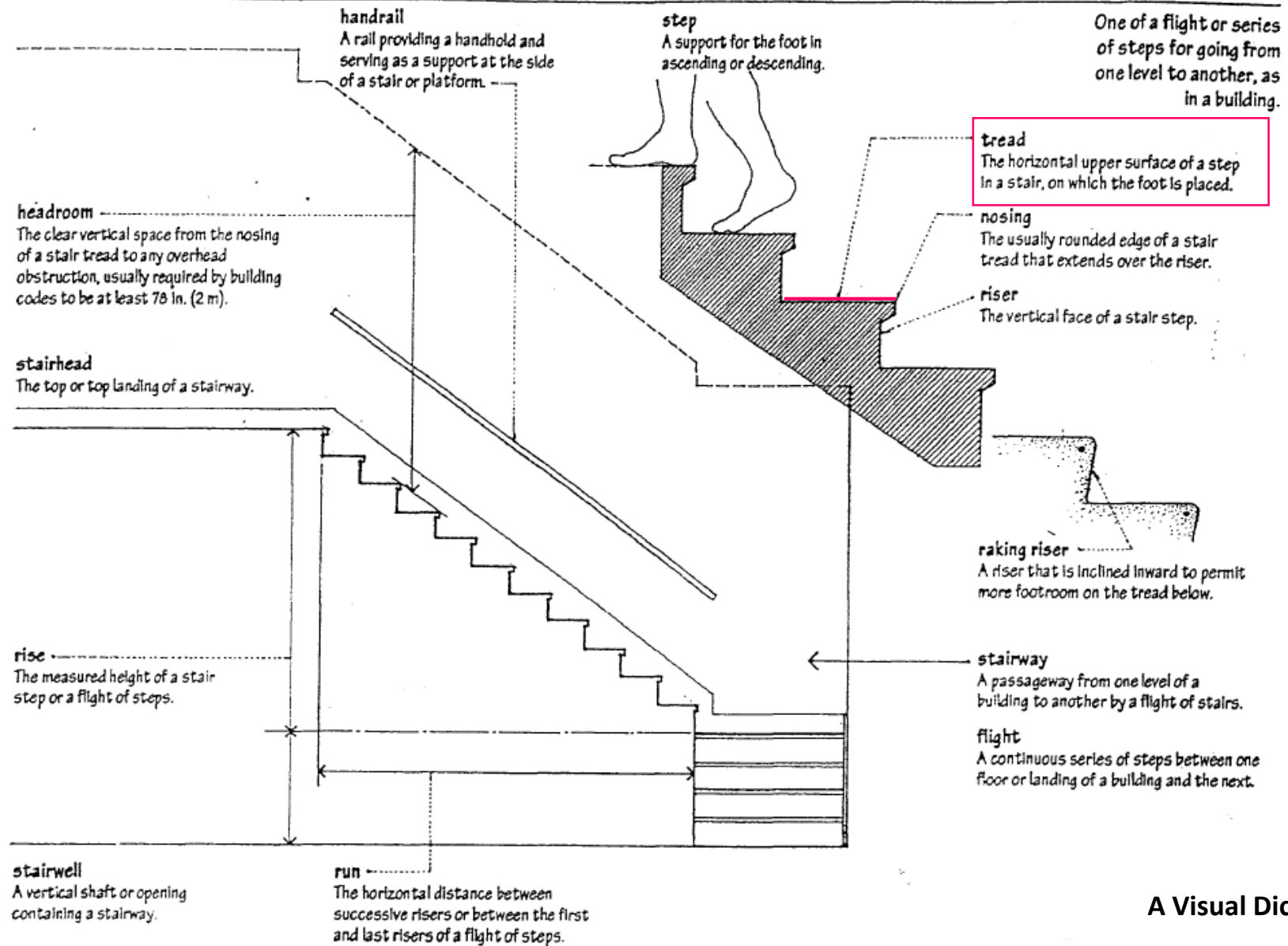
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

CORSO DI LAUREA IN ARCHITETTURA E CITTÀ SOSTENIBILI

BUILDING INFORMATION MODELING:
DIGITAL MODELING OF ARCHITECTURE, DIGITAL VISUALIZATION OF PROJECT

A.A. 2022-2023, Prof. Sandra Mikolajewska

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FRANCIS D.K. CHING,
A Visual Dictionary of Architecture



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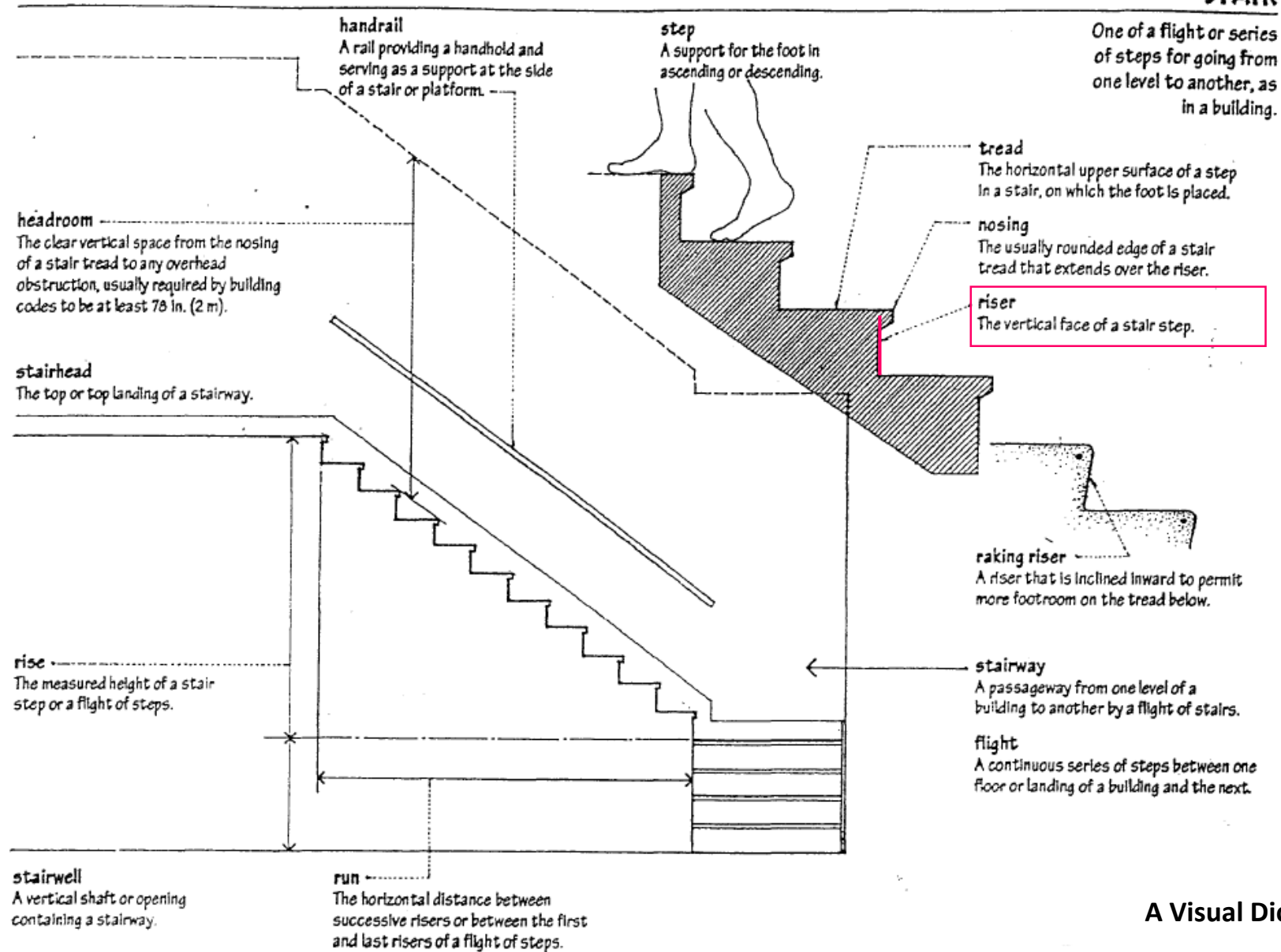
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

CORSO DI LAUREA IN ARCHITETTURA E CITTA' SOSTENIBILI

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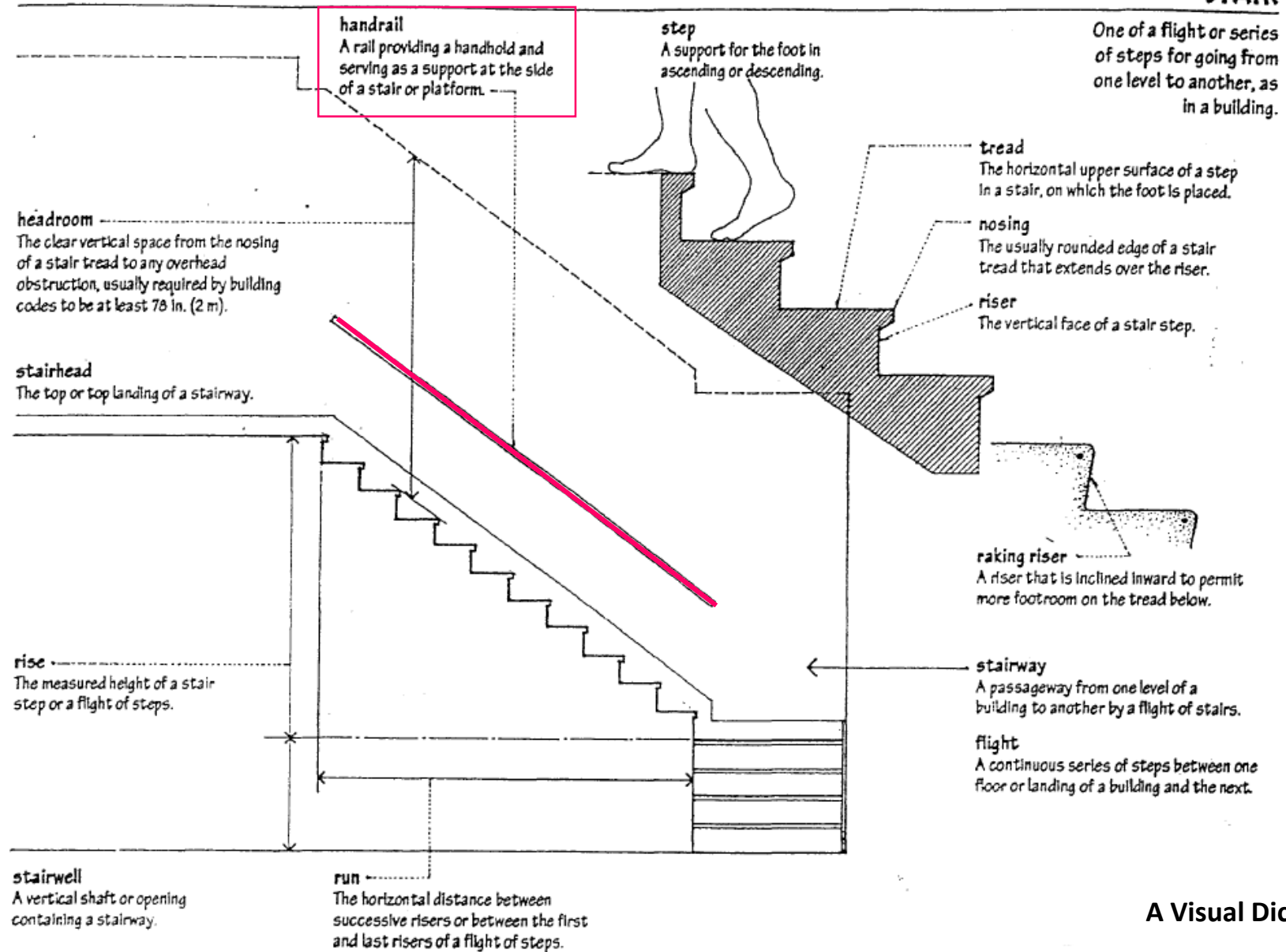
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

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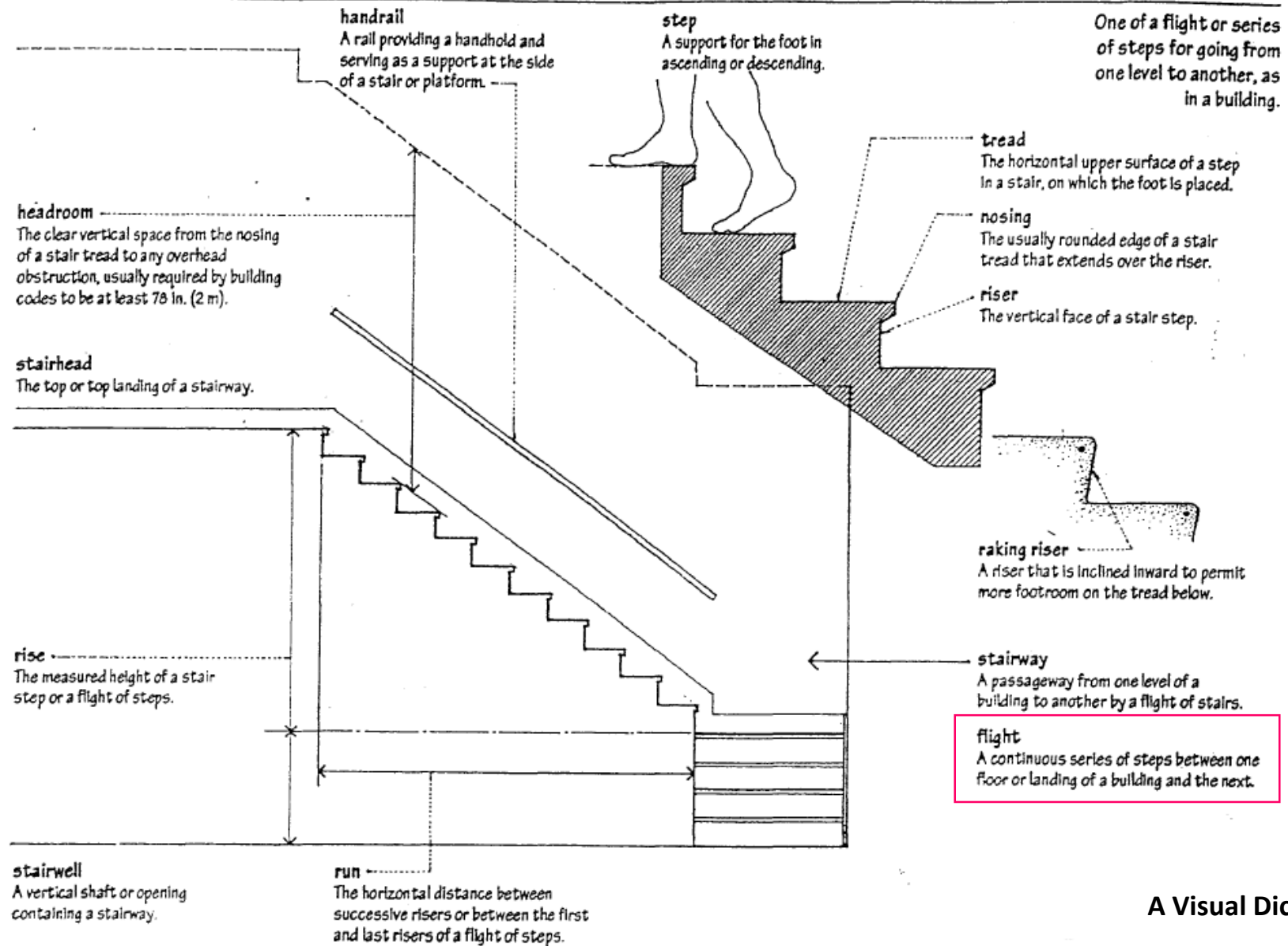
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

CORSO DI LAUREA IN ARCHITETTURA E CITTA' SOSTENIBILI

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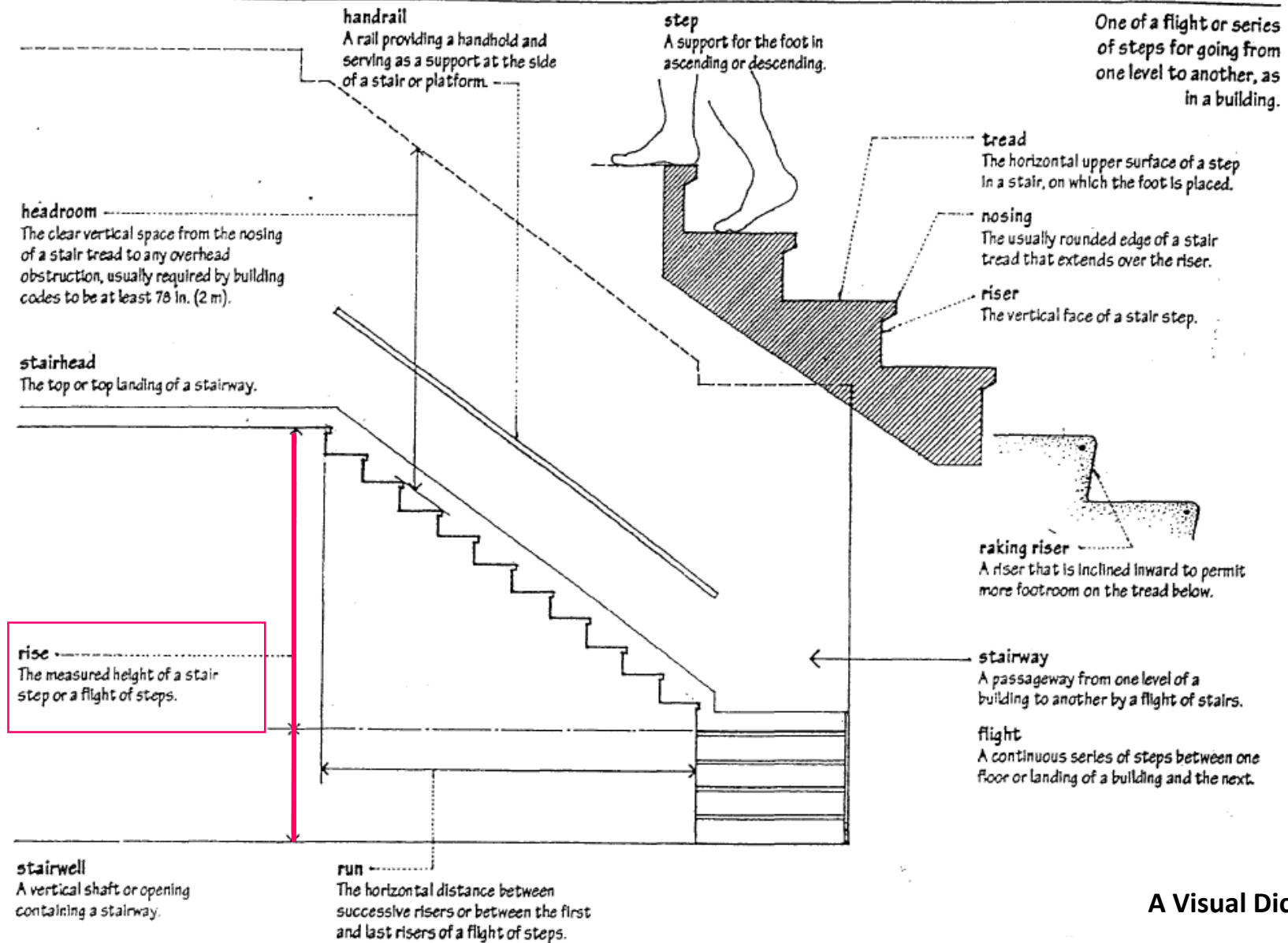
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

CORSO DI LAUREA IN ARCHITETTURA E CITTA' SOSTENIBILI

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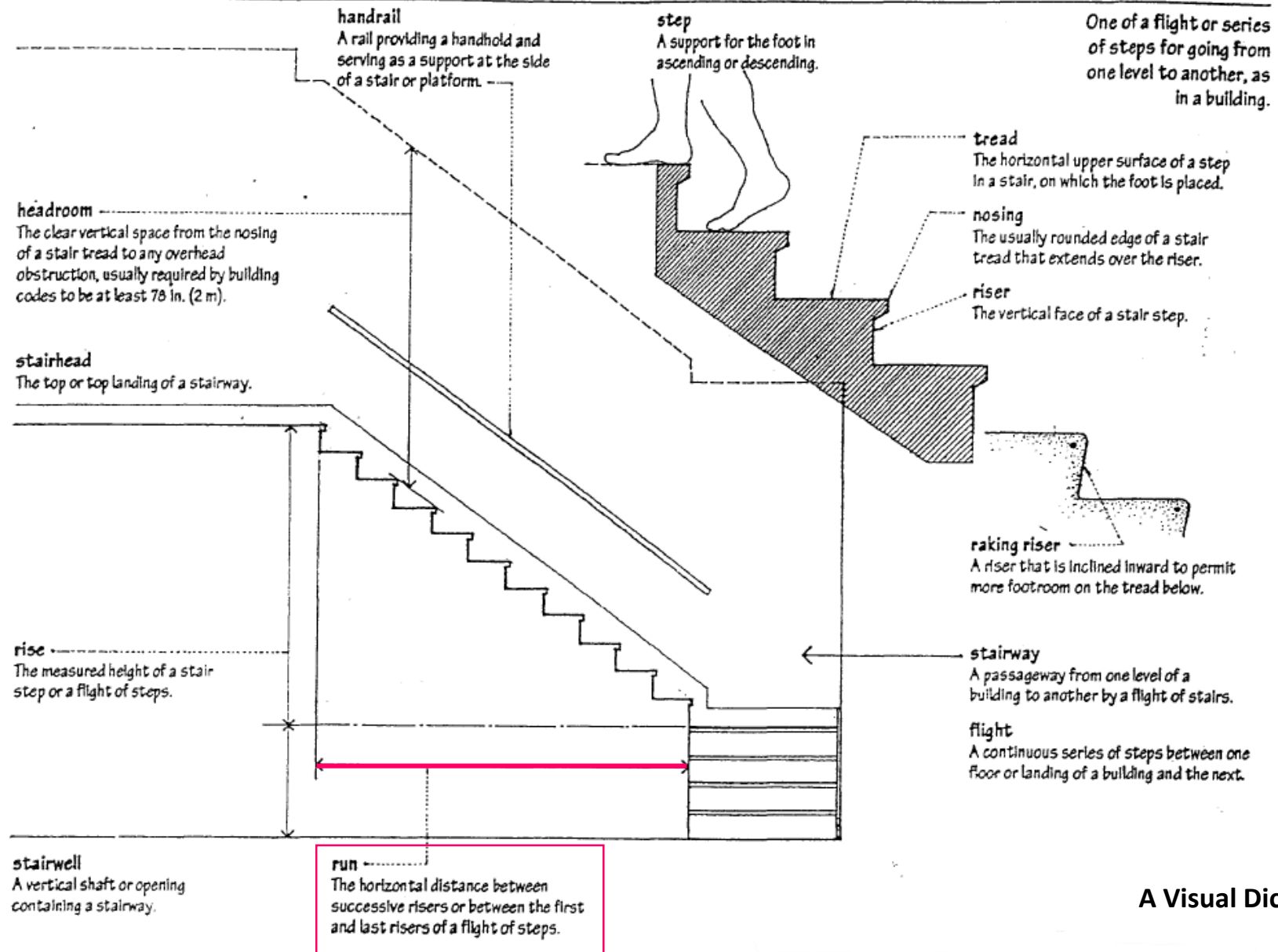
DIPARTIMENTO DI INGEGNERIA E ARCHITETTURA

CORSO DI LAUREA IN ARCHITETTURA E CITTA' SOSTENIBILI

BUILDING INFORMATION MODELING:
DIGITAL MODELING OF ARCHITECTURE, DIGITAL VISUALIZATION OF PROJECT

A.A. 2022-2023, Prof. Sandra Mikolajewska

STAIR



FRANCIS D.K. CHING,
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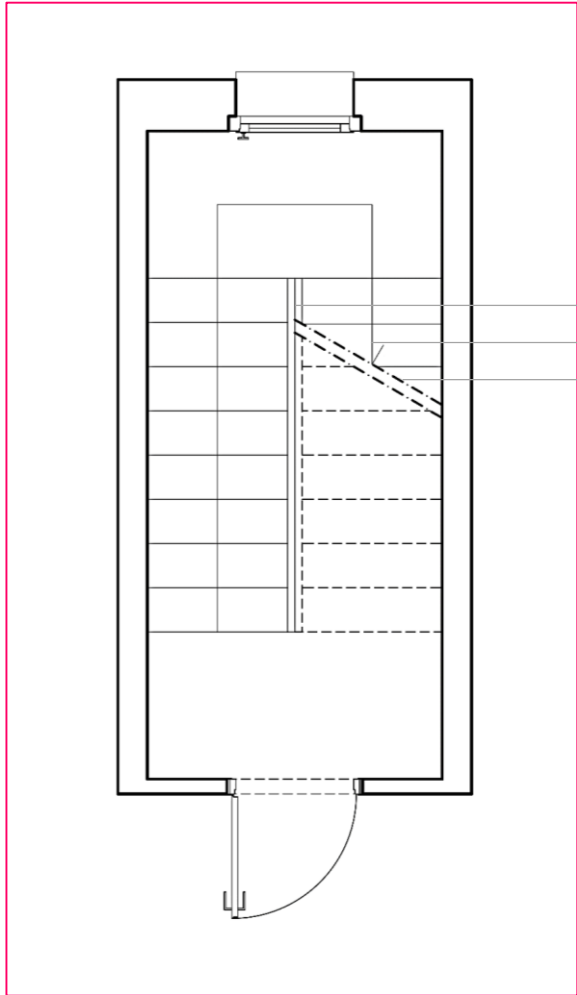
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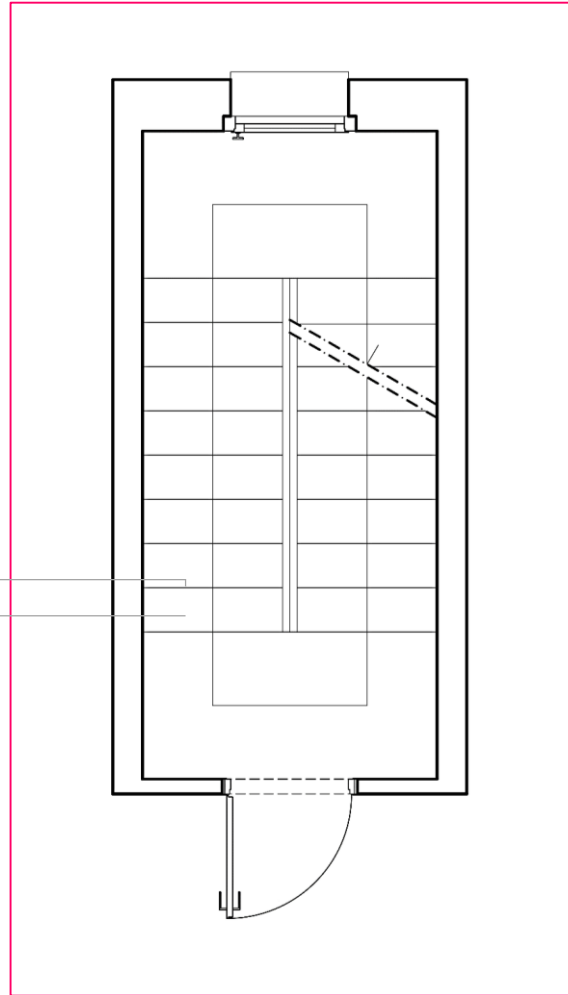
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ARCHITECTURAL DRAWINGS - STAIRS



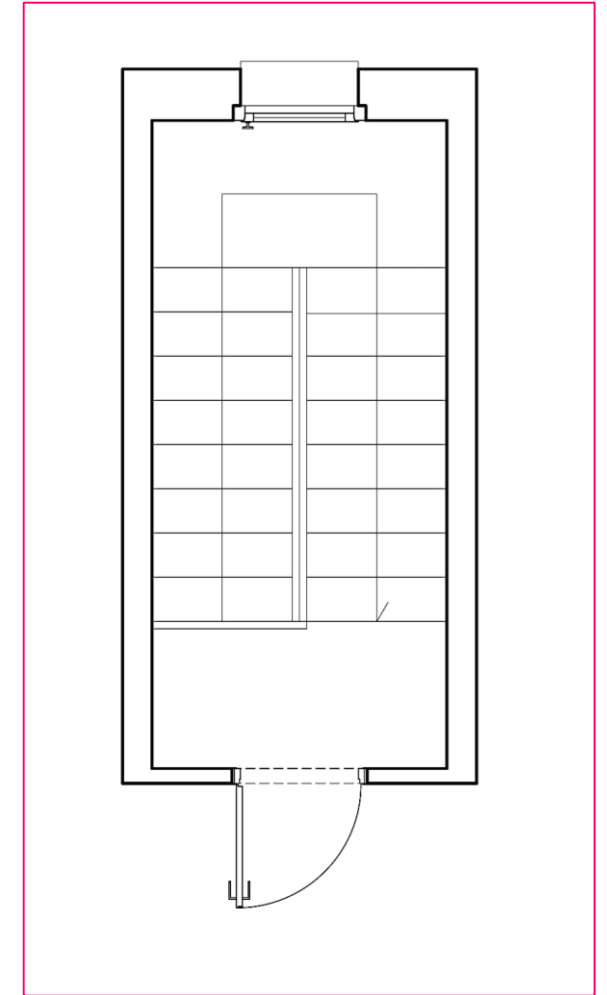
HANDRAIL
ARROW SYMBOL
SECTION LINES

GROUND FLOOR PLAN



RISER
TREAD

FIRST FLOOR PLAN



SECOND FLOOR PLAN (THE LAST ONE)



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