

AS 1100.101—1992
Reconfirmed 2014

Australian Standard[®]

Technical drawing

Part 101: General principles

This Australian Standard was prepared by Committee ME/72, Technical Drawing. It was approved on behalf of the Council of Standards Australia on 25 August 1992 and published on 16 November 1992.

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Australian Chamber of Commerce
Bureau of Steel Manufacturers of Australia
Confederation of Australian Industry
Department of Administrative Services
Department of Defence
Department of Employment and Technical and Further Education, South Australia
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Institute of Industrial Arts
Institution of Engineers, Australia
Master Builders — Construction and Housing Association, Australia
N.S.W Technical and Further Education Commission
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This Standard was issued in draft form for comment as DR 90110.

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 1100.101—1992

Technical drawing

Part 101: General principles

RECONFIRMATION NOTICE

Technical Committee ME-072 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 6 December 2013.

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NOTES

AS 1100.101—1992

Australian Standard[®]

Technical drawing

Part 101: General principles

For history before 1992, see Preface.
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PREFACE

This Standard was prepared by the Standards Australia Committee on Technical Drawing to supersede AS 1101.101–1984. AS 1100.101–1984 was a revision and amalgamation of AS 1100 Part 1–1977; Part 2–1975; Part 3–1971; Part 4–1972; Part 5–1973; Part 6 first published 1973 and revised in 1980; Part 7 first published 1972 and revised in 1978; and Part 8–1975.

AS 1100 Parts 1 to 8 ran concurrently with AS CZ1.1 of 1976 which was withdrawn in 1982. AS CZ1.1 was a revision of AS CZ1 which was first published in 1941, with further editions published in 1944, 1946, 1951, 1966 and 1973. The 1966 edition also superseded AS Z8 of 1956 (endorsement of BS 308.2–1953 without amendment).

The AS CZ1 Standards were endorsements of The Institution of Engineers, Australia publications entitled, *Engineering Drawing Practice*. The document from which these publications originated, was published by the Institution under the title, *Recommended Engineering Drawing Practice*, but this was not endorsed by this Association.

This Standard is one of a series dealing with technical drawing, the other Standards in the series being as follows:

- Part 201: *Mechanical drawing*
- Part 301: *Architectural drawing*
- Part 401: *Engineering survey and engineering survey design drawing*
- Part 501: *Structural engineering drawing*

In the preparation of this Standard, the committee took account of changes in Australian technical drawing practice and recommendations of the International Organization for Standardization. Also considered were the equivalent British, American, and Canadian Standards.

In its preparation many minor changes in the layout of the text and figures have taken place resulting in greater consistency and improved ease of use of the document.

The committee considers it important that this document will be applicable to all sectors of the technical field. For instance, although many of the examples are of a mechanical nature, the principles are applicable to all fields of technical drawing. Accordingly, wherever necessary, examples have been expanded to show other applications of the principles.

Clarity of expression in defining the designer's requirements and in the interpretation of these requirements has been considered at all times. The introduction of symbols now plays an important part in drawing practice so that language barriers in reading drawings are reduced to a minimum and the valuable drafting time spent inserting notes is minimized.

The section on dimensioning, which was formerly in [AS 1101.201](#), has been rearranged to make it easier to read and updated to Australian and International practice.

The use of computer-aided drafting (CAD) to produce technical drawings is acknowledged. In line with the practice of international Standards committees dealing with areas related to technical drawings, the requirements and principles of this Standard shall apply to users of CAD systems.

This Standard is in agreement with the following International Standards:

- | | |
|------------|---|
| ISO 128 | <i>Technical drawings — General principles of presentation</i> |
| ISO 129 | <i>Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications</i> |
| ISO 406 | <i>Technical drawing — Tolerancing of linear and angular dimensions</i> |
| ISO 1101 | <i>Technical drawings — Geometrical tolerancing — Tolerancing of form orientation, location and run-out — Generalities, definitions, symbols, indications on drawings</i> |
| ISO 1660 | <i>Technical drawings — Dimensioning and tolerancing of profiles</i> |
| ISO 3040 | <i>Technical drawings — Dimensioning and tolerancing — Cones</i> |
| ISO 3098/1 | <i>Technical drawings — Lettering, Part 1: Currently used characters</i> |
| ISO 5455 | <i>Technical drawings — Scales</i> |
| ISO 5459 | <i>Technical drawings — Geometrical tolerancing — Datums and datum-systems for geometrical tolerances</i> |
| ISO 6410 | <i>Technical drawings — Conventional representation of threaded parts</i> |

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STANDARDS AUSTRALIA

Australian Standard
Technical drawing

Part 101: General principles

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard sets out the basic principles of technical drawing practice.

Section 1 sets out abbreviations.

Section 2 specifies materials, sizes, and layout of drawing sheets.

Section 3 specifies the types and minimum thicknesses of lines to be used and shows typical examples of their application.

Section 4 sets out the requirements for distinct uniform letters, numerals, and symbols.

Section 5 sets out recommended scales and their application.

Section 6 sets out methods of projection and of indication of the various views of an object.

Section 7 sets out methods of indicating section and provides information on conventions used in sectioning.

Section 8 sets out recommendations for dimensioning including size and geometry tolerancing.

Section 9 specifies conventions used for the representation of components and repetitive features of components.

Appendices provide information on the various projection methods, geometry tolerancing and comparison with other Standards.

NOTE: All drawings in this Standard are drawn in third angle projection unless otherwise stated. See Clause 6.3.3.

1.2 APPLICATION The basic principles given in this Standard are intended for adoption in the fields of engineering, architecture, surveying, drafting technology, and education in the preparation and interpretation of technical drawings, diagrams, charts, and tables for the purpose of conveying technical information.

Technical drawings include such things as:

- (a) Detail drawings.
- (b) Assembly drawings.
- (c) Plans.
- (d) Illustrations.
- (e) Schematic diagrams.
- (f) Pictorial drawings.
- (g) Installation drawings.

1.3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS	
1000	The International System of Units (SI) and its application
1100	Technical drawing
1100.201	Part 201: Mechanical drawing
1100.301	Part 301: Architectural drawing
1100.401	Part 401: Engineering survey and engineering survey design drawing
1100.501	Part 501: Structural engineering drawing
1103	Diagrams, charts and tables for electrotechnology
1103.1	Part 1: Definitions and classifications
1203	Microfilming of engineering documents (35 mm)
1654	Limits and fits for engineering (Metric units)
2536	Surface texture

AS	
3702	Item designation in electrotechnology
B129	Designs for geometric limit gauges (plain and screwed in inch units)
B199	Undercuts and runouts for screw threads
ISO	
3098	Technical drawings—Lettering
3098/1	Part 1: Currently used characters

1.4 ABBREVIATIONS

1.4.1 General Table 1.1 gives general abbreviations for words or word combinations which are in common use on drawings for engineering, architecture, and surveying. In accordance with recommended practice, upper-case letters shall be used except where otherwise indicated in the Table. Abbreviations which are related only to a specific discipline are given in [AS 1100.201](#) for mechanical drawing, [AS 1100.301](#) for architectural drawing, [AS 1100.401](#) for engineering survey and design drawing, and AS 1100.501 for structural engineering drawing.

Table 1.2 gives the decoding of the abbreviations given in Table 1.1.

Abbreviations should be used only where brevity and conservation of space make it necessary, and then only when their meanings are unquestionably clear to the intended reader. WHEN IN DOUBT SPELL IT OUT.

NOTES:

- 1 An abbreviation may or may not be recognized internationally.
- 2 The abbreviations given in Tables 1.1 and 1.2 are not exhaustive. Other abbreviations and other meanings for those given may be used, provided that —
 - (a) their common usage in particular fields is clear;
 - (b) the meaning is clarified on the drawing; or
 - (c) the meaning is clarified in a reference document.

1.4.2 Use of abbreviations

1.4.2.1 Word combinations The parts of an abbreviation for a word combination shall not be isolated to derive an abbreviation for a single word or another group of words. Single abbreviations may be combined when necessary if there is no abbreviation listed for the combination.

1.4.2.2 Syntax Unless otherwise indicated herein, the same abbreviation shall be used for all tenses, the possessive case, participle endings, the singular and plural, and noun and modifying forms.

1.4.2.3 Punctuation Punctuation marks which do not appear in this Standard shall not be used with the abbreviation of a technical term.

1.4.2.4 Chemical elements Upper-case letters shall be used for the first letter of the abbreviation and lower-case for the second letter (where used).

1.5 SURFACE TEXTURE Information on surface texture related to technical drawings is given in [AS 1100.201](#). For a more complete understanding of surface texture, reference should be made to [AS 2536](#).

TABLE 1.1
ABBREVIATIONS—ENCODING

Terms	Abbreviation	Terms	Abbreviation
abbreviation	ABBR	cast steel	CS
absolute	ABS	caulking	CLKG
acceleration	ACCEL	cavity	CAV
access opening	AO	cement	CEM
access panel	AP	cement lined	CL
accordance with	A/W	centre-line	CL
accumulator	ACC	centre of gravity	CG
acoustic	ACST	centre-to-centre, centres	CRS
acrylic	ACRY	cheese head	CH HD
acrylonitrile butadiene styrene	ABS	chamfer	CHAM
active	A	channel	CHNL
addendum	ADD	chrome-plated	CP
adhesive	ADH	chute	CH
aggregate	AGGR	circle	CIRC
agricultural	AG	circuit	CCT
agricultural pipe drain	APD	circuit-breaker	CB
airblast circuit-breaker	ABCB	circular hollow section	CHS
air condition	AIR COND	circumference	CIRC
air valve	AV	clear glass	CG
alternating current	AC	clock	CK
amendment	AMDT	closed-circuit television	CCTV
American National Standards Institute	ANSI	coating	CTG
anhydrous	ANHYD	coefficient	COEF
approximate	APPROX	cold-rolled steel	CRS
aqueous	AQ	cold water	CW
arrangement	ARRGT	cold-water tank	CWT
asbestos	ASB	column	COL
assembly	ASSY	composition	COMPO
Association Francaise de Normalization	AFNOR	compression	COMP
assumed datum	ASSD	computer-aided design/drafting	CAD
atmosphere	ATM	computer-aided engineering	CAE
audio frequency	AF	computer-aided manufacture	CAM
automatic	AUTO	concentrated	CONC
auxiliary	AUX	concentric	CONC
average	AVG	concrete	CONC
baffle	BAF	concrete block	CB
baseplate	BPL	concrete ceiling	CC
basin	B	concrete floor	CF
bath	BTH	constant	CONST
bearer	BRR	construction	CONSTR
bearing	BRG	construction joint	CJ
benchmark	BM	contact adhesive	CA
bitumen	BIT	contour	CTR
bitumen lined	BL	control valve	CV
block	BLK	coordinating	COORD
board	BD	corner	CNR
boiling water unit	BWU	corrected	CORR
bottom	BOT	corrosion resistant (material)	CR
boundary trap	BT	corrugated	CORR
bracket	BRKT	corrugated galvanized steel	CGS
brass	BRS	countersink	CSK
brick	BK	countersunk head	CSK HD
brickwork	BWK	crest	CST
Brinell hardness number	HB	critical	CRIT
British Standards Institution	BSI	cross recess head	C REC HD
bronze	BRZ	crown (of road)	CRN
bucket	BKT	cup head	CUP HD
building	BLDG	current transformer	CT
building line	BL	cut-off valve	COV
bulkhead	BHD	cylinder	CYL
bullnose	BN	damp-proof course	DPC
cabinet	CAB	dead load	DL
cadmium plated	Cd PL	detail	DET
calculated	CALC	diagonal	DIAG
canopy	CAN	diagram	DIAG
cantilever	CANT	diameter	DIA*
capacity	CAP	inside	ID
casing	CSG	nominal	DN
cast iron	CI	outside	OD
cast iron pipe	CIP		

* When used in association with a numerical value, the preferred method of expressing this abbreviation is by a symbol. (continued)

TABLE 1.1 (continued)

Terms	Abbreviation	Terms	Abbreviation
diamond pyramid hardness number (Vickers)	HV	garage	GAR
dilute	DIL	gas cock	GC
dimension	DIM	gas main	GM
Deutsches Institut für Normung	DIN	gas meter	GM
direct current	DC	gas turret	GT
disconnecter trap	DT	gate valve	GV
distance	DIST	general arrangement	GA
distribution switchboard	DSB	general purpose outlet	GPO
drain	DR	geometric reference frame	GRF
drawing	DRG	grade	GR
dwelling	DWG	grease trap	GT
		grid	GD
each	EA	ground	GND
earth (electrical wiring)	E	ground height	GHT
earthenware	EW	group	GP
earthenware pipe	EWP	gully disconnector trap	GDT
easement	EMT	gully pit	GP
educt vent	EV	gully trap	GT
effective	EFF		
efficiency	EFF	hand	HD
effluent	EFF	hard	HD
electric, electrical	ELEC	hardboard	HBD
electromotive force	EMF	hardcore	HC
elevation	ELEV	hardwood	HWD
engine, engineering	ENG	head	HD
equivalent	EQUIV	cheese	CH HD
estimate	EST	cross recess	C REC HD
existing	EXST	countersunk	CSK HD
expansion	EXP	cup	CUP HD
expansion joint	EJ	fillister	FILL HD
external	EXT	hexagon	HEX HD
extra-high voltage	EHV	hexagon socket	HEX SOC HD
extra-low voltage	ELV	mushroom	MUSH HD
extrude	EXTD	raised countersunk	RSD CSK HD
		round	RD HD
fibres-reinforced plastic	FRP	square	SQ HD
figure	FIG	heater	HTR
fillister head	FILL HD	heavy duty	HD
finished floor height	FFHT	height	HT
finished ground height	FGHT	hexagon	HEX
fire alarm	FA	high frequency	HF
fire detector	FD	high pressure	HP
fire extinguisher	FE	high strength	HS
fire hose rack/reel	FHR	high-tensile steel	HTS
fire hydrant	FH	high voltage	HV
fire indicator panel	FIP	hollow section	
fire plug	FP	circular	CHS
fire resistant	FR	rectangular	RHS
fire service pipe	FSP	square	SHS
fire water service	FWS	horizontal	HORIZ
flange	FLG	hose cock	HC
flat	FL	hot-rolled steel	HRS
floor	FLR	hot water	HW
floor height	FHT	hot water unit	HWU
floor sump	FS	hydrant	H
flush fitting	FF	hydrant point	HP
forward	FWD	hydraulic	HYD
framework	FWK	hydrogen ion exponent	pH
frequency	FREQ		
audio	AF	include	INCL
high	HF	incorporate	INC
intermediate	IF	indicator	IND
low	LF	induct vent	IV
medium	MF	inspection chamber	IC
ultra-high	UHF	inspection opening	IO
very-high	VHF	inspection pit	IP
frequency modulated	FM	insoluble	INSOL
		insulated or insulation	INSUL
galvanize	GALV	integrated circuit	IC
galvanized iron	GI	interceptor trap	IT
galvanized iron pipe	GIP	intermediate frequency	IF
		internal	INT
		International Electrotechnical Commission	IEC
		International Organization for Standardization	ISO

(continued)

TABLE 1.1 (continued)

Terms	Abbreviation	Terms	Abbreviation
International System of Units (Système International d'Unités)	SI	pedestal	PED
intersection point	IP	per annum	PA
invert	INV	phase	PH
invert level (height)	IH	pipe	P
isolator	ISOL	pipeline	PL
		phosphor bronze	PH BRZ
Japanese Industrial Standards Committee	JISC	plasterboard	PBD
joint	JT	plate glass	PG
junction	JUNC	plywood	PLY
		pneumatic	PNEU
landing	LDG	polytetrafluoroethylene	PTFE
latent heat	LAT HT	polyvinyl acetate	PVA
least material condition	LMC	polyvinyl chloride	PVC
left hand	LH	portion	PORT
length	LG	position	POSN*
level	LEV	positive	POS
lining	LNG	potential difference	PD
liquefied natural gas	LNG	precast	PC
liquefied petroleum gas	LPG	precipitate (noun)	PPT
liquid	LIQ	prefabricated	PREFAB
live load	LL	preliminary	PRELIM
longitudinal	LONG	pressure	PRESS
louvre	LVR	pressure-relief pipe	PRP
low frequency	LF	printed circuit board	PCB
low pressure	LP	printed wiring board	PWB
low voltage	LV	push-button	PB
lubricate	LUB		
		quantity	QTY
machine	M/C	radius	RAD*
main switchboard	MSB	recovery peg	RP
malleable iron	MI	rectangular	RECT
manhole	MH	rectangular hollow section	RHS
mark	MK	reference	REF
masonry	MSRY	reference line	RL
material	MATL	reference mark	RM
maximum	MAX	reflux valve	RV
maximum material condition	MMC	reinforced concrete	RC
mechanical	MECH	reinforced-concrete pipe	RCP
medium pressure	MP	reinforcement	REINF
melting point	MP	relative humidity	RH
meter (instrument)	M	relief valve	RV
minimum	MIN	required	REQD
miscellaneous	MISC	right hand	RH
mixing valve	MV	right of way	ROW
modification	MOD	road	RD
modulus of elasticity	E	Rockwell hardness	
modulus, section	Z	A	HRA
moment of inertia	I	B	HRB
mounting	MTG	C	HRC
		rolled-steel angle	RSA
negative	NEG	rolled-steel channel	RSC
neutral (electrical)	N	rolled-steel joist	RSJ
nickel plated	NP	round	RD
nominal	NOM	runnel	R
nominal diameter	DN		
nominal size	NS	safety valve	SV
North	N	satin chrome plated	SCP
not to scale	NTS*	schedule	SCHED
number	NO	screw	SCR
		section	SECT
octagon	OCT	septic tank	ST
oil circuit-breaker	OCB	sewer	SEW
oil interceptor trap	OIT	sewer drain	SD
opposite	OPP	sewer vent	SV
oven	O	sewer vent pipe	SVP
overall	OA	sheet	SH
overhead	OH	sketch	SK
		soakage pit	SKP
parallel	PAR*	socket	SOC
parallel flange channel	PFC	solution	SOLN
part	PT	specification	SPEC
partition	PTN	spherical	SPHER*
passivate	PASS	spigot	SPT
pattern	PATT		

* When used in association with a numerical value, the preferred method of expressing this abbreviation is by a symbol. (continued)

TABLE 1.1 (continued)

Terms	Abbreviation	Terms	Abbreviation
spring steel	SPR STL	ultra-high frequency	UHF
sprinkler	SPR	undercut	UCUT
square	SQ	underground	U/G
square head	SQ HD	underside	U/S
square hollow section	SHS	universal beam	UB
standard	STD	universal bearing pile	UBP
standard temperature and pressure	STP	universal column	UC
station	STA	utility	UTIL
steam trap	ST		
steel	STL	vacuum	VAC
sterilizer	STER	vapour barrier	VB
stopcock	SC	vapour density	VD
stop tap	ST	vapour pressure	VP
stop valve	SV	vent pipe	VP
stormwater drain	SWD	ventilator	VENT
stormwater pit	SWP	verandah	VER
straight	STR	vertical	VERT
street	ST	very-high frequency	VHF
structural floor level	SFL	Vickers hardness	HV
surface level	SL	vinyl tiles	VT
switch	SW	vitrified clay	VC
switchboard	SWBD	vitrified clay pipe	VCP
symmetry	SYM	volume	VOL
tangent point	TP	wallboard	WBD
tank water level	TWL	wash trough	WT
telephone	TEL	washing machine	WM
television	TV	waste pipe	WP
temperature	TEMP	water gauge	WG
tensile strength	TS	water level, waterline	WL
thermoplastic insulated	TPI	water main	WM
thread	THD	water meter	WMR
time switch	TS	waterproof membrane	WPM
tolerance	TOL	with (combination form)	W/.....
tough plastics sheathed	TPS	without	W/O
tough rubber sheathed	TRS	wood	WD
transformer	XFMR	wrought iron	WI
transmitter	TX		
transverse	TRANSV	yield point	YP
true position	TP*		
true profile	TP*	zinc plated	Zn PLT
typical	TYP		
ultimate	ULT		

* When used in association with a numerical value, the preferred method of expressing this abbreviation is by a symbol.

TABLE 1.2
ABBREVIATIONS—DECODING

Abbreviation	Terms	Abbreviation	Terms
A	active	CAV	cavity
ABBR	abbreviation	CB	circuit-breaker
ABCB	airblast circuit-breaker	CB	concrete block
ABS	absolute	CC	concrete ceiling
ABS	acrylonitrile butadiene styrene	CCT	circuit
AC	alternating current	CCTV	closed-circuit television
ACC	accumulator	Cd PL	cadmium plated
ACCEL	acceleration	CEM	cement
ACRY	acrylic	CF	concrete floor
ACST	acoustic	CG	centre of gravity
ADD	addendum	CG	clear glass
ADH	adhesive	CGS	corrugated galvanized steel
AF	audio frequency	CH	chute
AFNOR	Association Francaise de Normalization	CHAM	chamfer
AG	agricultural	CH HD	cheese head
AGGR	aggregate	CHNL	channel
AIR COND	air condition	CHS	circular hollow section
AMDT	amendment	CI	cast iron
ANHYD	anhydrous	CIP	cast iron pipe
ANSI	American National Standards Institute	CIRC	circle
AO	access opening	CIRC	circumference
AP	access panel	CJ	construction joint
APD	agricultural pipe drain	CK	clock
APPROX	approximate	CL	cement lined
AQ	aqueous	CL	centre-line
ARRGT	arrangement	CLKG	caulking
ASB	asbestos	CNR	corner
ASSD	assumed datum	COEF	coefficient
ASSY	assembly	COL	column
ATM	atmosphere	COMP	compression
AUTO	automatic	COMPO	composition
AUX	auxiliary	CONC	concentrated
AVG	average	CONC	concentric
AV	air valve	CONC	concrete
A/W	accordance with	CONST	constant
B	basin	CONSTR	construction
BAF	baffle	COORD	coordinating
BD	board	CORR	corrected
BHD	bulkhead	CORR	corrugated
BIT	bitumen	COV	cut-off valve
BK	brick	CP	chrome-plated
BKT	bucket	C REC HD	cross recess head
BL	bitumen lined	CR	corrosion resistant (material)
BL	building line	CRIT	critical
BLDG	building	CRN	crown (of road)
BLK	block	CRS	centre-to-centre, centres
BM	benchmark	CRS	cold-rolled steel
BN	bullnose	CS	cast steel
BOT	bottom	CSG	casing
BPL	baseplate	CSK	countersunk
BRG	bearing	CSK HD	countersunk head
BRKT	bracket	CST	crest
BRR	bearer	CT	current transformer
BRs	brass	CTG	coating
BRZ	bronze	CTR	contour
BSI	British Standards Institution	CUP HD	cup head
BT	boundary trap	CV	control valve
BTH	bath	CW	cold water
BWK	brickwork	CWT	cold-water tank
BWU	boiling water unit	CYL	cylinder
CA	contact adhesive	DC	direct current
CAB	cabinet	DET	detail
CAD	computer-aided design/drafting	DIA	diameter
CAE	computer-aided engineering	DIAG	diagonal
CALC	calculated	DIAG	diagram
CAM	computer-aided manufacture	DIL	dilute
CAN	canopy	DIM	dimension
CANT	cantilever	DIN	Deutsches Institut fur Normung
CAP	capacity	DIST	distance
		DL	dead load
		DN	nominal diameter
		DPC	damp-proof course

(continued)

TABLE 1.2 (continued)

Abbreviation	Terms	Abbreviation	Terms
DR	drain	GT	grease trap
DRG	drawing	GT	gully trap
DSB	distribution switchboard	GV	gate valve
DT	disconnecter trap		
DWG	dwelling	H	hydrant
		HB	Brinell hardness number
E	earth (electrical wiring)	HBD	hardboard
E	modulus of elasticity	HC	hardcore
EA	each	HC	hose cock
EFF	effective	HD	hand
EFF	efficiency	HD	hard
EFF	effluent	HD	head
EHV	extra-high voltage	HD	heavy duty
EJ	expansion joint	HEX	hexagon
ELEC	electric, electrical	HEX HD	hexagon head
ELEV	elevation	HEX SOC HD	hexagon socket head
ELV	extra-low voltage	HF	high frequency
EMF	electromotive force	HORIZ	horizontal
EMT	easement	HP	hydrant point
ENG	engine, engineering	HP	high pressure
EQUIV	equivalent	HRA, HRB, HRC	Rockwell hardness (A, B, C)
EST	estimate	HRS	hot-rolled steel
EV	educt vent	HS	high strength
EW	earthenware	HT	height
EWP	earthenware pipe	HTR	heater
EXP	expansion	HTS	high-tensile steel
EXST	existing	HV	diamond pyramid hardness number (Vickers)
EXT	external	HV	high voltage
EXTD	extrude	HW	hot water
		HWU	hot water unit
FA	fire alarm	HWD	hardwood
FD	fire detector	HYD	hydraulic
FE	fire extinguisher		
FF	flush fitting	I	moment of inertia
FFHT	finished floor height	IC	inspection chamber
FGHT	finished ground height	IC	integrated circuit
FH	fire hydrant	ID	inside diameter
FHR	fire hose rack/reel	IEC	International Electrotechnical Commission
FIP	fire indicator panel	IF	intermediate frequency
FIG	figure	IH	invert level (height)
FILL HD	fillister head	INC	incorporate
FL	flat	INCL	include
FHT	floor height	IND	indicator
FLG	flange	INSOL	insoluble
FLR	floor	INSUL	insulated or insulation
FM	frequency modulated	INT	internal
FP	fire plug	INV	invert
FR	fire resistant	IO	inspection opening
FREQ	frequency	IP	inspection pit
FRP	fibre-reinforced plastic	IP	intersection point
FS	floor sump	ISO	International Organization for Standardization
FSP	fire service pipe	ISOL	isolator
FWD	forward	IT	interceptor trap
FWK	framework	IV	induct vent
FWS	fire water service		
		JISC	Japanese industrial Standards Committee
GA	general arrangement	JT	joint
GALV	galvanize	JUNC	junction
GAR	garage		
GC	gas cock	LAT HT	latent heat
GD	grid	LDG	landing
GDT	gully disconnecter trap	LEV	level
GHT	ground height	LF	low frequency
GI	galvanized iron	LG	length
GIP	galvanized iron pipe	LH	left hand
GM	gas main	LIQ	liquid
GM	gas meter	LL	live load
GND	ground	LMC	least material condition
GP	group	LNG	lining
GP	gully pit	LNG	liquefied naturel gas
GPO	general purpose outlet	LONG	longitudinal
GR	grade	LP	low pressure
GRF	geometric reference frame	LPG	liquefied petroleum gas
GT	gas turret	LUB	lubricate

(continued)

TABLE 1.2 (continued)

Abbreviation	Terms	Abbreviation	Terms
LV	low voltage	PVA	polyvinyl acetate
LVR	louvre	PVC	polyvinyl chloride
		PWB	printed wiring board
M	meter (instrument)	QTY	quantity
MATL	material	R	runnel
MAX	maximum	RAD	radius
M/C	machine	RC	reinforced concrete
MECH	mechanical	RCP	reinforced-concrete pipe
MF	medium frequency	RD	road
MH	manhole	RD	round
MI	malleable iron	RD HD	round head
MIN	minimum	RECT	rectangular
MISC	miscellaneous	REF	reference
MK	mark	REINF	reinforcement
MMC	maximum material condition	REQD	required
MOD	modification	RH	relative humidity
MP	medium pressure	RH	right hand
MP	melting point	RHS	rectangular hollow section
MSB	main switchboard	RL	reference line
MSRY	masonry	RM	reference mark
MTG	mounting	ROW	right of way
MUSH HD	mushroom head	RP	recovery peg
MV	mixing valve	RSA	rolled-steel angle
		RSC	rolled-steel channel
N	North	RSD	raised
N	neutral (electrical)	RSD CSK HD	raised countersunk head
NEG	negative	RSJ	rolled-steel joist
NO	number	RV	reflux valve
NOM	nominal	RV	relief valve
NP	nickel plated		
NS	nominal size	SC	stopcock
NTS	not to scale	SCHED	schedule
		SCP	satin chrome plated
O	oven	SCR	screw
OA	overall	SD	sewer drain
OCB	oil circuit-breaker	SECT	section
OCT	octagon	SEW	sewer
OD	outside diameter	SFL	structural floor level
OH	overhead	SH	sheet
OIT	oil interceptor trap	SHS	square hollow section
OPP	opposite	SI	International System of Units (Système International d'Unités)
		SK	sketch
P	pipe	SKP	soakage pit
PA	per annum	SL	surface level
PAR	parallel	SOC	socket
PASS	passivate	SOLN	solution
PATT	pattern	SPEC	specification
PB	push-button	SPHER	spherical
PBD	plasterboard	SPR	sprinkler
PC	precast	SPR STL	spring steel
PCB	printed circuit board	SPT	spigot
		SQ	square
PD	potential difference	SQ HD	square head
PED	pedestal	ST	septic tank
PFC	parallel flange channel	ST	steam trap
PG	plate glass	ST	street
PH	phase	ST	stop tap
pH	hydrogen ion exponent	STA	station
PH BRZ	phosphor bronze	STD	standard
PL	pipeline	STER	sterilizer
PLY	plywood	STL	steel
PNEU	pneumatic	STP	standard temperature and pressure
PORT	portion	STR	straight
POS	positive	SV	safety valve
POSN	position	SV	sewer vent
PPT	precipitate (noun)	SV	stop valve
PREFAB	prefabricated	SVP	sewer vent pipe
PRELIM	preliminary	SW	switch
PRESS	pressure	SWBD	switchboard
PRP	pressure-relief pipe	SWD	stormwater drain
PT	part	SWP	stormwater pit
PTFE	polytetrafluoroethylene	SYM	symmetry
PTN	partition		

(continued)



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TABLE 1.2 (continued)

Abbreviation	Terms	Abbreviation	Terms
TEL	telephone	VCP	vitrefied clay pipe
TEMP	temperature	VD	vapour density
THD	thread	VENT	ventilator
TOL	tolerance	VER	verandah
TP	tangent point	VERT	vertical
TP	true position	VHF	very-high frequency
TP	true profile	VOL	volume
TPI	thermoplastic insulated	VP	vapour pressure
TPS	tough plastics sheathed	VP	vent pipe
TRANSV	transverse	VT	vinyl tiles
TRS	tough rubber sheathed		
TS	tensile strength	W/.....	with (combination form)
TS	time switch	WBD	wallboard
TV	television	WD	wood
TWL	tank water level	WG	water gauge
TX	transmitter	WI	wrought iron
TYP	typical	WL	water level, waterline
		WM	washing machine
UB	universal beam	WM	water main
UBP	universal bearing pile	WMR	water meter
UC	universal column	W/O	without
UCUT	undercut	WP	waste pipe
U/G	underground	WPM	waterproof membrane
UHF	ultra-high frequency	WT	wash trough
ULT	ultimate		
U/S	underside	XFMR	transformer
UTIL	utility		
		YP	yield point
VAC	vacuum		
VB	vapour barrier	Z	modulus, section modulus
VC	vitrefied clay	Zn PLT	zinc plated

SECTION 2 MATERIALS, SIZES AND LAYOUT OF DRAWING SHEETS

2.1 SCOPE OF SECTION This Section specifies requirements for standard drawing sheets and covers materials, designation, sizes, tolerances, and layout details. Certain information is also given for roll drawings.

2.2 TYPES OF DRAWINGS AND RELATED TERMINOLOGY

2.2.1 Drawing—a document consisting of one or more drawing sheets presenting information pictorially or by textual matter (or both).

NOTE: A drawing is normally identified by a drawing number and title.

2.2.2 Arrangement drawing—a drawing depicting in any form of projection the relationships of major units or systems of the item depicted. Arrangement drawings may be with or without controlling dimensions.

2.2.3 Assembly drawing—a drawing depicting an assembly or subassembly.

NOTE: An assembly drawing is sometimes referred to as a general assembly.

2.2.4 Control drawing—a drawing that establishes parameters for the development, procurement or construction of an item, or for the co-functioning of items in an installation or layout.

Parameters include configurations and configuration limitations, performance and test requirements, access clearances, and mass and space limitations.

NOTE: Control drawings may be further classified as envelope, specification control, source control, interface control, and installation control types.

2.2.5 Detail assembly drawing—a drawing depicting an assembly on which one or more parts are detailed in the assembly view or on separate detail views.

2.2.6 Detail drawing—a drawing depicting end product requirements for the parts delineated on the drawing.

NOTE: Not to be confused with a 'Detail' (see Clause 6.3.8).

2.2.7 Diagrammatic drawing (or diagram)—a drawing delineating, by means of symbols and lines, the characteristics and relationships of items forming an assembly or system.

2.2.8 General arrangement drawing—an arrangement drawing where the item depicted is the end product.

2.2.9 Installation drawing—a drawing specifying complete information necessary to install an item or items relative to the supporting structure or to associated items.

2.2.10 Monodetail drawing—a detail drawing delineating a single part.

2.2.11 Multidetail drawing—a detail drawing delineating two or more uniquely identified parts on the same drawing sheet.

2.2.12 Tabulated drawing—a drawing showing similar configurations, parts, items or assemblies with the variations in characteristics given in tabular form.

2.2.13 Electrotechnology drawings For electrotechnology drawings, see [AS 1103.1](#).

2.2.14 Works as executed drawing—a record of work actually completed.

2.2.15 Assembly (subassembly)—a set of two or more items fitted together to perform a specific function.

NOTE: A subassembly is a portion of an assembly.

2.2.16 End product—an item, either an individual part, assembly, structure, or project, in its final or complete state.

2.2.17 Flow chart—a diagram in which objects are shown in a simplified way by means of graphical symbols (and letter symbols) in order to make the functional relationships or the assembly of an object clear.

2.2.18 Installation—a number of parts or subassemblies or any combination thereof fitted together to perform a specific function, in association with an appropriate structure or enclosure.

2.2.19 Part—one piece (member) or two or more pieces (members) joined together which cannot normally be separated without destruction or impairment of designed use.

NOTE: A part is sometimes described as a component.

2.2.20 Part number—a number assigned to identify uniquely a specific part. See also Note to Clause 4.2.2.2.

2.2.21 System—a combination of parts and assemblies fitted together to perform a specific operational function or functions.

2.3 MATERIALS Blanks or preprinted sheets for drawings and documents may be transparent, translucent or opaque, but should be matt on the drafting surface. Their quality shall be chosen to obtain the best contrast between background and lines. See also Clause 3.4.

NOTES:

- 1 If adhesive overlays are to be used, consideration must be given to the effects of dust, heat and ageing as these may result in defects in the reprographic process.
- 2 Edge binding is not recommended unless the binding and the drafting materials are compatible for shrinkage.

2.4 SIZE OF DRAWING SHEETS

2.4.1 Preferred sizes The preferred size of drawing sheets shall be the ISO-A series for which the designation and dimensions are as given in Table 2.1.

Preferred size drawing sheets, with slightly wider borders to take account of preprinting considerations, shall have dimensions as given in Table 2.2. Such sheets shall be additionally designated by the prefix R, i.e. RA0, RA1, RA2, RA3, and RA4.

Where drawing sheets of a greater length are required, they should be selected from and have dimensions in accordance with one of the series given in Table 2.3. Such sheets shall be designated A3 × 3, A3 × 4, A4 × 3, A4 × 4, and A4 × 5.

2.4.2 Non-preferred sizes The non-preferred size of drawing sheets shall be the ISO-B series for which the designations and dimensions are as given in Table 2.4.

Non-preferred size drawing sheets, with slightly wider borders to take account of preprinting considerations, shall have dimensions as given in Table 2.5. Such sheets shall be additionally designated by the prefix R, i.e. RB1, RB2, RB3, and RB4.

2.4.3 Roll drawings Standard widths of roll drawings shall be 860 mm and 610 mm. Lengths of the roll drawing sheets shall be determined to suit the requirements of the individual drawings.

NOTE: Care should be taken to ensure that the chosen length of a roll drawing is suitable for microfilming (see AS 1203), and for folding purposes.

2.4.4 Tolerances The cut sizes in Tables 2.1 to 2.5 shall be subject to the following tolerances:

For dimensions ≤600 mm—±2 mm.

For dimensions >600 mm—±3 mm.

Neither diagonal of any cut sheet shall exceed the diagonal of the appropriate maximum length and width, nor shall it be less than the diagonal of the appropriate minimum length and width.

For the purpose of checking the sheet sizes, the material shall be conditioned at 20 ±2°C at a relative humidity of 65 ±2 percent and measured under these conditions.

TABLE 2.1
DIMENSIONS OF PREFERRED SHEETS

Standard designation	Cut sheet dimensions mm
A0	841 × 1189
A1	594 × 841
A2	420 × 594
A3	297 × 420
A4	210 × 297

TABLE 2.2
DIMENSIONS OF PREFERRED SHEETS WITH WIDER BORDERS

Designation		Cut sheet dimensions mm
Ordering purposes only	Standard	
RA0	A0	860 × 1220
RA1	A1	610 × 860
RA2	A2	430 × 610
RA3	A3	305 × 430
RA4	A4	215 × 305

TABLE 2.3
DIMENSIONS OF ELONGATED PREFERRED SHEETS

Designation	Cut sheet dimensions mm
A3 × 3	420 × 891
A3 × 4	420 × 1189
A4 × 3	297 × 630
A4 × 4	297 × 841
A4 × 5	297 × 1051

TABLE 2.4
DIMENSIONS OF NON-PREFERRED SHEETS

Designation	Cut sheet dimensions mm
B1	707 × 1000
B2	500 × 707
B3	353 × 500
B4	250 × 353

TABLE 2.5
**DIMENSIONS OF NON-PREFERRED SHEETS
WITH WIDER BORDERS**

Designation		Cut sheet dimensions mm
Ordering purposes only	Standard	
RB1	B1	733 × 1019
RB2	B2	510 × 723
RB3	B3	361 × 510
RB4	B4	255 × 361

2.5 LAYOUT OF DRAWINGS SHEETS

2.5.1 Size of borders

2.5.1.1 Sheets without filing margin Where no filing margin is required, the drawing frame and its location in relation to the edges of the sheet should be as shown in Figure 2.1.

NOTE: The borders shown in Figure 2.1 are of minimum size.

2.5.1.2 Sheets with filing margin Where provision for a filing margin is required, the drawing frame and its location in relation to the edges of the sheets should be as shown in Figure 2.2.

NOTE: The borders and the filing margin shown in Figure 2.2 are of minimum size.

2.5.1.3 Roll drawings Where borders are required for roll drawings, the borders of sheets should conform to the dimensions shown in Figure 2.3.

2.5.2 Print trimming line Where drawing sheets complying with Table 2.2 or Table 2.5 are used, a method of indicating the print trimming line shall be marked on the sheets. This may be by means of broken lines forming a frame as in Figure 2.4 dimensioned to the cut-sheet dimensions of preferred or non-preferred series sheets specified in Table 2.1 or Table 2.4, or by other suitable methods of indication.

2.5.3 Camera alignment marks Camera alignment marks shall be provided at the centre of each of the four sides of the drawing sheet. Marks shall be in the form of an outline arrowhead pointing outwards and should be placed outside the drawing frame. A typical example showing the allowable 6 mm wide tolerance zone for microfilm centring is given in Figure 2.5.

The camera alignment marks on roll drawings shall be placed so that they comply with the requirements of [AS 1203](#). The drawing information in the overlap regions of the microfilm frames shall be minimal.

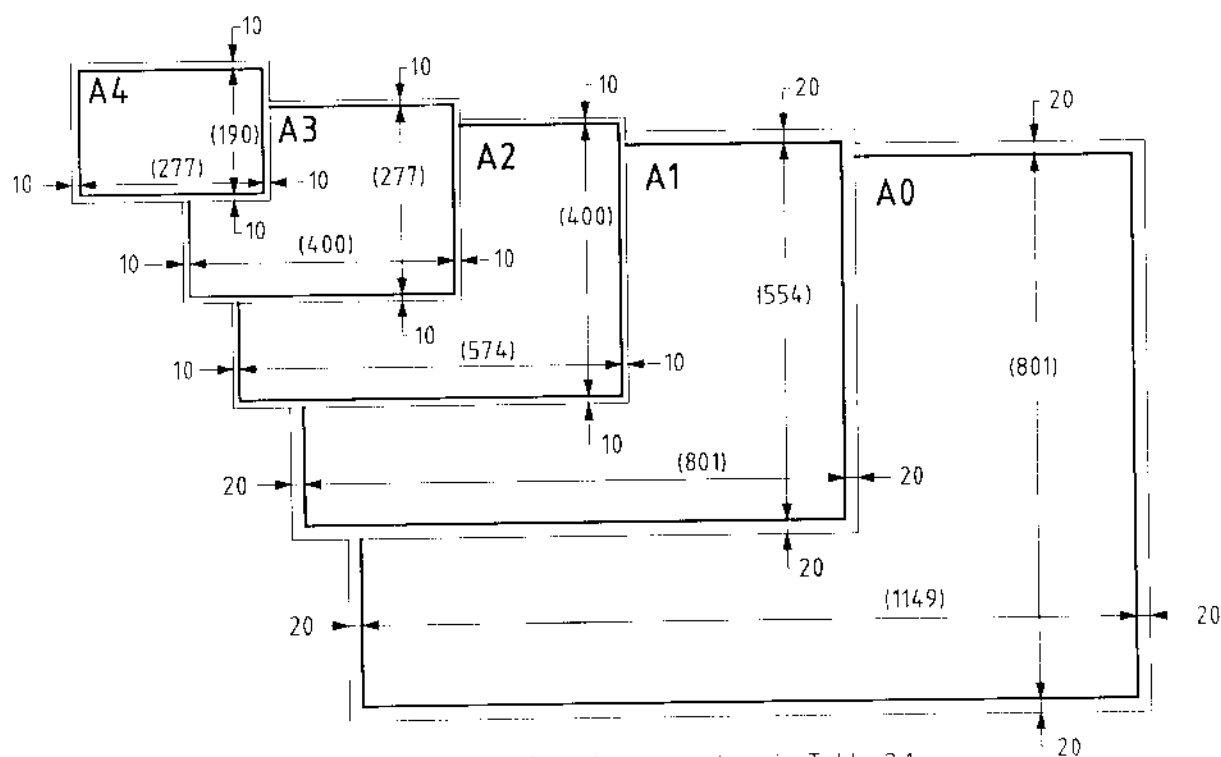
2.5.4 Grid referencing The provision of a grid reference system is recommended for all sizes, in order to permit easy location on the drawing of details, additions, and modifications.

The number of divisions should be divisible by two and be chosen in relation to the complexity of the drawing. It is recommended that the length of any side of the rectangles comprising the grid be not less than 25 mm and not more than 75 mm.

The rectangles of the grid should be referenced by means of capital letters along one edge and numerals along the other edge. The numbering direction may start at the sheet corner opposite to the title block and be repeated on the opposite sides.

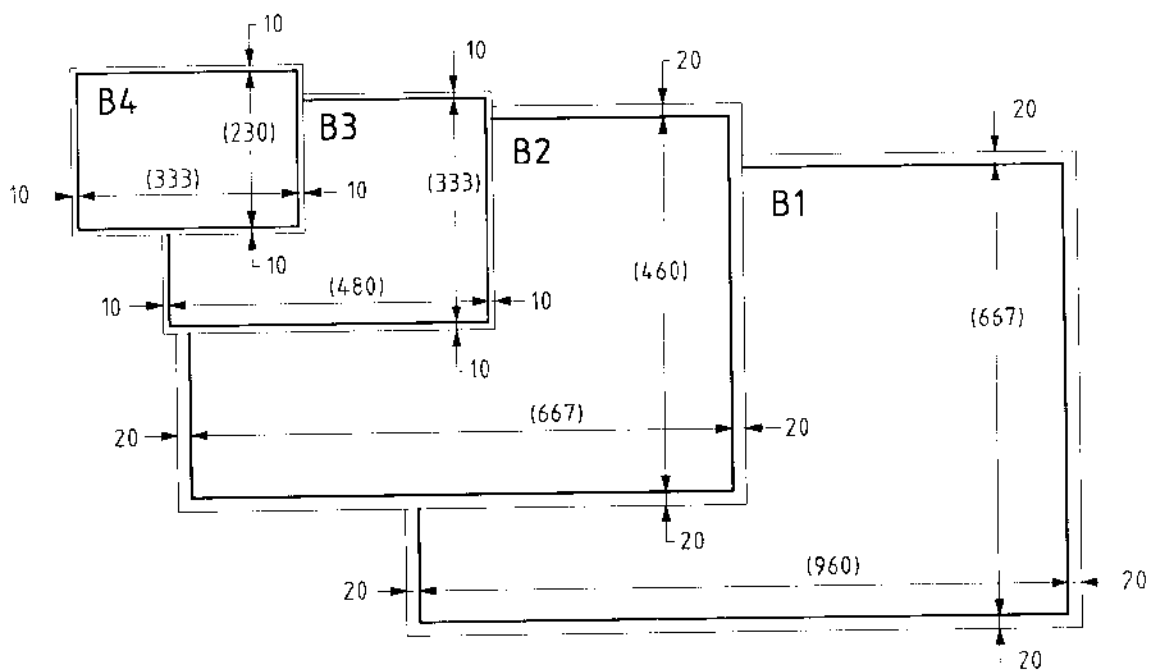
The letters and numerals shall be placed in the borders, close to the frame at a minimum distance of 5 mm from the edges of the trimmed sheet, and shall be written in upright characters according to Section 4 (see Figure 2.5).

If the number of the lettered divisions exceeds that of the alphabet, the reference letters with the extra divisions should be doubled (AA, BB, CC, etc).



NOTE: Overall dimensions are given in Table 2.1

(a) Preferred Series Sheets



NOTE: Overall dimensions are given in Table 2.4

(b) Non-preferred Series Sheets

FIGURE 2.1 SIZE AND LOCATION OF DRAWING FRAME ON DRAWING SHEETS WITHOUT FILING MARGIN

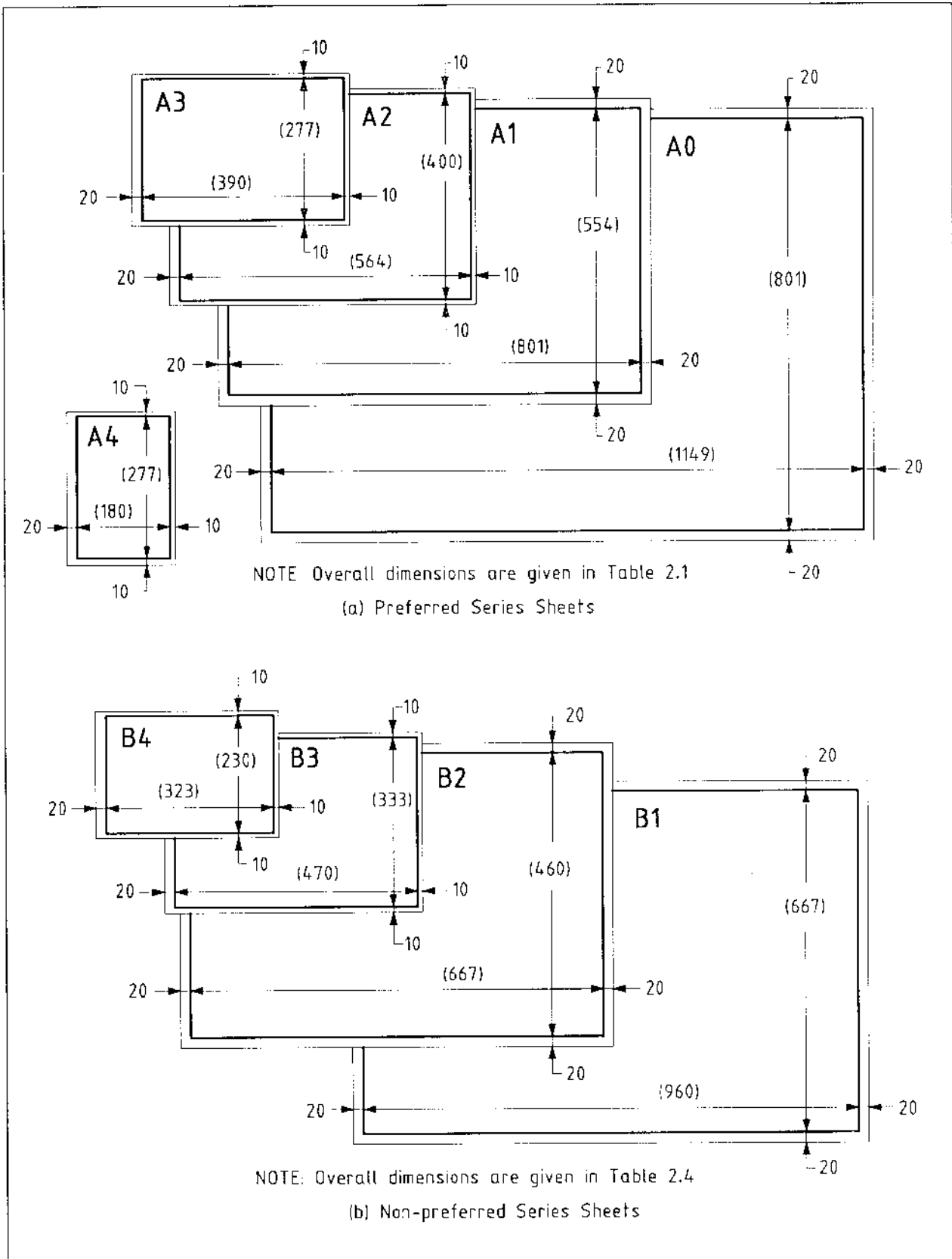
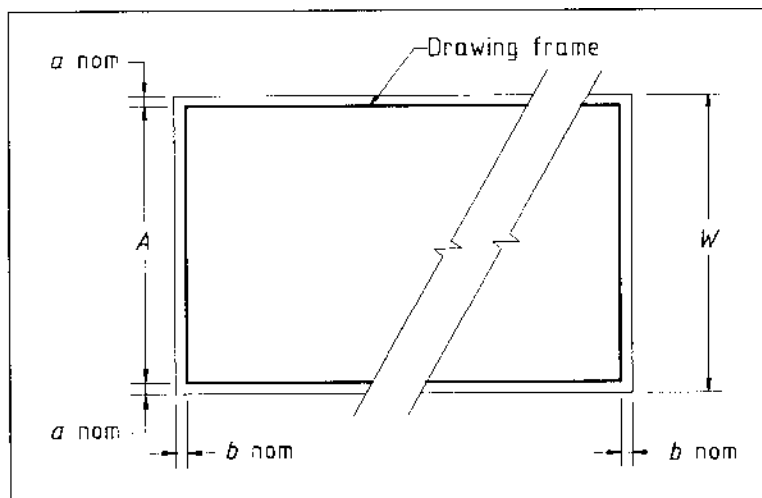


FIGURE 2.2 SIZE AND LOCATION OF DRAWING FRAME ON DRAWING SHEETS WITH FILING MARGIN



Standard width of roll [*] W	Nominal width of borders		millimetres
	Top and bottom a	On both sides b	Width of rectangular drawing frame A
860	29.5	20 min.	801
610	28	20 min.	554

* See Clause 2.4.3.

FIGURE 2.3 DIMENSIONS OF DRAWING FRAME—ROLL DRAWINGS

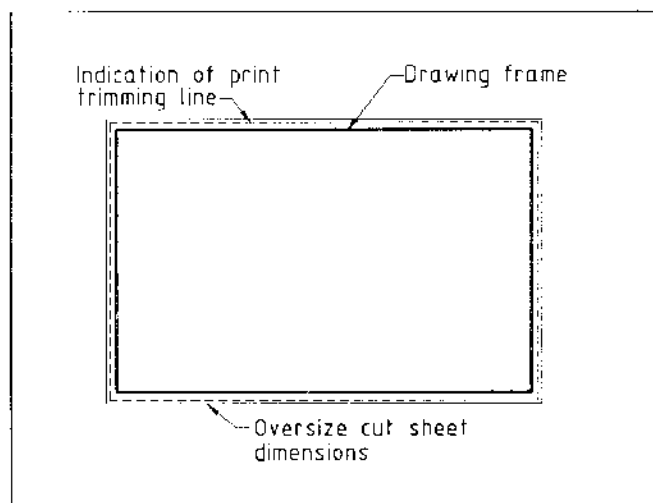


FIGURE 2.4 OVERSIZE DRAWING SHEET WITH PRINT TRIMMING LINE INDICATION

2.5.5 Sheet designation The sheet size designation number shall be indicated on the drawing, preferably in the right-hand bottom corner of the drawing frame (see Figure 2.6).

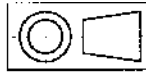
Drawings prepared for microfilming shall contain means of determining the original size. This should be achieved preferably by indicating the drawing frame dimensions. These may be shown outside the drawing frame near a corner (see Figure 2.6). Alternatively a graduated line at least 150 mm long should be shown in a suitable location (see Figure 2.8).

2.5.6 Other information The following information should be displayed on each drawing sheet in a prominent position as illustrated in Figures 2.6, 2.7, 2.8, and 2.9:

(a) Indication of system of projection.

(i) For third angle projection, which is the preferred system, either —

(A)

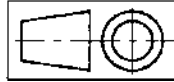


or (B)

3RD ANGLE PROJECTION

(ii) For first angle projection, either —

(A)



or (B)

1ST ANGLE PROJECTION

(b) Prohibition of scaling —

DO NOT SCALE

(c) Dimensional units —

DIMENSIONS IN MILLIMETRES

or other units as appropriate.

(d) The Standard to which the drawing is prepared.

2.5.7 Fold lines Where required, fold lines should be indicated on drawing sheets according to the method of folding used.

2.5.8 Layout

2.5.8.1 General Examples of layouts of drawing sheets are given in Figures 2.6, 2.7, 2.8, and 2.9. It is recognized that considerable latitude is necessary in the arrangement and position of title blocks, material and parts lists, and other text, and consequently the layouts illustrated should be regarded only as typical of practice. They may be modified in detail to suit the needs of any particular organization.

2.5.8.2 Detail drawings Figure 2.8 shows a sheet suitable for detail drawings. Normally, for production in quantity, only one part is shown on such a sheet, the size of which will vary to suit the actual part. The drawing and the contents of the title block should provide all the information needed for the manufacture of the part and indexing of drawing.

2.5.8.3 Assembly and multidetail drawings Figures 2.7 and 2.8 are examples of sheets suitable for assembly drawings or for drawings which show a number of parts on the same sheet. In either case, only general information is given in the title block, and particular information for the individual parts is tabulated in a material or parts list.

2.5.9 Title block Spaces shall be provided in the title block for the following information (see Figure 2.9):

(a) Name of firm, organization, department.

(b) Title or name of drawing.

(c) Drawing number.

(d) Signatures or initials and dates.

In addition, the scale, method of projection, and other information considered relevant may be shown.

The title block should be located in the bottom right-hand corner of the drawing sheets. For convenience of drawing layout however, the top right-hand corner may be used (see Figure 2.8).

The space for the drawing number shall be located in the title block near to the corner of the sheet. In addition, other spaces for the drawing number may be located in other corners of the sheet or along the sides of the sheet to ensure that it is visible when the drawing is filed or when a print is folded (see Figure 2.8).

2.5.10 Supplementary information It is recommended that spaces also be provided to the left of the title block as may be required to provide for the inclusion of standard information relating to units of measurement, tolerances, key to machining and other symbols, treatment, finish, tool and gauge references, issue number or letter, revision information, material specification, reference drawing numbers, and other details.

2.5.11 Material or parts list Where several parts are detailed on the one sheet or an assembly of parts is shown, a tabulated material or parts list should be provided adjacent to the title block. Where the list is extensive or when more convenient, a separate sheet distinct from detail or assembly drawings may be used. Such lists should be prepared on standard size drawing sheets, with the same essential spaces as specified for the title blocks of drawings (see Figures 2.7, 2.8, 2.10, 2.11, 2.12, and 2.13).

The list should also include the following information:

- (a) Items or part numbers.
- (b) Description or name of part.
- (c) Quantity required.
- (d) Material, material specification.
- (e) Drawing number of detail drawing.
- (f) Stores reference number, if applicable.

The quantity column may be extended, as shown in Figure 2.10, where the same parts may be used in different assemblies or groups, e.g. in different machines or different models.

2.5.12 Thickness of format lines The format lines specified in this Standard shall conform to the thickness given in Table 2.6.

NOTE: Lines used in drawing practice are specified in Section 3.

TABLE 2.6
THICKNESS OF FORMAT LINES

Features	Thickness of lines mm		
	Sheet size		
	A0 B1	A1 B2	A2, A3, A4 B3, B4
Border lines (see Clause 2.5.1)	1.4	1.0	0.7
Projection symbol (see Clause 2.5.6) Principal lines in title block (see Clause 2.5.9)	1.0	0.7	0.5
Grid lines (see Clause 2.5.4)	0.7	0.5	0.35
Camera alignment marks (see Clause 2.5.3)	0.5	0.35	0.25
Fold lines (see Clause 2.5.7)	0.25	0.25	0.25
Other format lines	0.35	0.25	0.18

2.5.13 Lettering in drawing layouts Lettering should comply with the requirements specified in Section 4.

2.5.14 Orientation of drawings The orientation of all tables, parts and lists, and drawings (including dimensions) shall be placed so as to read either from the bottom or right-hand side of the drawing sheet (see Figures 2.10 and 2.11).

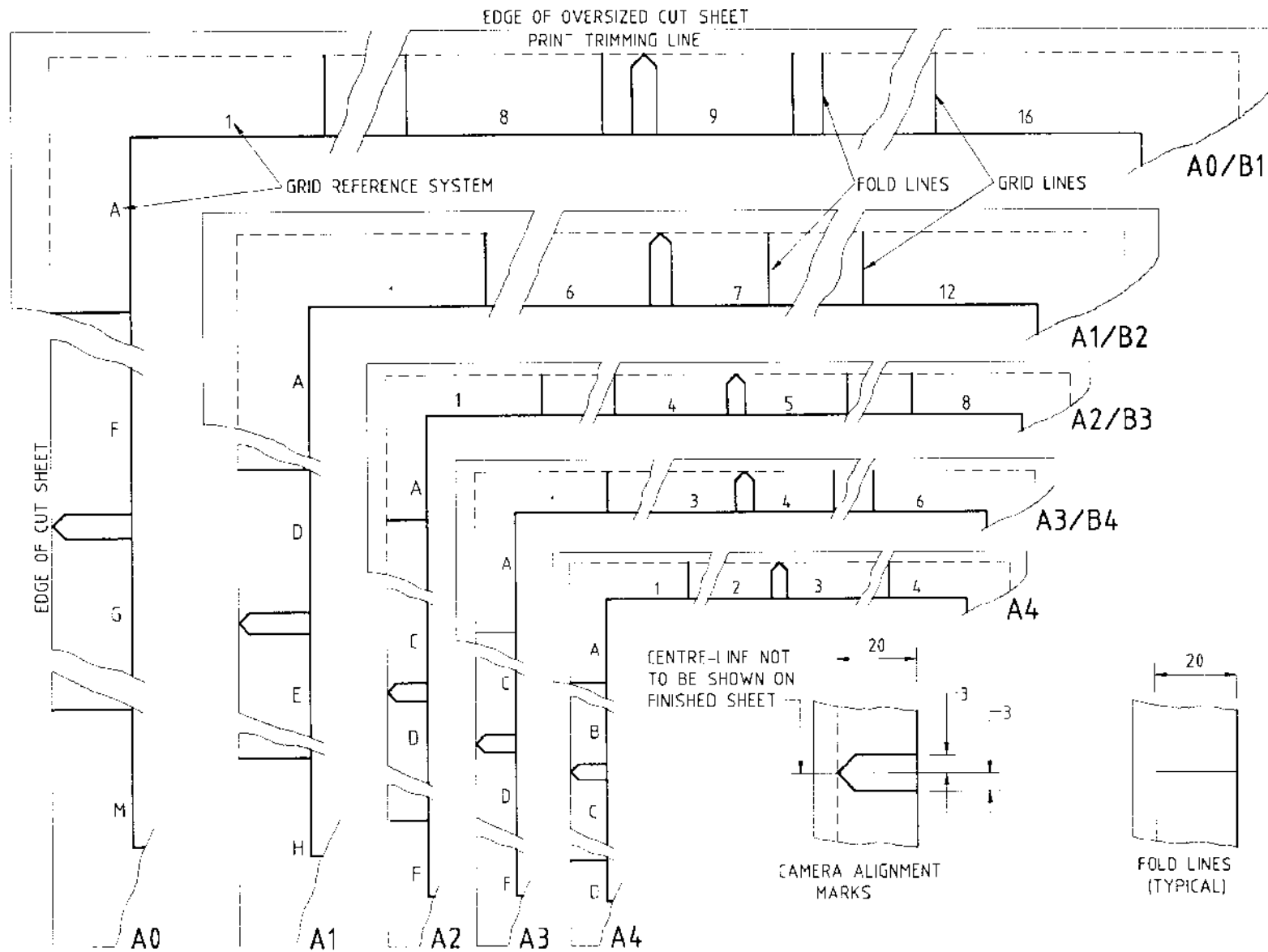


FIGURE 2.5 TYPICAL CAMERA ALIGNMENT MARKS, REFERENCE SYSTEM, AND FOLD LINES FOR PREFERRED AND NON-PREFERRED SERIES DRAWING SHEETS

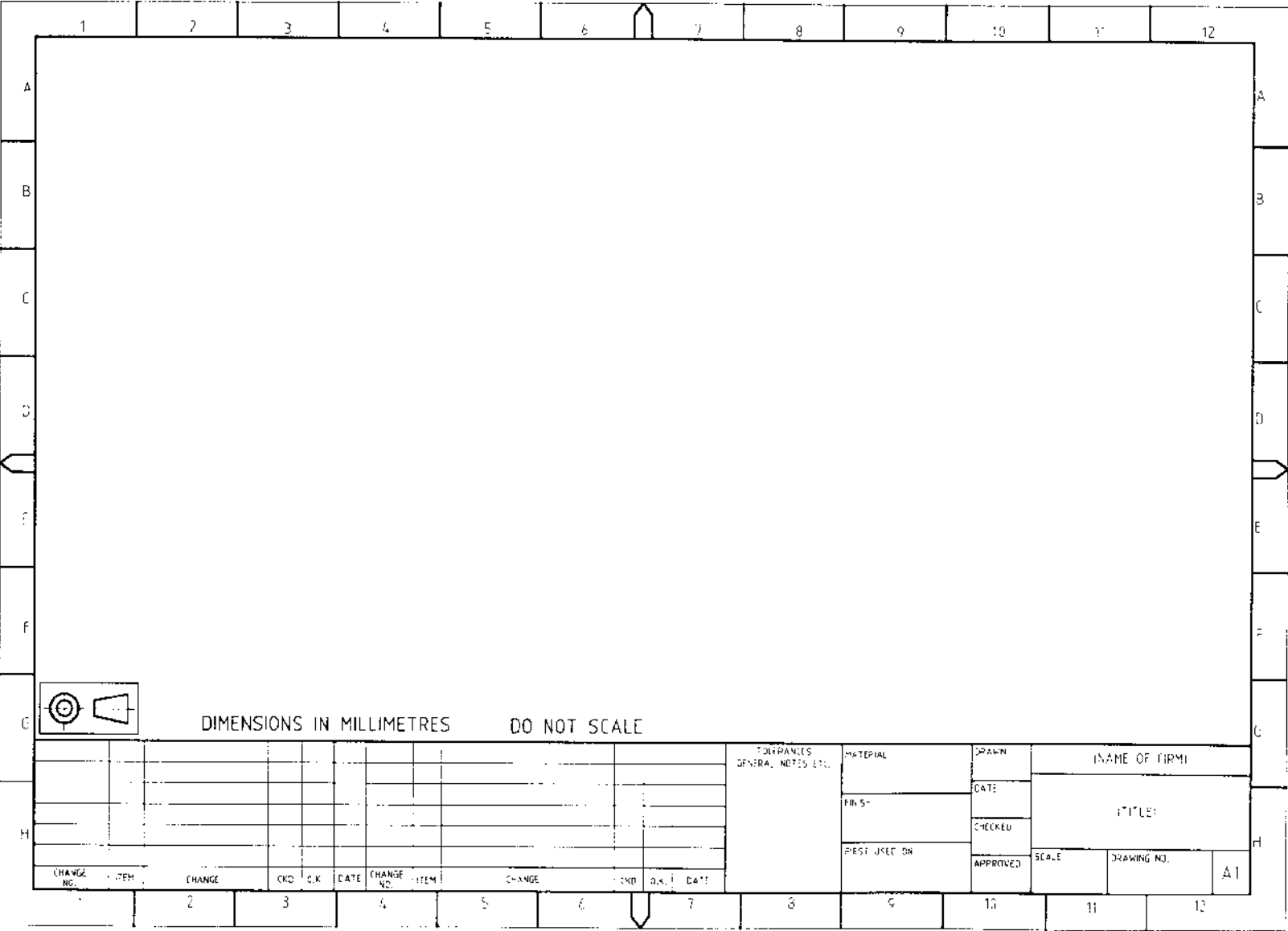


FIGURE 2.6 TYPICAL LAYOUT OF A DRAWING SHEET WITHOUT PARTS LIST

1	2	3	4	5	6	7	8	9	10	11	12			
									ZONE	RFF	REVISION	BY	CHKD	DATE

ITEM	PART NO.	NAME OF PART	QTY	MATERIAL	STORES REF. NO.
DRAWN					
NAME OF FIRM					
DATE					
CHECKED					
APPROVED					
SCALE				DRAWING NO.	
					A1

DIMENSIONS IN MILLIMETRES
 DO NOT SCALE

Figure 2.7 TYPICAL LAYOUT OF A DRAWING SHEET WITH PARTS LIST

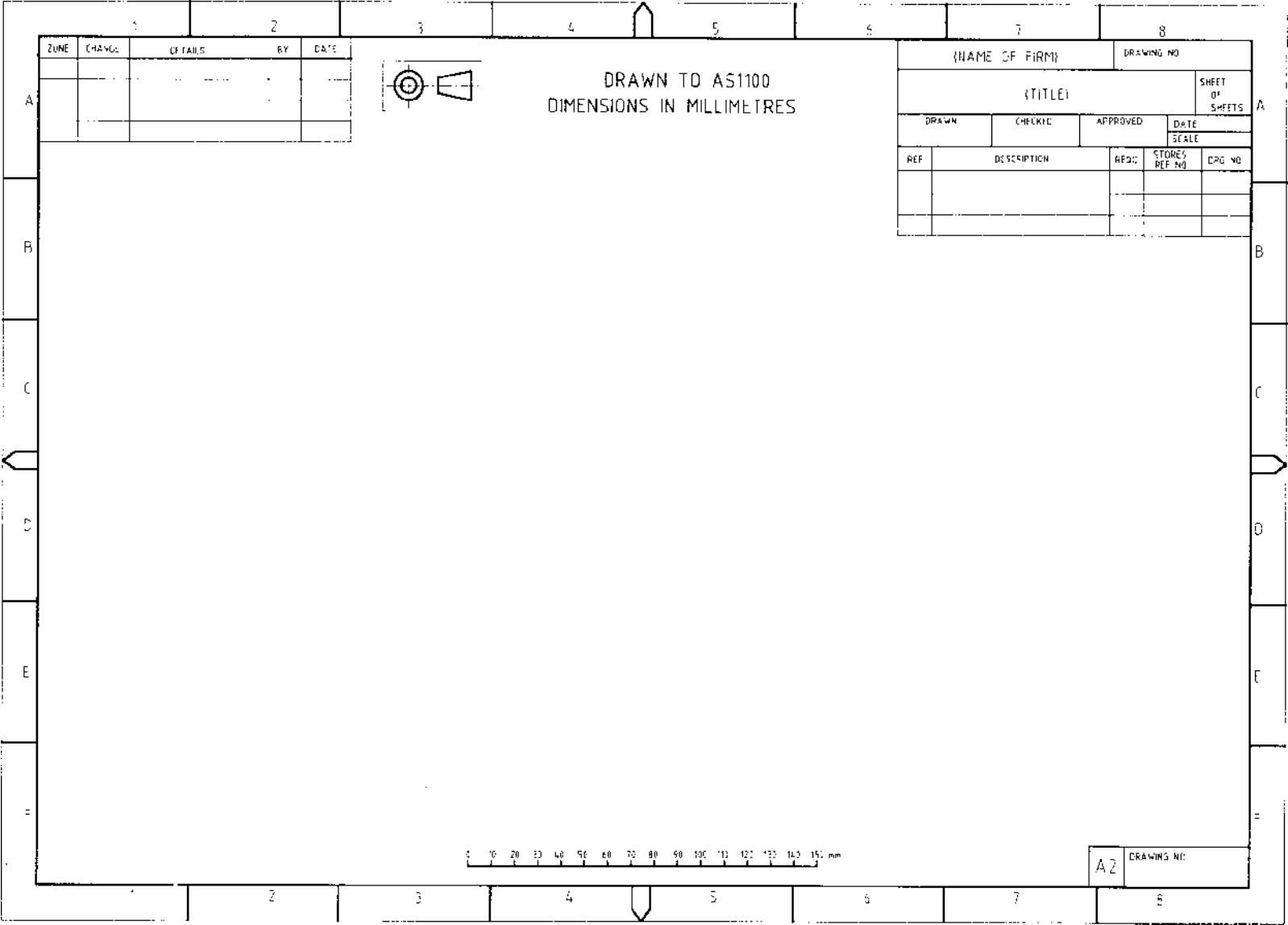


FIGURE 2.8 TYPICAL LAYOUT OF A DRAWING SHEET WITH ALTERNATIVE LOCATION OF TITLE BLOCK AND PARTS LIST

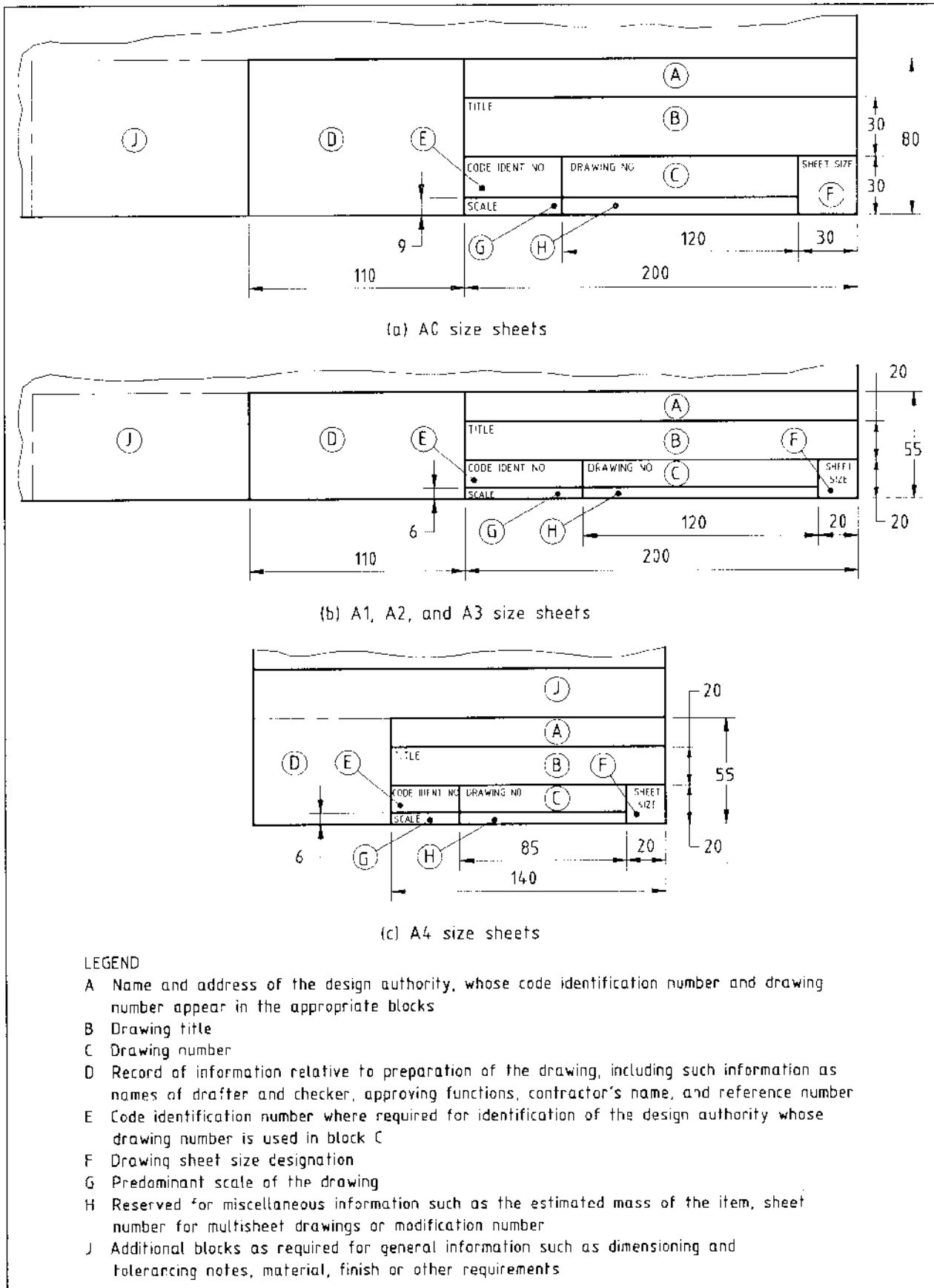


FIGURE 2.9 TYPICAL TITLE BLOCKS

FIGURE 2.10 TYPICAL LAYOUT OF A PARTS LIST

[illegible]

FIGURE 2.11 TECHNICAL DATA SHEET FOR COMPONENTS—ELECTROTECHNOLOGY

COPYRIGHT

TECHNICAL DATA CORRELATION SHEET																									
CHANGE No	CIRCUIT	ISSUES																							CHANGES
		TECHNICAL DATA																							
		SHEET No																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
ASSOCIATED DRAWINGS																									
DRAWING No		SHT No		TITLE																					
DRAWN	CHKD	AMENDMENT				LXAMU	APPD	DATE	ORDER	ISS															
											SHEET OF SHEETS														

A4

FIGURE 2.13 TECHNICAL DATA CORRELATION SHEET — ELECTROTECHNOLOGY

SECTION 3 LINES

3.1 TYPES OF LINES Lines on drawings shall be selected according to their application. Preferred types are shown in Table 3.1 and shall be selected from one of the line groups given in Figure 3.1. Each type is designated by a letter. Preferred types of the lines are shown in Table 3.1 and Figure 3.1 and typical applications in Figures 3.2 to 3.18.

TABLE 3.1
LINES AND APPLICATIONS

1	2	3	4	5
Designating letter	Type of line	Example of line	Typical application	Examples of application (Figure Nos)
A	Continuous—thick		Visible outlines General details Existing buildings Landscaping in site plans Busbars and transmission paths	3.3 3.4 3.2 3.5
M	Continuous—medium		See Note 1	—
B	Continuous—thin		Fictitious outlines Imaginary intersection of surfaces Dimension lines, projection lines, intersection lines and leaders Hatching and outlines of revolved sections Fold and tangent bend lines Short centre-lines General purpose electrical conductors and symbols	3.3 3.6 3.3 3.3 3.7 3.9 3.5
C	Continuous—thin, free-hand		Break lines (other than on an axis)	3.3, 3.8
D	Continuous—thin, ruled with zig-zag		Break lines (other than on an axis)	3.3, 3.4
E	Dashed—thick (see Note 2)		Hidden outlines Hidden edges	
N	Dashed—medium (see Note 2)		See Note 1	
F	Dashed—thin (see Note 2)		Hidden outlines Jumper connections magnetic or electric screen	3.3, 3.9
G	Chain—thin	 $s = 1 \text{ mm MINIMUM}$ $q = 2s \text{ to } 4s$ $p = 3q \text{ to } 10q$	Centre-lines and axes of solid Pitch lines Path lines for indicating movement Features in front of a cutting plane Indication of repeated detail Developed views Material to be removed Cutting planes	3.3 3.3 3.10 3.7 3.11 3.3
H	Chain—thick at ends and at change of direction—thin elsewhere		See Note 3	
J	Chain—thick		See Note 3	
K	Chain—thin, double dashed		See Note 3	
			Indications of surfaces to comply with special requirements Pipelines, drains, services Outlines of adjacent parts Alternative and extreme position of movable parts Centroidal lines Tooling	3.3, 3.12 3.2 3.3, 3.13 3.3 3.18 3.14

NOTES:

- 1 It is desirable to restrict line thickness to two on any one drawing. A medium thickness line may be used by some drafting disciplines such as structural and electrical for additional clarity. Refer to drafting standards for particular disciplines for examples.
- 2 It is recommended that only one thickness of dashed line be used.
- 3 Proportions of spaces are as specified for Type G.

3.2 DIMENSIONS OF LINES

3.2.1 Thickness The thickness of lines shall be selected from one of the line groups given in Figure 3.1, and shall be such that the thickness of any line after reproduction shall be not less than 0.18 mm.

3.2.2 Dashes The length and spacing of dashes shall be consistent, but they may vary in length depending on the complete length of the line and size of the drawing. Recommended dimensions are shown in Table 3.1.

LINE GROUP 1.0 mm		mm	LINE GROUP 0.7 mm		mm
A		1.0	A		0.7
M		0.7	M		0.5
B		0.5	B		0.35
C		0.5	C		0.35
D		0.5	D		0.35
E		1.0	E		0.7
N		0.7	N		0.5
F		0.5	F		0.35
G		0.5	G		0.35
H		{ 0.5 1.0	H		{ 0.35 0.7
J		1.0	J		0.7
K		0.5	K		0.35
LINE GROUP 0.5 mm		mm	LINE GROUP 0.35 mm		mm
A		0.5	A		0.35
M		0.35	M		0.25
B		0.25	B		0.18
C		0.25	C		0.18
D		0.25	D		0.18
E		0.5	E		0.35
N		0.35	N		0.25
F		0.25	F		0.18
G		0.25	G		0.18
H		{ 0.25 0.5	H		{ 0.18 0.35
J		0.5	J		0.35
K		0.25	K		0.18

FIGURE 3.1 LINE GROUPS

3.3 LINE SPACING Parallel lines shall be drawn with a clear space between them of not less than twice the thickness of the thickest line, with a minimum space of 1 mm.

Where a group of parallel lines intersect another group of parallel lines, the space between lines in each group should be not less than 2 mm.

3.4 LINE DENSITY To facilitate good quality reproduction of drawings using dyeline or microfilming processes, all lines on original drawings shall be matt, of constant density and have a high contrast with respect to the material background.

NOTE: Contrast is the difference between the optical density of a line and that of the sheet. The optical density of a medium is $\log_{10} \frac{(I_0)}{(I_1)}$ where I_0 is the amount of light falling on the surface of the medium and I_1 is the amount of light passing through the medium. A suggested minimum value for optical density is 0.7.

3.5 TYPICAL APPLICATION OF LINES

3.5.1 Type A Type A lines shall be used for the following purposes:

- (a) Visible outlines of features of an object (see Figure 3.3).
- (b) General details of structures (see Figure 3.4).
- (c) Landscaping and existing buildings in survey drawing (see Figure 3.2).
- (d) Busbars and transmission paths in electrotechnology (see Figure 3.5).

3.5.2 Type B Type B lines shall be used for the following purposes:

- (a) Fictitious outlines, such as minor diameters of external threads and major diameters of internal threads (see Figure 3.3).
- (b) Dimension lines and projection lines (see Figure 3.3).
- (c) Hatching (see Figures 3.3 and 3.4).
- (d) Leaders (see Figures 3.3 and 3.4).
- (e) Outlines of revolved sections (see Figure 3.3).
- (f) Imaginary intersection of surfaces (see Figure 3.6). Such lines should not meet the outlines.
- (g) Fold or tangent bend lines (see Figure 3.7).
- (h) Short centre-lines if Type G lines are not appropriate (see Clause 3.5.6).
- (i) General purpose electrical conductors and symbols (see Figure 3.5).
- (j) Line of intersection of principal planes (see Figure 6.18).

See also Clause 3.6.

3.5.3 Types C and D Lines of Types C and D shall be used to terminate part views (see Figures 3.3 and 3.4) and part sections (see Figure 3.8).

Type C is recommended for short break lines and for the S-break in cylindrical members in exterior views. Type D is recommended for long break lines, and shall extend beyond the outlines which they terminate.

Both types may be used in the one view (see Figure 3.3).

3.5.4 Type E Type E lines shall be used to indicate hidden outlines and hidden edges.

3.5.5 Type F Type F lines shall be used to indicate hidden outlines of internal features of an object that are not otherwise shown, or where their use would assist or is necessary in the interpretation of the drawing (see Figure 3.9). Features located behind transparent materials shall be treated as hidden parts.

It is important to guard against excessive use of hidden outlines. They should be confined to the view or views in which they are needed.

The following further requirements in the use of Type F lines are illustrated in Figure 3.9:

- (a) Hidden outlines should always begin and end with a dash in contact with the visible or hidden outline at which they start and end, except where such a dash would form a continuation of a visible outline.
- (b) Dashes should join at corners, and arcs should start with dashes at the tangent points.
- (c) Dashes of parallel hidden outlines, when close together, should preferably be staggered.

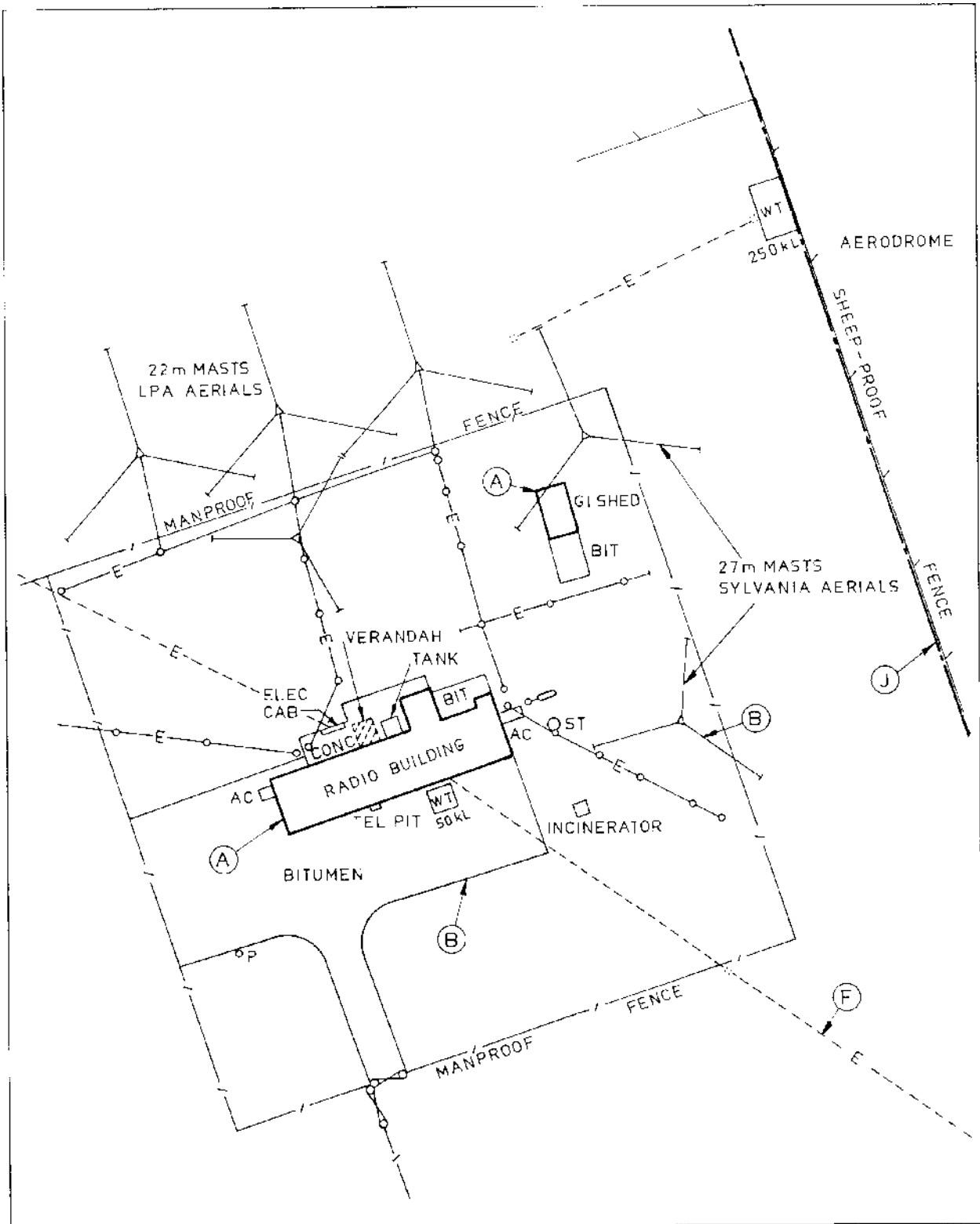


FIGURE 3.2 TYPICAL APPLICATION OF TYPES OF LINES — SURVEY

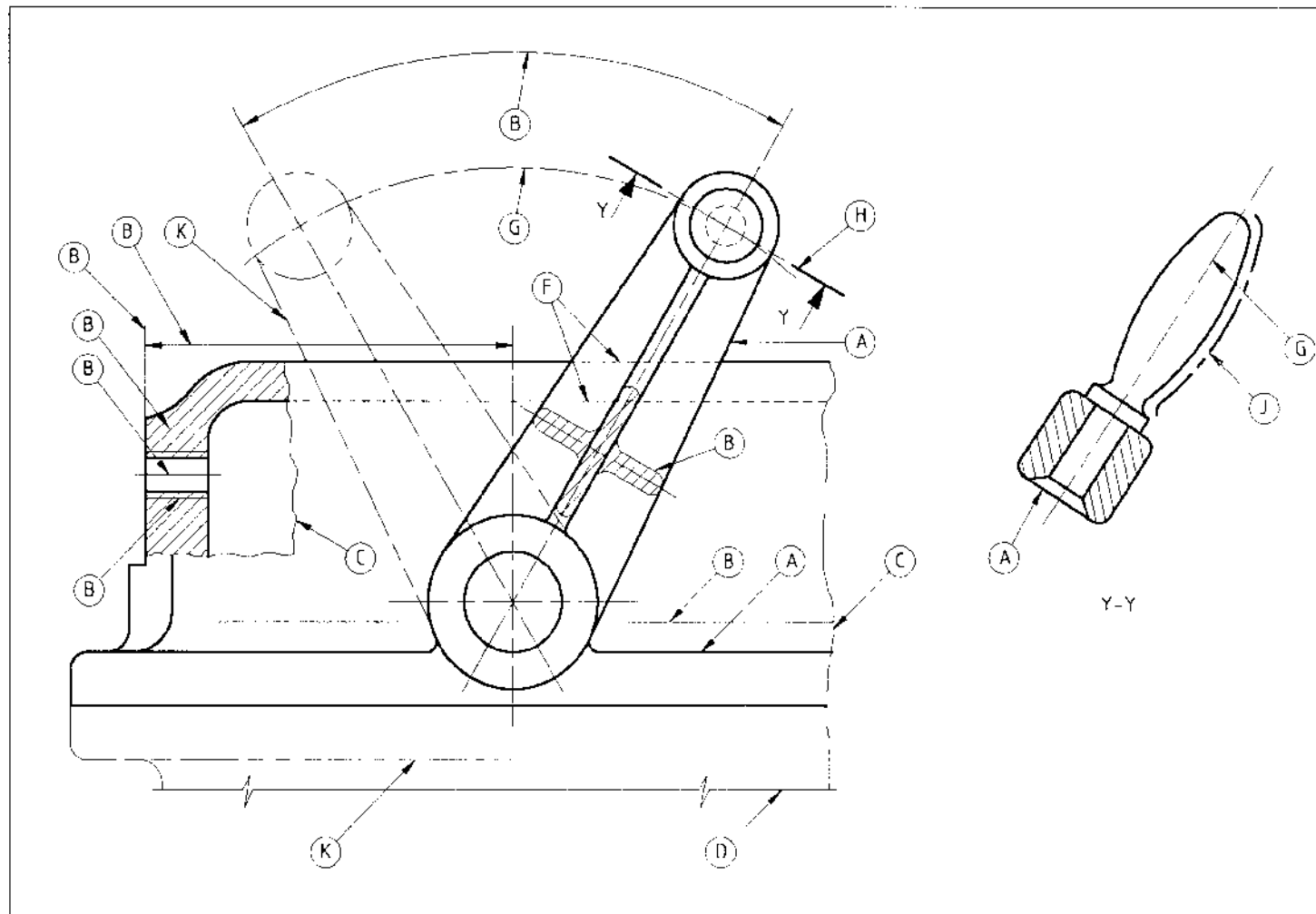


FIGURE 3.3 TYPICAL APPLICATION OF TYPES OF LINES—MECHANICAL

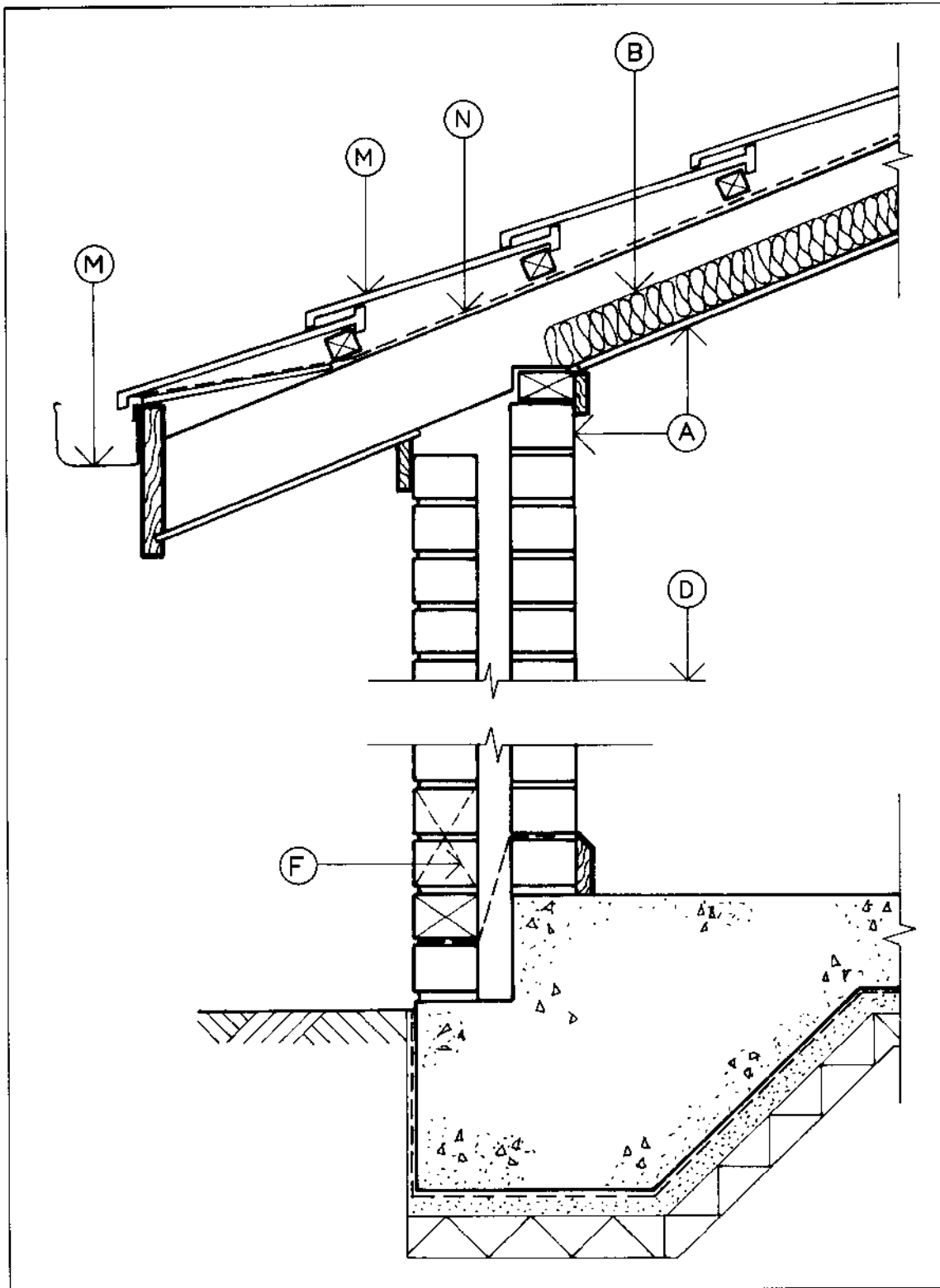


FIGURE 3.4 TYPICAL APPLICATION OF TYPES OF LINES—ARCHITECTURAL

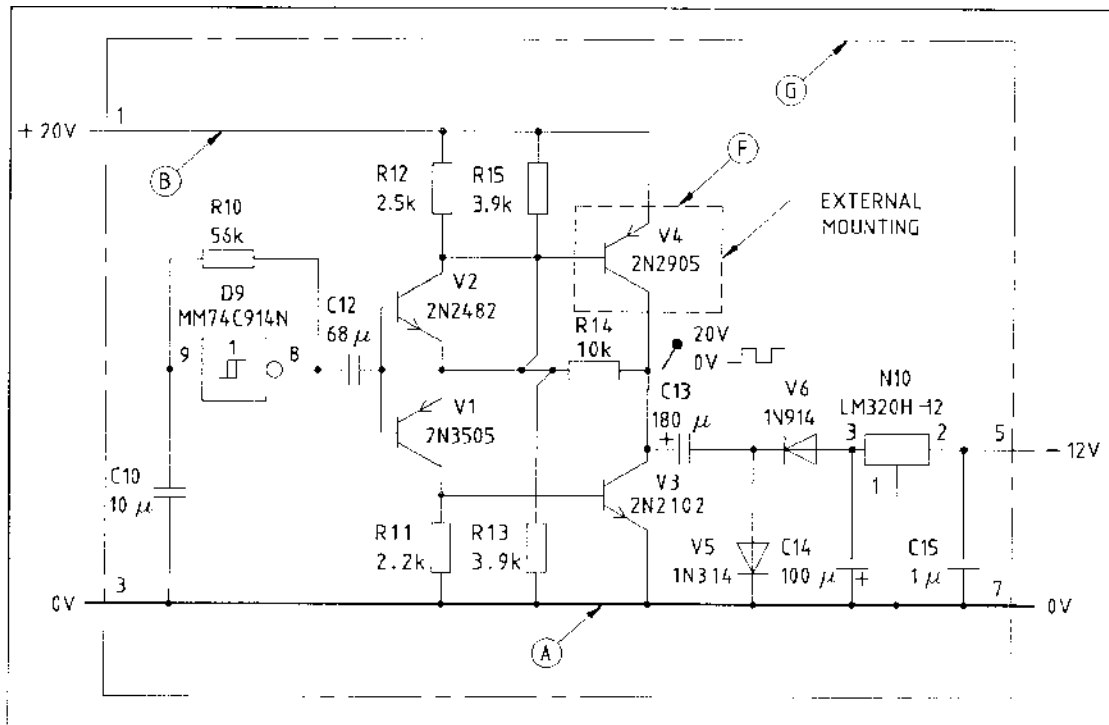


FIGURE 3.5 TYPICAL APPLICATION OF TYPES OF LINES—ELECTROTECHNOLOGY

3.5.6 Type G Type G lines shall be used for centre-lines and pitch lines, and for indicating features in front of a cutting plane (see Figure 3.10). They may also be used for indication of repeated details.

Centre-lines of a feature should not intersect in the spaces between dashes.

Centre-lines should project for a short distance beyond relevant outlines and, where necessary for dimensioning or correlation of views, they may be extended. For short centre-lines, Type G lines should be used with a long dash passing through the feature and a short dash at each end (see Figure 3.9). A Type B line may be used for a short centre-line where there is no space for a dash or where there is no confusion with other types of lines.

For use of this line for developed views, see Figure 3.7.

Type G lines shall be used to show material to be removed, such as locating or holding bosses and lugs which are subsequently cut off (see Figure 3.11).

3.5.7 Type H Type H lines shall be used to indicate the location of cutting planes in sectioning and the viewing position for removed views and removed partial views. The short arrowed leaders indicating direction of viewing position should be located with the arrow touching and normal to the thick ends of the Type H lines (see Figure 3.3).

3.5.8 Type J Type J lines shall be used to indicate that portion of a surface which has to comply with some special requirement. For example, Figures 3.3 and 3.12 require a surface which has to comply with some special tolerance requirement or requires special surface treatment such as surface hardening detailed by a note.

3.5.9 Type K Type K lines shall be used for the following purposes:

- Outlines of adjacent parts (see Figures 3.3 and 3.13). Where an adjacent part is shown in section, hatching should be shown only to avoid confusion and then only along the outlines.
- Alternative and extreme positions of movable parts (see Figure 3.3).
- Centroidal lines (see Figure 3.18(b)).
- Tooling outlines. Alternatively, the component outline where tool drawings are involved (see Figure 3.14).

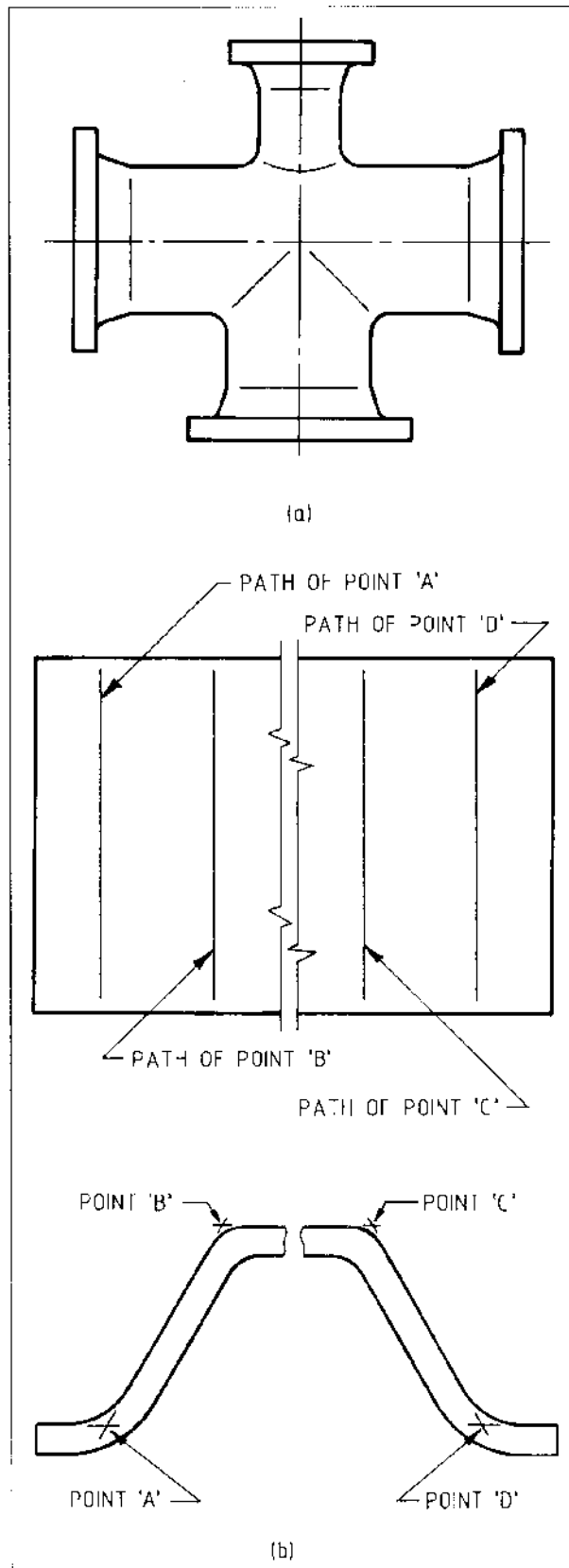


FIGURE 3.6 IMAGINARY INTERSECTION OF SURFACES

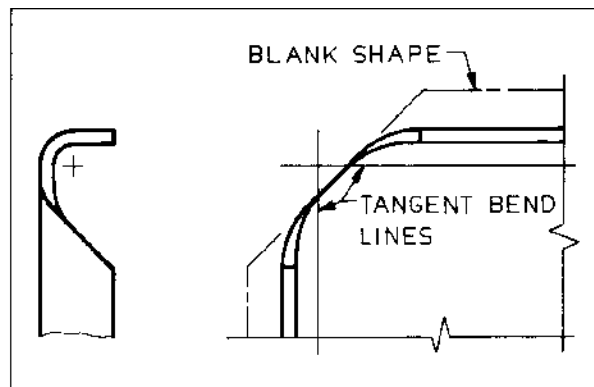


FIGURE 3.7 TANGENT BEND LINES

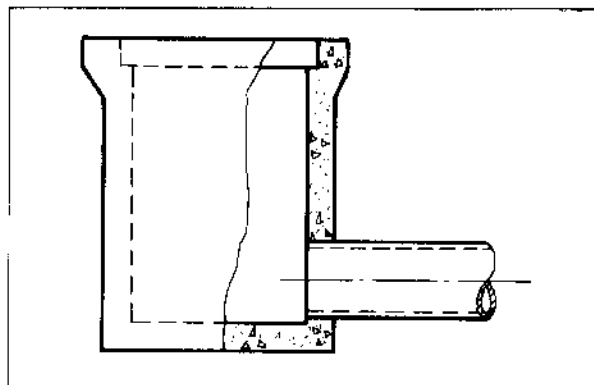
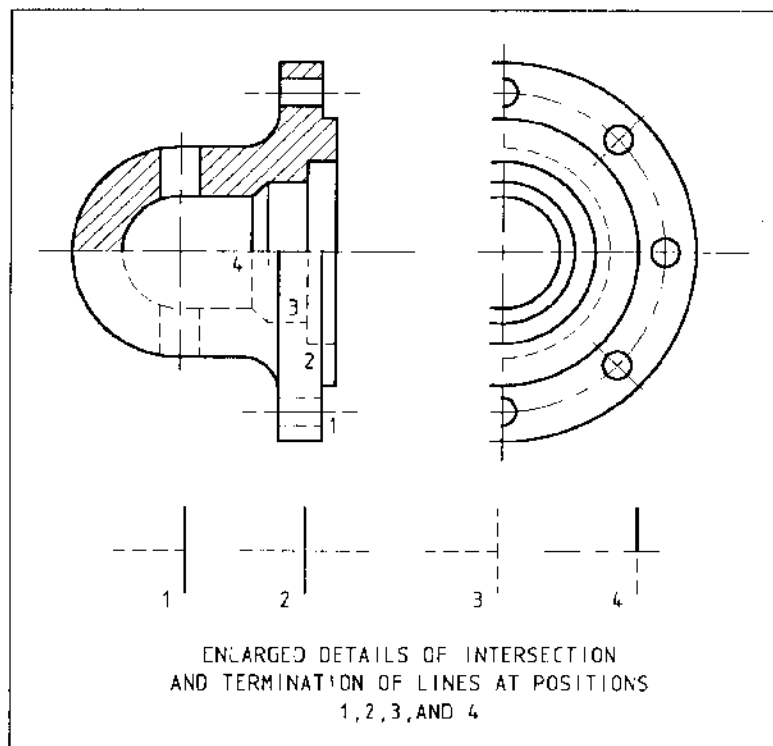
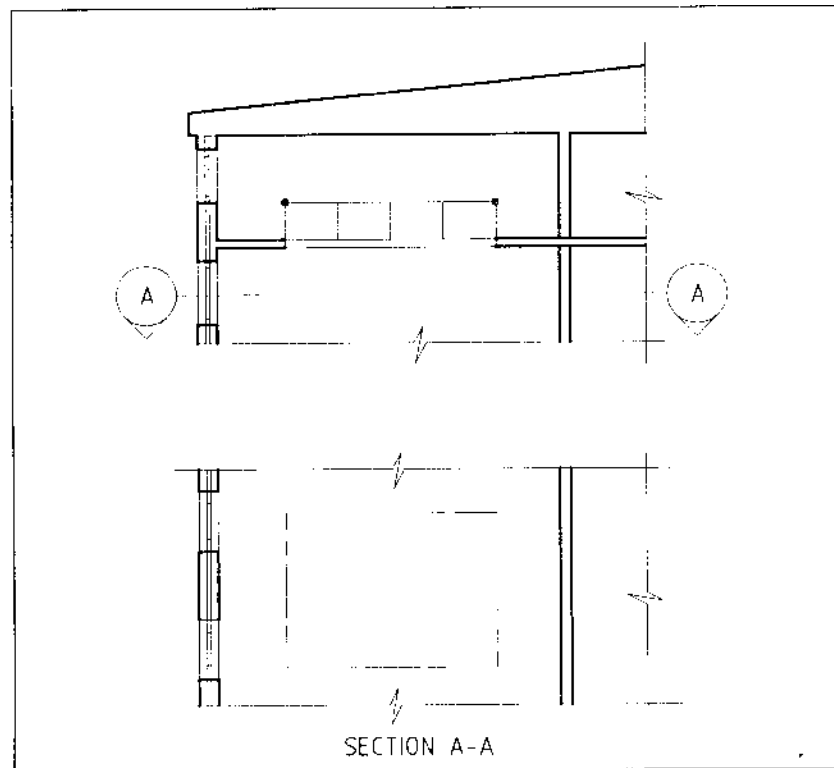


FIGURE 3.8 PART SECTION AND S-BREAK LINES



NOTE: Section shown for hidden detail.

FIGURE 3.9 HIDDEN OUTLINE TECHNIQUES



NOTE: Architectural example in accordance with AS 1100.301—in first angle projection.

FIGURE 3.10 FEATURE IN FRONT OF CUTTING PLANE

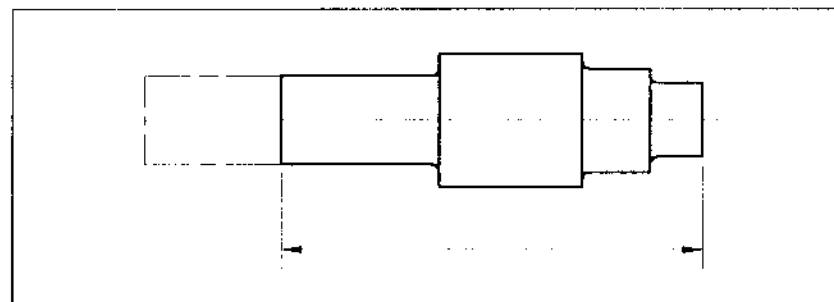


FIGURE 3.11 MATERIAL TO BE REMOVED

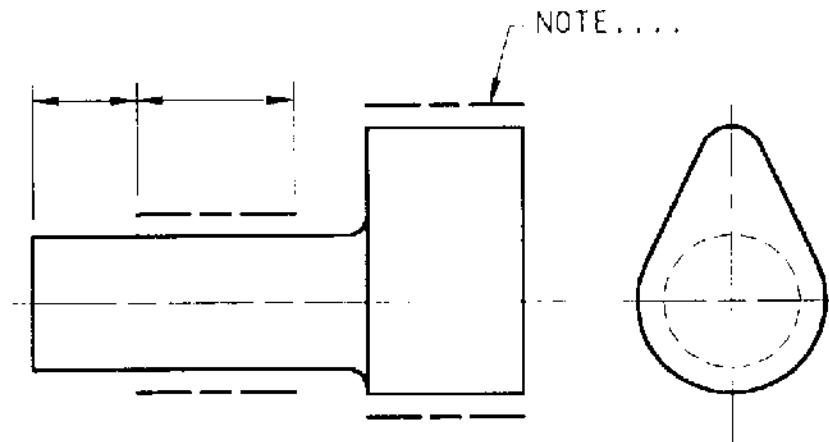


FIGURE 3.12 SURFACE TO MEET SPECIAL TOLERANCE REQUIREMENTS AND SURFACE TREATMENT

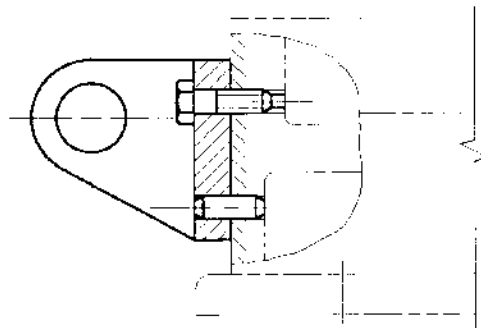


FIGURE 3.13 ADJACENT PART

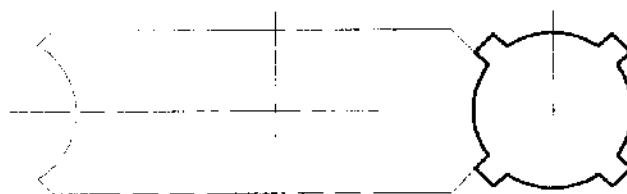


FIGURE 3.14 TOOL SHAPE IN OUTLINE

3.6 SPECIAL APPLICATIONS OF LINES

3.6.1 Representation of some plane faces A flat surface may be indicated by two diagonal Type B lines as shown in Figure 3.15.

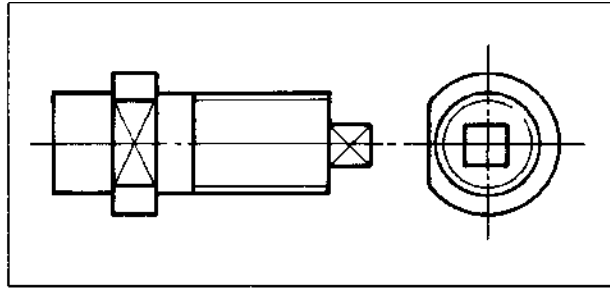


FIGURE 3.15 INDICATION OF FLAT SURFACES

3.6.2 Representation of a rectangular opening A rectangular opening in a floor or a hatchway may be indicated by two diagonal Type B lines as shown in Figure 3.16.

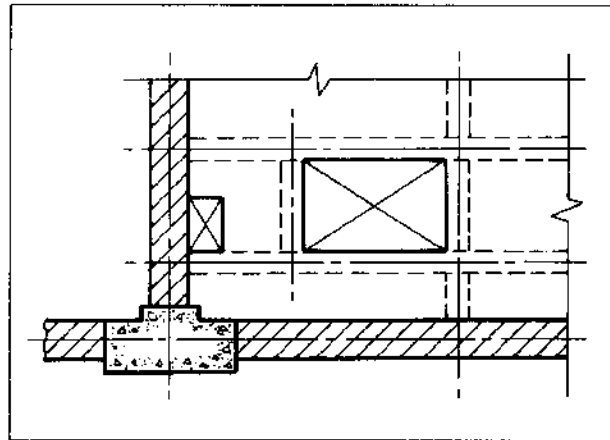


FIGURE 3.16 REPRESENTATION OF RECTANGULAR FLOOR OPENING

3.6.3 Partial views of symmetrical objects Where it is desired to draw a symmetrical object as a fraction of the whole, the line of symmetry shall be indicated by two short parallel Type B lines, drawn normal to and at each end of it (see Figure 3.17).

3.6.4 Other special applications Where special lines are used of types other than those shown in this Standard, their purpose should be stated.

3.7 ORDER OF PRIORITY OF COINCIDENT LINES Where two or more lines of different type coincide, the following order of priority should be observed (see Figure 3.18):

- (a) Visible outlines and edges.
- (b) Hidden outlines and edges.
- (c) Cutting planes.
- (d) Centre-lines.
- (e) Centroidal lines.
- (f) Projection lines.

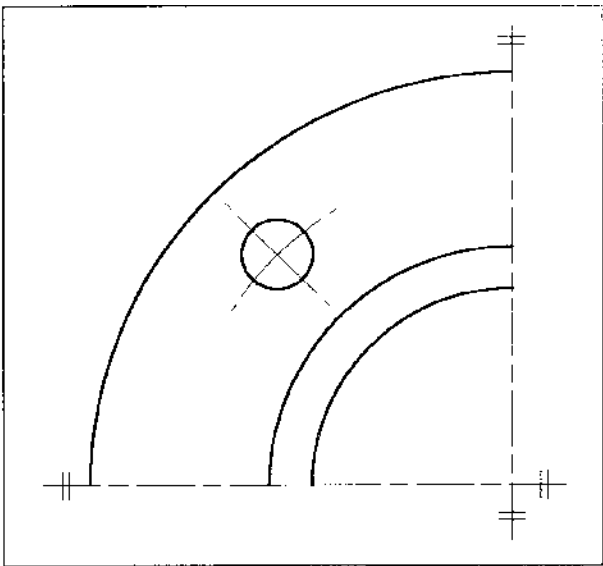


FIGURE 3.17 LINES OF SYMMETRY

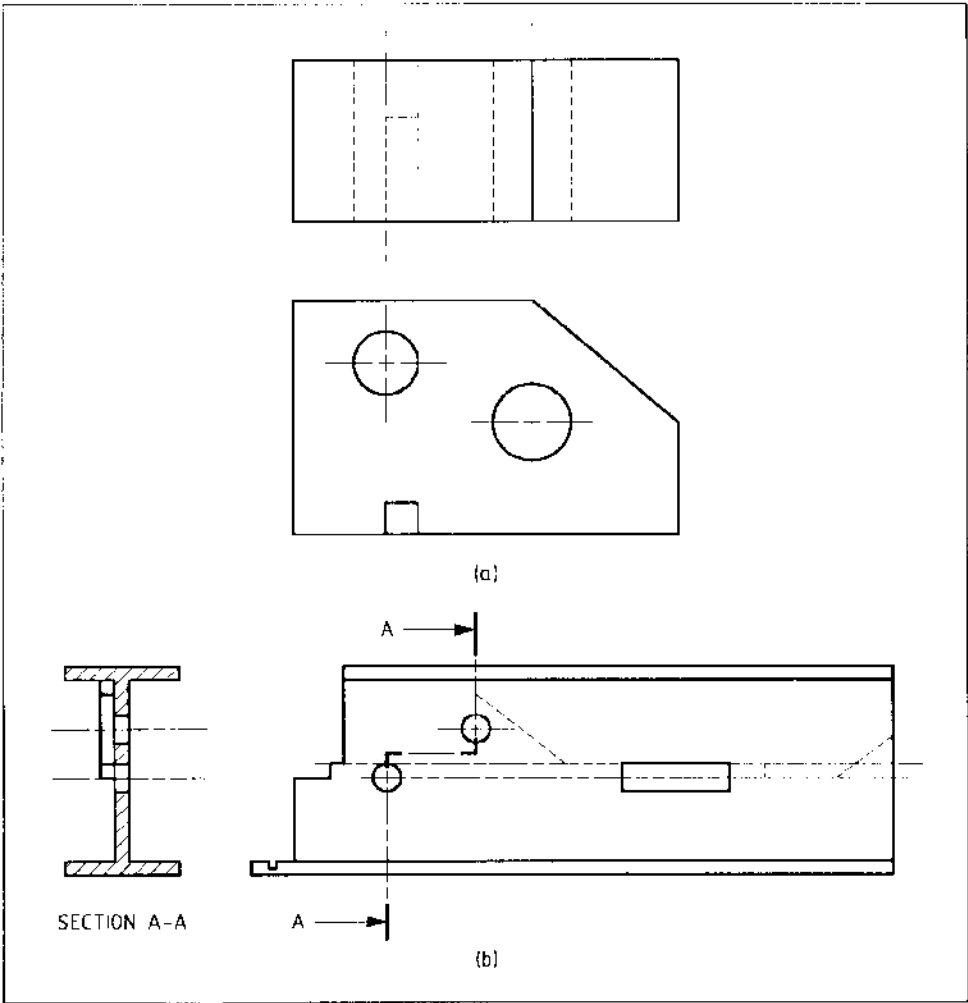


FIGURE 3.18 ORDER OF PRIORITY OF COINCIDENT LINES

SECTION 4 LETTERS, NUMERALS AND SYMBOLS

4.1 LETTERS AND NUMERALS

4.1.1 Character shapes and proportions

4.1.1.1 General Characters shall be uniform and capable of being produced at reasonable speed by hand, stencil, machine, or other means. They shall remain legible and unambiguous in a direct photocopy print, in a reduced copy, and as an image on a microfilm-viewing screen.

Characters shall be of simple form and preferably without serifs and other embellishments, and shall not be of exaggerated proportions.

NOTE: Clarity, style, size, and spacing are important, particularly for numerals as, unlike letters, they rarely fall into self-identifying patterns and hence are read individually.

4.1.1.2 Basic form The basic form of letters and numerals should proportionally conform to those illustrated in Figures 4.1 and 4.2.

4.1.1.3 Freehand characters Although it is recognized that slight variations will naturally occur with freehand characters, the characters should as much as possible conform to the basic forms given in Figures 4.1 and 4.2.

4.1.1.4 Stencil characters Suitable stencilled characters include the following types:

- (a) Upright Gothic.
- (b) Sloping Gothic.
- (c) ISO 3098/1 Type B Upright.
- (d) ISO 3098/1 Type B Sloping.
- (e) Microfont.

NOTES:

- 1 See Figures 4.1 to 4.5 inclusive.
- 2 ISO 3098/1 Type A characters which have a height equal to 14 times the line thickness are not normally used in Australia.

4.1.1.5 Machine made characters Machine-made characters as produced by mechanical means or a transfer process should generally comply with the basic requirements specified in this Standard.

4.1.2 Height of characters The height (h) in millimetres (see Figures 4.1 to 4.5 inclusive) of characters should be one of the following:

2.5 3.5 5 7 10 14 20

NOTES:

- 1 For special requirements, other heights may be used, provided that the minimum height complies with the requirements of this Clause.
- 2 The height of lettering used for tolerances shall be the same height as the particular dimension to which they are applying.

The recommended height of the characters should be not less than the height stated in Table 4.1 for the sheet sizes indicated. Where the drawing is to be reduced, the character height (h) shall be selected so that the height as reproduced is not less than 1.7 mm.

TABLE 4.1

RECOMMENDED MINIMUM HEIGHT OF CHARACTERS ON DRAWINGS

Character use	Character height (h), mm	
	Sheet size	
	A0, B1	A1, A2, A3, A4 B2, B3 & B4
Titles and drawing numbers	7	5
Subtitles, headings, view and section designations	5	3.5
General notes, material lists, dimensions	3.5	2.5

NOTE: The recommended minimum character heights are for upper-case lettering only. For upper-case and lower-case combinations, the minimum character height should be one size larger than that specified.

4.1.3 Thickness of character lines The maximum thickness of the lines used to form the characters shall be $0.1h$, where h is the height of the characters as shown in Figures 4.1 and 4.2 and as specified in Clause 4.1.2. The line thickness of both lower-case and upper-case letters shall be the same (to facilitate lettering).

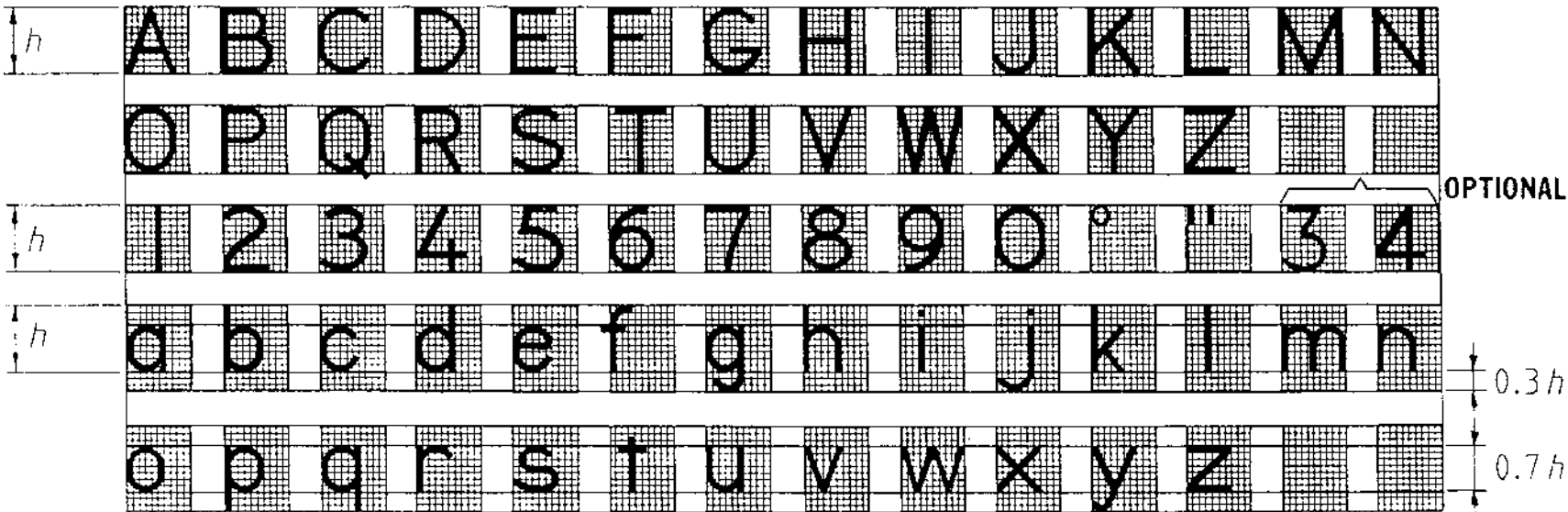


FIGURE 4.1 UPRIGHT GOTHIC (ROMAN) CHARACTERS

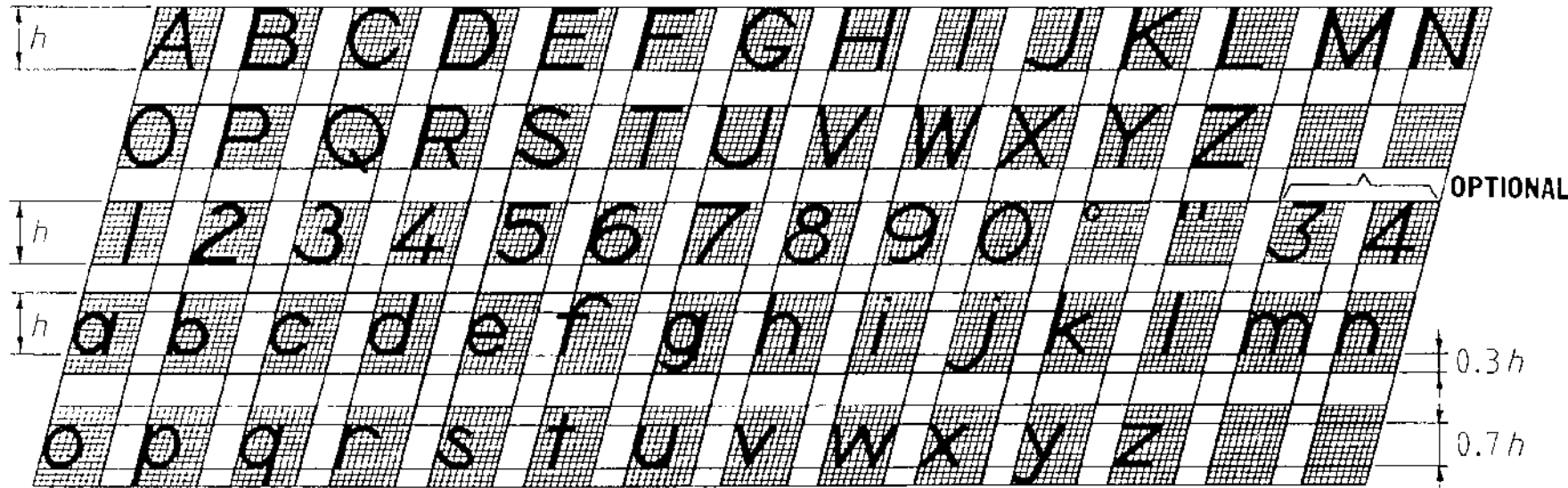


FIGURE 4.2 SLOPING GOTHIC (ITALIC) CHARACTERS