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# Quality Levels for Typesetting 1993



Public Works and  
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Travaux publics et  
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Canada

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## INTRODUCTION

*Quality Levels for Typesetting 1993* has been developed by the Quality Assurance Unit of the Canada Communication Group (CCG), Public Works and Government Services Canada (PWGSC). The purpose of this document is to apply measurable values to typesetting, therefore providing purchasers and suppliers with a means of specifying and evaluating the quality requirements of camera-ready typesetting purchased by PWGSC. This document is for the evaluation of camera-ready typesetting and not for the evaluation of the final printed product.

The detailed requirements for each of the four typesetting quality levels are outlined in this document. The parameters for these levels were developed following a review of a large number of typesetting jobs produced by a variety of commercial typesetters. The Canadian Printing Industries Association provided assistance during the final review of this document.

In general, good production practice and attention to proper plant and equipment maintenance will ensure that the last three quality levels—Informational, Office and Utility—are achieved.

For the highest quality level—Prestige—the same good production practice will assist in the achievement of the quality attributes; however, extra care and attention is critical in achieving this higher level.

This document permits purchasers of typesetting to specify the quality levels required for specific jobs. In addition, both purchasers and suppliers of typesetting can determine, with measurable values, if camera-ready typeset components meet the quality level requested.

The *Quality Levels for Typesetting 1993* criteria shall be the recognized basis under which camera-ready copy from suppliers' typesetting systems shall be categorized by CCG. Suppliers wishing to tender on Government of Canada typesetting requirements must submit samples produced on their systems to the address below. These samples will be evaluated and prospective suppliers will be added to the typesetting source list in accordance with the quality level achieved. Until suppliers are placed on this source list, CCG will not accept their bids for Prestige quality typesetting.

With the increase in quality of print output of modern computer printers, several types of computer-driven printer technologies, which produce output suitable for reproduction, have been evaluated and added to this revised document. They are outlined on pages 2 and 3.

The supplier must provide typesetting which conforms to good workmanship, sound trade practices, satisfactory materials and consistency throughout the job. These requirements apply to all quality attributes.

Questions concerning a specific requirement should be directed to the contracting officer named on the contract.

Please direct any comments, proposed revisions or requests for further copies of this publication to:

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## TYPESETTING METHODS

### 2.1 Phototypesetting

In phototypesetting, solid characters with accurately contoured shapes are formed by adjoining sweeps of scanned lines. The scan lines are formed on the screen of a cathode ray tube (CRT) and the resulting image is beamed by light rays to a light-sensitive substance such as photographic paper and photographic film.

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The density of the scan lines determines the typographic quality in phototypesetting; a greater number of scan lines to the inch results in a higher resolution and sharpness of the characters.

Phototypesetting can also be directly imaged from negative or positive font film onto photographic film or paper.

#### Phototypesetting

Laser technology has been combined with traditional CRT phototypesetting to produce laser phototypesetting. This system can output paper positive or film (negative or positive). The system can also produce high quality halftone photographs and merge them with the text. Some laser typesetters can also image offset plates.

### 2.2 Computer-driven Printer Output

Although not considered "typesetting" in the traditional sense, the output from some computer printers can be considered suitable for reproduction at the Informational, Office and Utility levels if the quality requirements for typesetting are met and the output is made camera-ready.

Impact/Strike-on Printers which use a hard surface to hit against an inked ribbon to produce characters belong to the impact or strike-on category. Having evolved from the long-established "cold-type" and typewriter technologies, some computer-driven impact printers are capable of producing good quality camera-ready output suitable for reproduction. When impact printing output is used for reproduction, it is best to use a one-time carbon ribbon.

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Fully-formed Strike-on

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Dot Matrix Impact

With fully-formed impact printing, a solid, raised letter is struck against an inked ribbon. With dot matrix impact printing, characters are formed by dots produced by tiny wires. These wires are placed in a brushlike, grid formation and are activated by electronic impulses from the computer which cause the wires to strike against an inked ribbon. The number and size of wires in the grid determine the character's resolution; the more dots per character, the greater the detail. The quality of the character can also depend on the size and consistency of each dot, overlap and alignment of dots into rows.



### 2.3 Non-impact

Non-impact computer-driven printers are still relatively new when compared to traditional technology. There is a wide difference between non-impact approaches and quality results.

**Ink Jet:** Computer-driven ink jet printers open and close tiny electronic valves in their printheads to spray fine drops of ink onto paper to create characters. There are two basic types of ink jet printers. The drop-on-demand printhead valve sprays a drop when one is needed. The continuous flow printhead valve sprays a non-stop ink flow which is either sprayed on the paper or diverted into a gutter. The continuous flow printer usually produces a higher quality.



Ink Jet

With some ink jet printers, hard- or clay-coated paper is needed to prevent excessive ink bleed (spread) when the ink hits the paper. Ink spread will increase density but will also decrease character resolution.



Thermal Transfer

**Thermal Transfer:** Thermal transfer is a non-impact printing technology in which individual points on a ceramic printhead electrically heat the waxy ink on a heat-sensitive ribbon. As the heating elements are turned on and off, the wax-based ink melts onto the paper in a pattern of minute dots to form characters.

Some thermal transfer printers have a high resolution and are able to produce good quality characters with good edge quality. Some produce type which resembles the low resolution dot matrix printer.

**Laser Printing:** These high speed computer-driven printers produce fully-formed characters by a process similar to photocopying. The computer sends digitized information to a laser head which converts the information into laser light pulses. These light pulses are reflected off a rotating mirror onto a light-sensitive charged rotating drum. The drum loses its charge when struck by light. As the drum rotates, it passes over a bin of oppositely charged toner particles which are attracted to the uncharged parts of the drum. The drum rotates further and the toner is deposited onto the paper. The paper is then fed through a heating unit which fuses the particles of toner to the paper.

Laser printing has a high dot resolution which produces a good quality level of print. One disadvantage is the varying degree of "splashed" toner which appears around the edge of each character.



Laser Printing

**3****ACHIEVABLE QUALITY LEVELS**

Method of Typesetting	Prestige	Informational	Office	Utility
Phototypesetting	X	X	X	X
Laser Phototypesetting	X	X	X	X
Fully-formed Strike-on		X	X	X
Dot Matrix Strike-on			X	X
Thermal Transfer		X	X	X
Laser		X	X	X
Ink Jet			X	X

**P****Prestige****I****Informational****O****Office****u****Utility****Examples of Quality Levels****4****EVALUATION METHODS**

Typesetting quality is evaluated according to the following measurements and test standards. Some attributes are measured with fine laboratory equipment. Other attributes are examined using a measurement instrument capable of linear discrimination to 0.0025 cm. In some cases, the typeset material is visually examined to verify compliance with the typesetting quality characteristics set out below.





## 4.1 Dots

### 4.1.1 Dot Size

In dot matrix output where separate, visible dots are used to create a character, the dots must be of uniform size, within the allowances outlined in the detailed requirements below.

DOT SIZE	
Quality Level	Acceptable Deviation:
Informational	0%
Office	20%
Utility	40%



Informational



Utility

### 4.1.2 Dot Alignment

In any dot matrix output where separate, visible dots are used to create a character, the dots must be aligned within the allowances shown below.

DOT ALIGNMENT	
Quality Level	Acceptable Deviation:
Informational	0%
Office	20%
Utility	40%



Informational



Utility



### 4.1.3 Dot Overlap

Where separate, visible dots are overlapped in dot matrix output, the overrun must be consistent and uniform within the allowances shown in the detailed requirements below.

DOT OVERLAP	
Quality Level	Acceptable Deviation:
Informational	0%
Office	10%
Utility	20%



Informational



Utility

## 4.2 Characters

### 4.2.1 Font

The typeset material must conform to the specified type style and face.

### 4.2.2 Character Size

Normal character size and face width must be consistent with the original character size and face widths allotted by the type font designer and/or manufacturer. In addition, the consistency and appearance must be equivalent to the quality of image produced under the prescribed operating conditions of the typesetting equipment.

General overall reduction or increase of normal character size must only be done if specifically requested and agreed to by the customer.

Conformance to these requirements will be determined by either using type catalogues or previously supplied and accepted typeset samples from the supplier, and visually comparing them to the produced typeset material.

### 4.2.3 Character Spacing

Normal character spacing must be consistent with the original character space escapement values allotted by the type font designer and/or manufacturer. In addition, the consistency and appearance must be equivalent to the quality of spacing produced under the prescribed operating conditions of the typesetting equipment.

General overall reduction or increase of normal character space escapement values must only be done if specifically requested and agreed to by the customer. In the case of typesetting systems which justify lines by reducing or increasing the space between



individual characters, the onus shall be on the supplier to contact the CCG purchasing officer and obtain approval prior to commencing production.

General kerning of visually awkward letter combinations to improve and make letter spacing more uniform is acceptable, and even desirable. However, the supplier must include, along with the samples submitted for approval, a list of unique character combinations (including point sizes) which are normally kerned by that particular typesetting system.

Conformance to these requirements will be determined by either using type catalogues or previously supplied and accepted samples from the supplier, and visually comparing them to the produced typeset material.

#### 4.2.4 Stroke Width

The width of any part of a printed type character is measured and expressed as a percentage of the width of the same character on the specified copy. The variation of stroke width is the difference between the maximum and minimum percentage values found on a page or sheet.

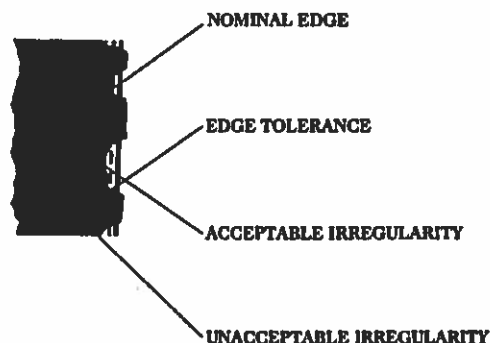
— STROKE WIDTH —	
Quality Level	Acceptable Deviation:
Prestige	± 5%
Informational	± 10%
Office	± 20%
Utility	± 25%

— STROKE WIDTH VARIATION —	
Quality Level	Maximum Variation:
Prestige	1%
Informational	5%
Office	10%
Utility	15%

#### 4.2.5 Edge Irregularity

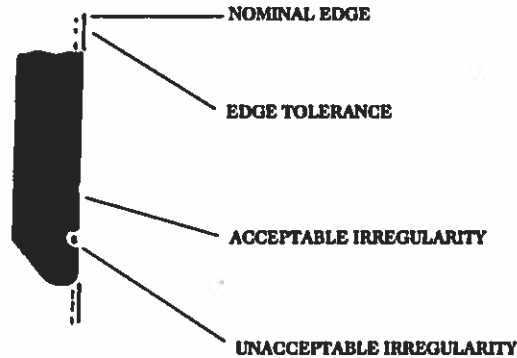
Edge irregularity is the unevenness of the outline of the character caused by gaps or protrusions beyond the nominal edge. The nominal edge is defined by an imaginary line which can be found as follows:

In composition, the nominal edge is an imaginary line which divides the edge irregularities in the character outline. The summation of the white (non-image) areas on one side of the line is equal to the summation of the black (image) areas on the other side.





In photocomposition, the nominal edge is a continuous line which defines the edges of the character excluding any gaps or breaks which may have occurred.



When viewed under 40X magnification, the actual edge of the character must not deviate from the nominal edge by more than the specified distance.

— EDGE IRREGULARITY —

Quality Level	Edge Tolerance:
Prestige	$\pm 0.000$ cm
Informational	$\pm 0.013$ cm
Office	$\pm 0.025$ cm
Utility	$\pm 0.127$ cm

#### 4.2.6 Doubling

The secondary or ghost image beside the primary character is measured with a magnifier having a measuring reticule and is expressed as a percentage of the primary image.

— DOUBLING —

Quality Level	Maximum Doubling:
Prestige	0%
Informational	5%
Office	10%
Utility	25%

#### 4.2.7 Plugging

Plugging normally occurs when characters having an enclosed area such as the letters *a*, *e* and *o* are filled in. The degree of plugging is measured using a magnifier with a measuring reticule and is expressed as the percentage of the open area that has been filled in.



**PLUGGING**

Quality Level	Maximum Plugging:
Prestige	0%
Informational	10%
Office	15%
Utility	20%

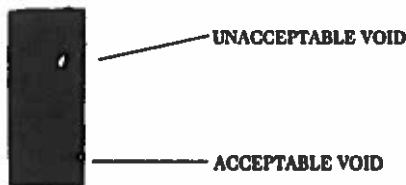
### 4.2.8 Type Voids

Type voids are white spots on characters which should not occur beyond the amounts listed in the detailed requirements. A representative area of printed type (10 cm wide × 10 cm deep) is selected. The total number of voids within this area is counted. The voids are weighted according to size as shown in the chart below. The total equals the count in the area.

Quantity of Voids	×	Size of Void	×	Weighting = Area Count
		0.005 cm to 0.010 cm		× 1
		0.010 cm to 0.015 cm		× 3
		0.015 cm or greater		× 10
				+ TOTAL

**TYPE VOIDS**

Quality Level	Maximum Permitted Count in 10 cm × 10 cm Area:
Prestige	2
Informational	5
Office	15
Utility	50



### 4.2.9 Image Density

Image density is a measurement of the darkness/lightness of a character. In order to facilitate the measurement of character density, a test target is desirable at the beginning and end of each typesetting job. This target consists of the following:



- (i) A row of solid squares, approximately  $6.5 \text{ mm}^2$  (18 pt<sup>2</sup>) across the page;
- (ii) A row of 10 pt uppercase "X"s across the page; and,
- (iii) A row of 24 pt uppercase "X"s across the page.

**NOTE :**

The "X"s should be in the same font as used in the job.

**4.2.9.1**

For paper base materials, the density of the solid square is measured with a calibrated reflection densitometer through the visual filter (Wratten 106).

**— IMAGE DENSITY —****Quality Level**

**Reflection density of test solid  
must not be less than:**

Prestige	1.40
Informational	1.20
Office	1.10
Utility	0.75

**4.2.9.2**

The density of the test "X"s and other type characters is measured with a microdensitometer. (Kidder 081 Optical Comparator or similar instrument.)

**— IMAGE DENSITY —****Quality Level**

**Reflection density of test "X"s and all  
characters must not be less than:**

Prestige	0.85
Informational	0.75
Office	0.70
Utility	0.60

**4.2.9.3**

For film base materials, the density of the solid square is measured with a calibrated transmission densitometer through the visual filter.

**— IMAGE DENSITY —****Quality Level**

**Transmission density of test solid  
must not be less than:**

Prestige	4
Informational	3
Office	2
Utility	2



#### 4.2.10 Density Variation

The density range is the difference between the maximum and minimum character densities within the entire job. The character density is measured with a Kidder 081 microdensitometer or similar instrument.

---

##### — DENSITY VARIATION —

Quality Level	Density range must not exceed:
Prestige	0.05
Informational	0.10
Office	0.15
Utility	0.20

#### 4.2.11 PCS: Type Print Contrast Signal—Black Type

The type print contrast signal (density) is measured with a MacBeth PCM II, Filter A microdensitometer or other similar instrument. Measurements are made on type throughout the job and the average PCS is calculated. The PCS of any area shall not vary from the average PCS by more than the amounts specified in the detailed requirements.

---

##### — PCS: UNCOATED PAPER —

Quality Level	Uncoated Paper: Minimum Acceptable PCS
Prestige	0.85
Informational	0.75
Office	0.70
Utility	0.60

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##### — PCS: COATED PAPER —

Quality Level	Coated Paper: Minimum Acceptable PCS
Prestige	0.90
Informational	0.80
Office	0.75
Utility	0.65

---

##### — PCS: VARIATION —

Quality Level	Maximum Acceptable Variation:
Prestige	± 0.02
Informational	± 0.05
Office	± 0.10
Utility	± 0.15



### 4.3 Words

#### 4.3.1 Word Spacing

Unless otherwise specified, the linear distance between consecutive words must be uniform and adequate. If justification has been specified, the spacing between words within one line must be consistent. In unjustified text, if the word spacing distance is specified in the contract, the actual word spacing may not deviate by more than the levels shown in the detailed requirements below.

WORD SPACING	
All Levels	Acceptable Variation:
Unjustified copy	1 mm
Justified copy	0.5 mm

### 4.4 Lines

#### 4.4.1 Line Spacing

The distance from baseline to baseline of any two consecutive lines of type must be equal, within the tolerances listed below.

LINE SPACING	
Quality Level	Maximum Variation Allowed:
Prestige	$\pm 0.05$ mm
Informational	$\pm 0.13$ mm
Office	$\pm 0.25$ mm
Utility	$\pm 0.76$ mm

#### 4.4.2 Alignments

- (a) **Horizontal:** This is the measure of the uniformity of the alignment of a line of characters along the horizontal baseline. A continuous straight line is drawn along the ideal line on which all the characters should stand. The deviation of each character from this ideal baseline must not exceed the levels found in the detailed requirements.

ALIGNMENT: HORIZONTAL	
Quality Level	Maximum Deviation Allowed:
Prestige	$\pm 0.05$ mm
Informational	$\pm 0.13$ mm
Office	$\pm 0.25$ mm
Utility	$\pm 0.76$ mm

stra

Horizontal Misalignment





(b) **Vertical:** Vertical alignment is the measure of the uniformity of alignment of each character when specified for alignment into a column. A continuous straight line is drawn along the ideal position on which all the characters in that column should stand. The deviation of each character from this ideal line must not exceed the specification by more than the allowances shown below.

---

**ALIGNMENT: VERTICAL**

Quality Level	Maximum Deviation Allowed:
Prestige	$\pm 0.05$ mm
Informational	$\pm 0.13$ mm
Office	$\pm 0.25$ mm
Utility	$\pm 0.76$ mm

info  
info  
info  
info

Vertical Misalignment

#### 4.4.3 Line Skew

Skew is the displacement of the image from its intended alignment on the page. This may occur when a paste-up has been made to correct a camera-ready page.

To measure the angular displacement (horizontal or vertical), a line is drawn which represents the actual axis of the printed image. From a point at one end of the line, another line is drawn which is parallel to the top of the page or to the intended axis. If any skew exists, these two lines will not be identical but will be displaced from each other. If this is the case, the linear displacement is measured at a distance of 12 cm from the point where the two lines join. This displacement shall not exceed the detailed requirements for the specified quality level.

---

**LINE SKEW**

Quality Level	Maximum Acceptable Skew:
Prestige	0.5°
Informational	1°
Office	1.5°
Utility	2°

#### 4.4.4 Hyphenation

Hyphenations are word divisions at the end of a line. The lines of information are visually examined to count the number of consecutive hyphenated lines. The quantity must not exceed the amounts acceptable in the detailed requirements.



HYPHENATION	
Quality Level	Acceptable Consecutive Hyphens:
Prestige	3
Informational	3
Office	5
Utility	5



## PARAGRAPHS

### 5.1 Widow Lines

A widow line is a single line of a paragraph which is positioned at the bottom or at the top of a column or page. These are not acceptable at the Prestige and Informational quality levels.

### 5.2 Indentions

An indention is the blank space beside a line of type set in from the regular margin. This includes paragraph indentions, quotations or any indention as specified in the original order.

An indention may not deviate from the specified length by more than the allowance levels as shown in the detailed requirements.

INDENTIONS	
Quality Level	Acceptable Deviation:
Prestige	5%
Informational	10%
Office	15%
Utility	20%



## PAGE MAKE-UP

### 6.1 Horizontal Limits

The width of the lines and columns must not exceed the limits for deviation as shown in the detailed requirements below. These requirements include the sum of all columns of type and each column spacing.



---

**— HORIZONTAL LIMITS****Quality Level****Acceptable Deviation:**

All Levels

2 mm

**6.2 Vertical Limits**

The actual vertical range of the columns must not vary from the specified vertical range by more than the limits for deviation as outlined in the detailed requirements below.

---

**— VERTICAL LIMITS****Quality Level****Acceptable Deviation:**

All Levels

1 mm

**6.3 Spacing Between Columns**

The space between columns must not vary from the originally specified distance by more than the deviation allowance found below.

---

**— SPACING BETWEEN COLUMNS****Quality Level****Acceptable Deviation:**

Prestige

0.12 mm

Informational

0.25 mm

Office

0.38 mm

Utility

0.50 mm

**6.4 Spacing of Elements**

The actual placement of elements on the page, such as headings, text, tables, legends, footnotes, running heads, running feet, page numbers, etc., must be consistent and not vary from the specified spacing. Any deviation may not exceed the levels given in the detailed requirements below.

---

**— SPACING OF ELEMENTS****Quality Level****Acceptable Deviation:**

Prestige

0%

Informational

10%

Office

20%

Utility

25%



### 6.4.1 Consistency Page-to-Page

Elements such as headings, text, tables, legends, footnotes, running heads, running feet, page numbers, etc. must remain consistent from page to page. Any deviation may not exceed the limitations given in the detailed requirements shown below.

#### — CONSISTENCY PAGE-TO-PAGE —

Quality Level	Acceptable Deviation:
Prestige	0%
Informational	10%
Office	20%
Utility	25%

### 6.5 Rules and Lines

Rules and lines must conform to the following characteristics within the quality level deviance allowances as shown in the detailed requirements below.

#### 6.5.1 Offset

A line/rule which is offset is not in line with its intended path. Lines and rules may not diverge more than as outlined in the detailed requirements below.

#### — OFFSET —

Quality Level	Acceptable Deviation:
Prestige	0.00 mm
Informational	0.03 mm
Office	0.03 mm
Utility	0.05 mm



Rule and Line offset

#### 6.5.2 Line and Rule Breaks

Line and rule breaks are unspecified spaces in a solid line or rule. These breaks may not occur more often than outlined in the detailed requirements below.

#### — BREAKS: QUANTITY —

Quality Level	Number of Permitted Breaks per 2.5 cm:
Prestige	0
Informational	0
Office	2
Utility	3



## QUALITY LEVELS FOR TYPESETTING 1993



Line and Rule Breaks: Quantity per 2.5 cm.

Line and rule breaks may not be longer than as allowed in the detailed requirements shown below.

### BREAKS: LENGTH

Quality Level	Length of Break Permitted:
Prestige	0.00 mm
Informational	0.00 mm
Office	0.07 mm
Utility	0.13 mm

### 6.5.3 Abutment

Rules and lines which are specified to join each other, whether at a "T", "L" or "V" intersection, may not exceed the detailed requirements for overlapping or falling short of the specified abutment.

### ABUTMENT

Quality Level	Overlap or Opening Permitted:
Prestige	0.000 mm
Informational	0.001 mm
Office	0.003 mm
Utility	0.005 mm

### 6.5.4 Thickness

The thickness of the lines and rules must fall within the specified thickness by the percent shown in the detailed requirements outlined below.

### THICKNESS

Quality Level	Acceptable Deviation:
Prestige	5%
Informational	10%
Office	15%
Utility	20%

### 6.5.5 Length

The actual length of a rule or line must meet the requested length within the allowance margins of the detailed requirements shown below.



---

**— LENGTH —**

<b>Quality Level</b>	<b>Acceptable Deviation:</b>
Prestige	0.05 mm
Informational	0.07 mm
Office	0.13 mm
Utility	0.25 mm

**6.5.6 Placement**

Rules and lines must be correctly positioned within the tolerance levels outlined in the detailed requirements shown below.

---

**— PLACEMENT —**

<b>Quality Level</b>	<b>Acceptable Deviation:</b>
Prestige	0.05 mm
Informational	0.07 mm
Office	0.13 mm
Utility	0.25 mm

**GENERAL****7.1 Base Density****7.1.1 Reflection Base Density**

The density of the printing paper or photographic paper used to carry the image is measured with a calibrated reflection densitometer through the neutral or visual filter (Wratten 106).

---

**— BASE DENSITY —**

<b>Quality Level</b>	<b>Reflection Base Density— Maximum Acceptable Density:</b>
Prestige	0.10
Informational	0.15
Office	0.20
Utility	0.20

**7.1.2 Transmission Base Density**

The density of the photographic film on which the image appears is measured in the clear areas with a calibrated transmission densitometer through the neutral or visual filter (Wratten 106).

**— BASE DENSITY****Quality Level****Transmission Base Density—  
Maximum Acceptable Density:**

Prestige	0.10
Informational	0.15
Office	0.20
Utility	0.30

**7.2 Spots and Lint**

A representative area of print 10 cm × 10 cm is selected. For ease of testing, a 10 cm × 10 cm template may be cut from board and placed over the print to be tested.

The total number of spots or lint within this area is counted, and weighted according to the size of hickey. The maximum count observed in the work is recorded, along with an average count calculated from random areas throughout the work.

**NOTE :**

Approximate size can be rapidly assessed, with adequate accuracy, by means of a low-powered magnifying glass (5× to 10×) with a measuring reticule.

Quantity	×	Size of Spot or Lint	×	Weighting	= Area Count
		very small:			
		0.13 mm or less		× 1	
		noticeable:			
		0.13 mm—0.50 mm		× 2	
		large:			
		0.50 mm—2.50 mm		× 3	
		very large:			
		2.50 mm or greater		× 6	+ _____
					<b>TOTAL</b>

**— SPOTS AND LINT****Quality Level****Maximum Permitted Count  
in any 10 cm × 10 cm Area:**

Prestige	1
Informational	15
Office	25
Utility	55

**7.3 Image Longevity**

Camera-ready galley and page output must continue to meet the specifications herein and continue to be useable for a period of one year after delivery.

All material must be stored away from any light in a horizontal position. Storage conditions must be maintained in the temperature range of 15°C to 25°C (60°F to 78°F) and from 40% to 60% relative humidity.