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Quality Levels for Forms 1993



Public Works and
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1 INTRODUCTION

Quality Levels for Forms 1993 has been developed by the Quality Assurance Unit, Canada Communication Group (CCG), Public Works and Government Services Canada (PWGSC). It is the intent of this document to provide a means of specifying, between purchaser and supplier, the quality requirements of forms purchased by Public Works and Government Services Canada.

Most forms are regarded as being at the Office Quality Level, although many can be called up for the Prestige, Library or Informational Quality levels as defined in the document *Quality Levels for Printing 1993*, but separate numerical tolerances are listed for each of the following types of forms:

- Flat Forms;
- Snap-Sets;
- Continuous Forms (single-part and multi-part).

The specifications on each contract will state which of these three types is applicable in that specific contract. For each type of form the quality required in the delivered forms is expressed in measurable values as listed in this document.

This document is not designed to be applicable to forms which involve:

- Magnetic Ink Character Recognition (MICR);
- Optical Character Recognition (OCR);
- Mark Sensing.

It is inherent in the quality level process that the quality of components supplied permits the production of the desired quality of the finished work.

No attempt has been made to restrict or control manufacturing process but rather this document sets the quality which must be achieved in the product. It is the responsibility of the supplier to ensure that the forms meet the quality requirements regardless of the method of manufacture. The tabular data shown in these levels were developed from reviewing a large number of sample forms produced by a variety of commercial forms manufacturers. All of the quality requirements can be attained and are quite normal in several plants. However, some of them require attention to detail beyond that which is normal in a few plants.

It is incumbent on the contractor to supply forms which conform to good workmanship, sound trade practices, satisfactory materials and consistency throughout the job. These requirements apply to all quality attributes whether or not they are specifically mentioned in this document.

Questions concerning a specific contract 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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2 FLAT FORMS

All testing will be carried out at a temperature of $23 \pm 2^\circ\text{C}$ and in a relative humidity between 40% and 50%.

2.1 General Attributes

2.1.1 Size

Forms dimension shall be as specified with a tolerance of ± 0.8 mm (1/32 in.).

2.1.2 Position of Image

The consistency of positioning the image shall be such that when any two forms of identical image in a batch are placed one on top of the other with the left and top edges in alignment and when a pin-point is stuck through the image of the top form, the pinhole's position on the second form will coincide with its position relative to the image on the top form with a tolerance of ± 0.8 mm (1/32 in.).

2.1.3 Perforation Positioning

Position accuracy of any vertical or horizontal perforation other than the outside edges shall be determined by measuring the distance from the perforation, at any given point, to the specified line of reference. The perforation shall be positioned as specified with a tolerance of ± 1.6 mm (1/16 in.).

2.1.4 Perforation Tear

The force required to pull apart flat forms made up of paper with a basis weight between 55 and 90 g/m² shall not be less than 1.75 nor more than 5 lb. per linear inch. Flat forms made up of paper with a basis weight of more than 90 g/m² shall not be less than 1.75 nor more than 13 lb. per linear inch when tested using an Ametak Perforation Strength Tester or similar instrument.

2.1.5 File Hole Positioning

The position of punched holes shall be measured from the specified edges of the form to the centre of the hole and from centre to centre of the holes. The holes shall be positioned as specified with a tolerance of:

± 1.6 mm (1/16 in.) edge of sheet to centre of hole;

± 0.8 mm (1/32 in.) from the centre of one hole to the centre of the adjacent hole.

2.1.6 Folding

Folds shall not be out of specified position by more than ± 1.6 mm (1/16 in.).

2.1.7 Padding

When the forms are to be padded, the adhesive used shall give sufficient bonding such that the pad will not come apart during normal handling. When a sheet is removed from the pad, it shall release completely, without tearing.



2.2 Print Quality

2.2.1 Density of Printed Type

The density of type matter is measured with a microdensitometer (e.g. Macbeth PCM II, Print Contrast Meter with the A filter setting, or similar instrument). The average type density is found by calculating the numerical average of density measurement made on randomly selected samples.

Average type density shall not be less than:

Ink Colour	PMS Numbers	Minimum Density
Black	001	0.90
Red	Warm Red	0.75
Purple	266	0.85
Blue	Reflex Blue	0.85
Green	347	0.52
Brown	174	0.80
Grey	416	0.45

2.2.2 Flat Screen Tints

When screen tints are specified, use the Dupont Dot Size Comparator, Series II, and locate the screened area with the same line screen and percentage tint as specified. Compare this area to the actual printed screen tint and visually estimate the difference in percentage dot area if any exists.

Screen tints shall have the percentage dot area as specified with a tolerance of:

Specified Screen Tint	Tolerance
10%, 20%	± 5%
30%, 40%, 50%, 60%, 70%, 80%.....	± 10%

e.g. Acceptable range of a 20% screen is from 15% to 25%.

2.2.3 Register, Colour to Colour

Misregister is recorded as the linear displacement of any colour relative to another colour on the same sheet. The maximum allowable misregister is ± 0.4 mm (1/64 in.).

2.2.4 Extraneous Markings (Scumming or Set-Off)

Lines, spots, smears or other extraneous (background) markings are assessed visually. Generalized scumming or tinting is assessed in terms of average reflection density of the affected area. Using a reflection densitometer zeroed on the unmarked paper, measure the background density with the visual filter setting. The maximum acceptable background density is 0.06.



2.2.5 Rub-Resistance of Printed Image

A representative sample of a single sheet of the printed form is placed on a Sutherland rub-tester or equivalent instrument and given 25 rubs at a pressure of 6.8948 kPa (1 psi) against an unmarked sample of stock similar to that on which the form is printed. Density measurements with a reflection densitometer are then made on the rub-off smear, having pre-zeroed the densitometer on an unmarked sample of the paper stock. An average density is calculated for the rub-off smear. The maximum acceptable density of rub-off smear is 0.06.

2.2.6 Character 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 original camera ready copy. The acceptable range of printed character stroke width is 80 to 120%.

2.2.7 Plugging

This normally occurs with characters having an enclosed area such as the letters *a*, *e* and *o*. The degree of plugging is measured using a magnifier with a measuring reticle and is expressed as the percentage of the enclosed area that has been filled in. The maximum percent plugging allowed is 20%.

NOTE:

Any six-point or smaller type is excluded from this requirement.

2.2.8 Doubling and Slurring

The secondary or ghost image adjacent to the primary character is measured with a magnifier having a measuring reticle and is expressed as a percentage of the primary image. The maximum allowable doubling or slurring is 10%.

2.2.9 Rulings on Forms

Rulings shall have an even width and consistent density throughout the batch. The positioning and spacing of the ruling shall conform to the requirements of the processing equipment.

3

SNAP-SETS

All testing, except that for bleeding of carbon (see par. 3.3.1), will be carried out at a temperature of $23 \pm 2^\circ\text{C}$ and in a relative humidity between 40% and 50%.

For carbon interleaved forms quality parameters 3.1.1 to 3.4.2 shall apply. For forms utilizing carbonless copy paper quality parameters 3.1.1 to 3.2.9 shall apply.

3.1 General Attributes

3.1.1 Size

Form dimensions shall be as specified with a tolerance of ± 0.8 mm (1/32 in.).



3.1.2 Position of Image

The consistency of positioning of the printed image, part to part shall be such that when a pin-point is stuck through the image of the top form, the pinhole position on the top form will coincide with its position relative to the image on each succeeding part in the set with a tolerance of ± 0.8 mm (1/32 in.).

3.1.3 Perforation Positioning

Position accuracy of any vertical or horizontal perforation shall be determined by measuring the distance from the perforation at any given point to the specified line of reference. The perforation shall be positioned as specified with a tolerance of ± 1.6 mm (1/16 in.).

3.1.4 Perforation Tear

The force required to pull apart snap-sets made up of paper with a basis weight between 55 and 90 g/m² shall not be less than 1.75 nor more than 5 lb. per linear inch. Snap-sets made up of paper with a basis weight of more than 90 g/m² shall not be less than 1.75 nor more than 13 lb. per linear inch when tested using an Ametak Perforation Strength Tester or similar instrument.

3.1.5 File Hole Positioning

The position of punched holes shall be measured from the specified edges of the form to the centre of the hole and from centre to centre of the holes. The holes shall be positioned as specified with a tolerance of:

± 1.6 mm (1/16 in.) side of sheet to centre of hole;

± 0.8 mm (1/32 in.) from the centre of one hole to the centre of the adjacent hole.

3.1.6 Extraneous Paper or Chad

Extraneous strips of paper shall not be present and chad shall not occur in amounts which will interfere with the forms processing equipment.

3.1.7 Curl

When the entire set is laid flat on a flat surface, no part of the set and no carbon sheet shall curl sufficiently to cause difficulties in use of the set.

3.1.8 Gluing of Sets

The stubs of sets shall be glued according to the contract and shall hold the individual parts together during normal handling.

3.2 Print Quality

3.2.1 Density of Printed Type

The density of type matter is measured with a microdensitometer (e.g. Macbeth PCM II, Print Contrast Meter with the A filter setting, or similar instrument). The average type density is found by calculating the numerical average of density measurements made on randomly selected samples.



Average type density shall not be less than:

Ink Colour	PMS Numbers	Minimum Density
Black	001	0.90
Red	Warm Red	0.75
Purple	266	0.85
Blue	Reflex Blue	0.85
Green	347	0.52
Brown	174	0.80
Grey	416	0.45

3.2.2 Flat Screen Tints

When screen tints are specified, use the Dupont Dot Size Comparator, Series II, and locate the screened area with the same line screen and percentage tint as specified. Compare this area to the actual printed screen tint and visually estimate the difference in percentage dot area if any exists.

Screen tints shall have the percentage dot area as specified with a tolerance of:

Specified Screen Tint	Tolerance
10%, 20%	± 5%
30%, 40%, 50%, 60%, 70%, 80%	± 10%

e.g. Acceptable range of a 20% screen is from 15% to 25%.

3.2.3 Register, Colour to Colour

Misregister is recorded as the linear displacement of any colour relative to another colour on the same sheet.

Maximum allowable misregister: ± 0.4 mm (1/64 in.).

For part-to-part changes, designations, strike-ins: ± 1.6 mm (1/16 in.).

3.2.4 Extraneous Markings (Scumming or Set-Off)

Lines, spots, smears or other extraneous (background) markings are assessed visually. Generalized scumming or tinting is assessed in terms of average reflection density of the affected area. Using a reflection densitometer zeroed on the unmarked paper, measure the background density with the visual filter setting. The maximum acceptable background density is 0.06.

3.2.5 Rub-Resistance of Printed Image

A representative sample of a single sheet of the printed form is placed on a Sutherland rub-tester or equivalent instrument and given 25 rubs at a pressure of 6.8948 kPa (1 psi) against an unmarked sample of stock similar to that on which the form is printed. Density measurements with a reflection densitometer are then made on the rub-off smear, having pre-zeroed the densitometer on an unmarked sample of the paper stock. An average density is calculated for the rub-off smear. The maximum acceptable density of rub-off smear is 0.06.



3.2.6 Character 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 original camera ready copy. The acceptable range of printed character stroke width is 80 to 120%.

3.2.7 Plugging

This normally occurs with characters having an enclosed area such as the letters *a*, *e* and *o*. The degree of plugging is measured using a magnifier with a measuring reticle and is expressed as the percentage of the enclosed area that has been filled in. The maximum percent plugging allowed is 20%.

NOTE:

Any six-point or smaller type is excluded from this requirement.

3.2.8 Doubling and Slurring

The secondary or ghost image adjacent to the primary character is measured with a magnifier having a measuring reticle and is expressed as a percentage of the primary image. The maximum allowable doubling or slurring is 10%.

3.2.9 Rulings on Forms

Rulings shall have an even width and consistent density throughout the batch. The positioning and spacing of the ruling shall conform to the requirements of the processing equipment.

3.3 Carbons

3.3.1 Bleeding of Carbon

Test Method—Subject an area of at least 1 in.² of the complete snap-set, face up, to a uniform pressure of 27 kPa (4 psi) at $34 \pm 1^\circ\text{C}$ and $50 \pm 2\%$ relative humidity for seven days. At the end of this time, separate the set and examine each part for bleeding or offsetting.

Required Result—The bleeding or offsetting shall not be such as to render the form unusable or illegible.

3.3.2 Smudging of Carbon

Test Method—The snap-set shall be placed, face-up, on a smooth glass plate which is maintained at $23 \pm 2^\circ\text{C}$ and a relative humidity between 40% and 50%. A test tube measuring about 15 mm in diameter and about 15 cm in length, containing sufficient lead shot to provide a total weight of 25 g, shall be allowed to rest vertically, by means of a suitable support, on the top of the snap-set. The support of the test tube should permit free vertical movement of the tube. The snap-set shall be quickly pulled out from beneath the test tube. Each part of the snap-set shall be examined for carbon impression.

Required Result—There shall be no perceptible line caused by the carbon being pressed against any part of the snap-set.



3.4 Quality of Copies

3.4.1 Legibility of Characters on Copies

The image produced on carbon interleaved multipart forms should be based upon the user's approved write test using agreed papers and carbons processed over the specific equipment.

3.4.2 Density of Characters on Copies

Test Method—A test image shall be applied to the set using a TMI Impact Image Tester with the impact angle set at 75°. The density of type matter formed by carbon release is measured with a microdensitometer (e.g. Macbeth PCM II with the A filter setting) on images made by the Impact Tester. The average density is found by calculating the numerical average of density measurements made on the copies sampled from the entire job lot.

Required Result—Minimum type density shall not be less than 0.65.

4 SINGLE-PART AND MULTI-PART CONTINUOUS FORMS

All testing, except that for bleeding of carbons (see par. 4.3.1), will be carried out at a temperature of $23 \pm 2^\circ\text{C}$ and in a relative humidity between 40% and 50%.

For carbon interleaved forms, quality parameters 4.1.1 to 4.4.2 shall apply. For forms utilizing carbonless copy paper, quality parameters 4.1.1 to 4.2.9 shall apply.

4.1 General Attributes

4.1.1 Size

The size of each part shall be in accordance with national standard CAN 2-9.62-81.

4.1.2 Marginal Punch Holes and Margins

For each individual part the punch holes and margins shall be in accordance with national standard CAN 2-9.62-81.

4.1.3 Collating

The parts shall be collated in such a manner that the marginal holes of each part are aligned so as not to cause runnability problems on sprocket feed mechanisms.

4.1.4 Position of Image

(a) *Form to Form*—The consistency of positioning of the image shall be such that when any two forms of identical image in a batch are separated and placed one on top of the other with the left marginal sprocket holes in alignment and when a pin-point is stuck through the image of the top form, the pinhole position on the second form will coincide with its position relative to the image on the top form with a tolerance of ± 0.8 mm (1/32 in.).



If there are no marginal punch holes, the left hand and top edges will be aligned.

(b) *Part to Part*—The consistency of positioning of the printed image, part to part shall be such that when a pin-point is stuck through the image of the top form, the pinhole position on the image of the top part will coincide with its position relative to the printed image on each succeeding part of the set with a tolerance of ± 0.8 mm ($1/32$ in.).

4.1.5 Perforation Positioning

Position accuracy of any vertical or horizontal perforation other than the outside edges shall be determined by measuring the distance from the perforation at any given point, to the specified line of reference. The perforations shall be positioned as specified with a tolerance of ± 1.6 mm ($1/16$ in.).

4.1.6 Perforation Tear

Forms intended to be burst or separated mechanically shall be perforated so as to be suitable for the machine make and model specified in the contract. In no case shall any part of a multipart form have a pull apart force less than 5 lb. per linear inch when tested using the Ametak Perforation Strength Tester or similar instrument.

4.1.7 File Hole Positioning

The position of punched holes shall be measured from the specified edges of the form to the centre of the hole and from centre to centre of the holes. The holes shall be positioned as specified with a tolerance of:

± 1.6 mm ($1/16$ in.) edge of sheet to centre of hole;

± 0.8 mm ($1/32$ in.) from the centre of one hole to the centre of the adjacent hole.

4.1.8 Extraneous Paper or Chad

Extraneous strips of paper shall not be present and chad shall not occur in amounts which will interfere with the forms processing equipment.

4.1.9 Fastening or Crimping

Fastening of forms shall be such that it is suitable for the processing system specified in the contract and in no case shall the forms separate during normal processing.

4.2 Print Quality

4.2.1 Density of Printed Type

The density of type matter is measured with a microdensitometer (e.g. Macbeth PCM II, Print Contrast Meter with the A filter setting, or similar instrument). The average type density is found by calculating the numerical average of density measurements made on randomly selected samples.



Average type density shall not be less than:

Ink Colour	PMS Numbers	Minimum Density
Black	001	0.90
Red	Warm Red	0.75
Purple	266	0.85
Blue	Reflex Blue	0.85
Green	347	0.52
Brown	174	0.80
Grey	416	0.45

4.2.2 Flat Screen Tints

When screen tints are specified, use the Dupont Dot Size Comparator, Series II, and locate the screened area with the same line screen and percentage tint as specified. Compare this area to the actual printed screen tint and visually estimate the difference in percentage dot area if any exists.

Screen tints shall have the percentage dot area as specified with a tolerance of:

Specified Screen Tint	Tolerance
10%, 20%	± 5%
30%, 40%, 50%, 60%, 70%, 80%.....	± 10%

e.g. Acceptable range of a 20% screen is from 15% to 25%.

4.2.3 Register, Colour to Colour

Misregister is recorded as the linear displacement of any colour relative to another colour on the same sheet.

Maximum allowable misregister: ± 0.4 mm (1/64 in.).

For part-to-part changes, designations, strike-ins: ± 1.6 mm (1/16 in.).

4.2.4 Extraneous Markings (Scumming or Set-Off)

Lines, spots, smears or other extraneous (background) markings are assessed visually. Generalized scumming or tinting is assessed in terms of average reflection density of the affected area. Using a reflection densitometer zeroed on the unmarked paper, measure the background density with the "visual" filter setting. The maximum acceptable background density is 0.06.

4.2.5 Rub-Resistance of Printed Image

A representative sample of a single sheet of the printed form is placed on a Sutherland rub-tester or equivalent instrument and given 25 rubs at a pressure of 6.8948 kPa (1 psi) against an unmarked sample of stock similar to that on which the form is printed. Density measurements with a reflection densitometer are then made on the rub-off smear, having pre-zeroed the densitometer on an unmarked sample of the paper stock. An average density is calculated for the rub-off smear. The maximum allowable density of rub-off smear is 0.06.



4.2.6 Character 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 original camera ready copy. The acceptable range of printed character stroke width is 80 to 120%.

4.2.7 Plugging

This normally occurs with characters having an enclosed area such as the letters *a*, *e* and *o*. The degree of plugging is measured using a magnifier with a measuring reticle and is expressed as the percentage of the enclosed area that has been filled in. The maximum allowable plugging is 20%.

NOTE:

Any six-point or smaller type is excluded from this requirement.

4.2.8 Doubling and Slurring

The secondary or ghost image adjacent to the primary character is measured with a magnifier having a measuring reticle and is expressed as a percentage of the primary image. The maximum allowable doubling or slurring is 10%.

4.2.9 Rulings on Forms

Rulings shall have an even width and consistent density throughout the batch. The positioning and spacing of the ruling shall conform to the requirements of the processing equipment.

4.3 Carbons

4.3.1 Bleeding of Carbon

Test Method—Subject an area of at least 1 in.² of the complete set, face up, to a uniform pressure of 27 kPa (4 psi) at $34 \pm 1^\circ\text{C}$ and $50 \pm 2\%$ relative humidity for seven days. At the end of this time, separate the set and examine each part for bleeding or offsetting.

Required Result—The bleeding or offsetting shall not be such as to render the form unusable or illegible.

4.3.2 Smudging of Carbon

Test Method—On receipt, the set of forms shall be placed, face-up, on a smooth glass plate which is maintained at $23 \pm 2^\circ\text{C}$ and a relative humidity of between 40% and 50%. A test tube measuring about 15 mm in diameter and about 15 cm in length, containing sufficient lead shot to provide a total weight of 25 g, shall be allowed to rest vertically, by means of a suitable support, on the top of the set. The support of the test tube should permit free vertical movement of the tube. The set shall be quickly pulled out from beneath the test tube. Each part of the set shall be examined for carbon impression.



Required Result—There shall be no perceptible line caused by the carbon being pressed against any part of the set.

4.4 Quality of Copies

4.4.1 Legibility of Characters on Copies

The image produced on carbon interleaved multipart forms should be based upon the user's approved write test using agreed papers and carbons processed over the specific equipment.

4.4.2 Density of Characters on Copies

Test Method—A test image shall be applied to the set using a TMI Impact Image Tester with the impact angle set at 75°. The density of type matter formed by carbon release is measured with a microdensitometer (e.g. Macbeth PCM II with the A filter setting) on images made by the Impact Tester. The average density is found by calculating the numerical average of density measurements made on the copies sampled from the entire job lot.

Required Result—Minimum type density shall not be less than 0.65.