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Supersedes CAN/CGSB-53.148-2011

Remanufactured toner cartridges

Canadian General Standards Board CGSB

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Remanufactured toner cartridges

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Preface

This National Standard of Canada has been reaffirmed by the CGSB Committee on Remanufactured Toner Cartridges.

The following definitions apply in understanding how to implement this National Standard of Canada:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

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Introduction

Remanufactured toner cartridges are toner cartridges that have been refurbished for reuse. They are office supplies for laser print devices. The industry for remanufactured toner cartridges was developed as a result of a desire by Canadians to purchase more environmentally preferable products for use in the office while considering costs compared to original equipment manufacturer (OEM) toner cartridges.

Historically, a perception existed amongst consumers that remanufactured toner cartridges were inferior to OEM toner cartridges in terms of quality, cost and lifetime performance. This standard is written to present testing criteria for setting equal or better quality requirements and to specify requirements for warranty information and packaging instructions that a remanufactured toner cartridge shall meet in a qualification program.

This standard supports the national economy by providing clear and measurable attributes specifically for remanufactured toner cartridge products. The standard protects consumers by specifying the requirements for cartridge warranties and quality expectations. It is the foundation for a national conformity program, thereby facilitating trade. Furthermore, the standard supports green procurement initiatives and sustainable development by reusing otherwise discarded toner cartridge components in the production of remanufactured toner cartridges. The fundamental goal of this standard is to ensure that a spent toner cartridge (the casing and other components) is reused as much as possible in the new remanufactured product, and that the end product is not merely a composite of new components. The integrity of the remanufacturing process, i.e. to ensure a robust, quality end product, is also integral to the standard.

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Remanufactured toner cartridges

1 Scope

This National Standard of Canada specifies the manufacturing, performance and labelling requirements for remanufactured toner cartridges for monochrome laser print devices, including but not limited to printers, multi-function devices, copiers and facsimile (fax) machines.

Note: Some cartridges, because of their original OEM design and construction, may be more suitable than others for remanufacturing. Moreover, the life of the drum depends on the roughness of the paper used, the amount of continuous use (causing overheating), the length of time the printer is left switched on, and the quantity of graphics (as distinct from text) printed. Consequently, no definite statement can be made about the number of times a cartridge can be remanufactured.

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

2 Normative references

The following documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

Note: The contact information provided below was valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 International Organization for Standardization (ISO)

ISO 534 — *Paper and board — Determination of thickness, density and specific volume*

ISO 780 — *Packaging — Distribution packaging — Graphical symbols for handling and storage of packages*

ISO 2469 — *Paper, board and pulps — Measurement of diffuse radiance factor (diffuse reflectance factor)*

2.1.1 Contact information

The above may be obtained from IHS Markit. Telephone: 613-237-4250 or 1-800-267-8220. Fax: 613-237-4251. Web site: www.global.ihs.com.

2.2 Technical Association of the Pulp and Paper Industry (TAPPI)

TAPPI T 452 — *Brightness of pulp, paper, and paperboard (directional reflectance at 457 nm), Test Method*

2.2.1 Contact information

The above may be obtained from TAPPI. Telephone: 770-446-1400.

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3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply.

3.1
adhesion
bond between the imaged toner and the copy paper by surface attachment.

3.2
assembly
putting together of a group of cartridge parts that fit together to form a self-contained unit.

3.3
aftermarket drum
replacement organic photoreceptor cell (OPC) drum that was not originally manufactured, in whole or in part, or distributed by the original equipment manufacturer (OEM), and is equal to or better in performance than the OEM OPC drum.

3.4
blasting
particles of toner deposited outside the actual printed area of the defined image.

3.5
background scatter
print quality defect of particles of toner randomly deposited and fused on the page.

3.6
conditioned equipment and paper
equipment or paper that is at equilibrium with prescribed ambient temperature and humidity conditions.

3.7
control cartridges
control cartridges shall be OEM cartridges randomly purchased from different lots and manufactured by the same manufacturer as the printer, and used in the determination of the performance requirements of remanufactured cartridges.

3.8
disassembly
reversal of the process of assembly such that the original parts or components remain undamaged and their structural integrity is maintained and the disassembly process does not render the cartridge unsuitable for further remanufacturing.

3.9
image density
relative measurement of the darkness of a printed area using a reflection densitometer.

3.10
impression
imaged page produced by the print device. Similar to the term ‘copy’, though a copy is an exact image produced on a photocopier machine, whereas an impression is a variable image from a laser print device.

3.11
refurbishing
cleaning, and if required, resurfacing the OPC drum to remove contamination (e.g. used toner particles), and to restore durability and performance.

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3.12
remanufacturing
disassembly of previously used toner cartridges into components and the assembly of the reusable parts into functioning toner cartridges, introducing new components only where necessary or where expressly required by this standard.

3.13
smudging
print quality defect consisting of a mark made by smearing toner to a non-imaged area.

3.14
streaking
print quality defect consisting of a line where no or a limited amount of toner was applied, thus showing a great contrast with the surrounding solid print area.

3.15
voids
missing toner on the printed portion of characters or graphics.

3.16
yield
number of copies of acceptable quality produced by a cartridge using a specified test pattern.

4 General requirements

4.1 Materials

The materials used for remanufacturing the cartridge shall be of the best quality. All work shall be executed in a climate-controlled area with the temperature not exceeding 30 °C and the relative humidity (RH) between 35% and 60% at least 24 h prior to testing. Written procedures for the remanufacturing process, including inspections, testing and cautionary instructions, shall be available at the manufacturer's facility.

4.2 Disassembly

The disassembly (dismantling) process, including the removal of pins, screws etc., and the separation of joints, shall be carried out in a manner that does not damage any part of the cartridge or change its functional design.

4.3 Remanufacturing

The remanufacturing process, including repairs, upgrades, materials and quality of work, shall be free of any characteristics or defects that may render the cartridge unsuitable for further remanufacturing. Any required[1] cutting or drilling of the cartridge components shall be completely resealed to prevent toner leakage and shall ensure that the cartridge can be remanufactured again in the future.

4.4 Replacement parts

Replacement parts shall be of equal or better quality than that of the OEM parts, of the same shape and size as the original parts, and of comparable material.

[1] Where components cannot otherwise be opened, except by cutting or drilling.

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4.5 Impression capability of cartridge

The remanufactured cartridge shall produce a quality of impression equal to or better than that of the control cartridges and shall be capable of retaining this quality of impression to produce a yield equal to or greater than the yield of the control cartridges.

4.6 Warranty on device damage

The remanufactured cartridge shall not cause damage to any laser print device for which it is intended. A warranty shall be provided with each cartridge, guaranteeing to clean, repair or replace any part of the laser print device damaged or adversely affected by the use of the remanufactured cartridge[2]. The warranty shall also guarantee to replace or refund the cost of any cartridge failing to meet the requirements of this standard. The terms of the warranty shall be equal to or better than those of the OEM cartridge.

4.7 Cartridge cleaning

The toner compartment, waste bin and all other components of the cartridge shall be thoroughly cleaned prior to assembly. All remaining toner in used cartridges shall be disposed of in a manner that is in compliance with legislative requirements or recycled (i.e. the spent toner shall not be reused in the newly remanufactured cartridge, but the spent toner may be recycled if facilities exist for repurposing of carbon).

4.8 Device electronics

If the remanufactured cartridge requires a microchip to operate in the laser print device, it shall be modified or replaced to allow the cartridge to operate as, or equivalent to, the OEM cartridge.

5 Detailed requirements

5.1 Disassembly

All parts necessary for the remanufacturing of the cartridge shall be removed.

Note: These parts include such items as screws, springs, clips, plugs, counter assembly, primary charge roller, OPC drum, waste bin, axles and toner casing with magnetic roller. Care should be taken to prevent damage to fragile parts during disassembly, cleaning, maintenance and reassembly of the cartridge.

5.2 Maintenance and reassembly

5.2.1 Examination for wear

All parts of the cartridge shall be examined for wear and replaced as necessary.

5.2.2 Reassembly

The seal, where applicable, shall be installed; the toner compartment replenished with toner (see 5.2.3); and the magnetic roller and doctor blade installed and adjusted if necessary. Adjustment of the doctor blade is required only if the blade was removed or a problem related to a doctor blade was experienced during the pre-test.

5.2.3 Toner

The toner shall be traceable to the manufacturer’s lot or batch number. It shall be black toner intended for use in a monochrome laser print device.

[2] If a faulty cartridge is suspected of having caused damage to a print device, the cartridge supplier should be contacted before scheduling any maintenance to the printer.

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5.3 Serial number

A unique serial number shall be affixed to each remanufactured cartridge. If more than one number is on the cartridge, clear identification shall be given as to which is the serial number (for example, “serial number” or “SN” indicated before the number itself). Provision shall be made to ensure that the following information can be traced from the serial number:

a) name of the company that remanufactured the cartridge;

b) date of each remanufacture and record of replacement of the OPC drum;

c) identification of the toner supplier.

5.4 Wiper wand

Where applicable, the wiper wand shall be refelted using a heat-resistant felt impregnated with fuser oil, or it shall be replaced if the original wand is not returned to the supplier with the cartridge.

5.5 Performance

5.5.1 Cartridge performance

Cartridge performance tests shall be conducted on the first 25 copies (see 7.2.2) and then repeated as indicated in the yield test (see 7.2.7).

5.5.2 Print quality

The printed images shall be clean, sharp and uniform in intensity and shall meet the following requirements when tested in accordance with 7.2.3:

a) there shall be no blasting, streaking or background scatter;

b) no voids greater than 0.2 mm in diameter shall appear in the solid graphic area in a repetitive manner, in the same vertical or horizontal lines (depending on the device) on two or more of the ten pages examined.

5.5.3 Density of printed image

The average reflection density of the printed image of two remanufactured cartridges shall be at least 96% of the median image density of the control cartridges when tested in accordance with 7.2.6. The uniformity (difference as measured by the median coefficient of variation) for the densities shall not be greater than 15%.

5.5.4 Smudging

The printed images shall not show more smudging than the control cartridges when tested in accordance with 7.2.5. A slight amount of toner transfer to the blank pages shall not be cause for rejection.

5.5.5 Adhesion

There shall not be more than a slight amount of cracking, flaking or lifting of the toner on the printed images of graphics when tested in accordance with 7.2.4. Hairline cracks along the fold shall not be cause for rejection.

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5.5.6 Yield

The average yield of the two cartridges, when tested in accordance with 7.2.7, shall meet or exceed the median yield of the OEM cartridges tested by the same method. No cartridge yield shall be below 80% of that median[3].

6 Preparation for delivery

6.1 Packaging

Each cartridge shall be individually sealed in an airtight, moisture-proof, light-proof, antistatic bag and adequately protected in a carton for transport by road, rail or air.

Note: Packaging should be designed and packaging materials selected to minimize waste and environmental impact, both during transport to and recovery from the consumer. The reuse of packaging or the use of recycled or recyclable components should be incorporated where recycling facilities exist. Where possible, any plastic components in the packaging should be identified with a composition code to facilitate recycling.

6.2 Labelling identification

The following information shall be shown on each carton[4]:

a) remanufactured toner cartridge, and make and model;

b) use-before date;

Note: This is not the manufacturing date. May express as YYYY-MMM-DD.

c) supplier's name and postal address;

d) fragile, handle with care;

e) store in upright position between -20 (minus 20) and 40°C;

f) do not stack beyond the limits recommended by the manufacturer.

Note: This is a numerical limit as determined by manufacturer, not the actual text in the line f) above.

6.3 Maintenance instructions and warranty

The warranty (see 4.6) and the maintenance instructions shall be included with each cartridge.

7 Inspection

7.1 Defects

The cartridges shall be examined for the requirements of 5.5.2 to 5.5.6, and any major and minor defects shall be listed (see 7.1.1 and 7.1.2). A cartridge with more than one defect shall be counted as one defective, provided the defects are all major or all minor. For compliance, there shall be no major defects in either of the two units of the sample; only one of the units may have minor defects.

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[3] At least two cartridges shall be tested.

[4] The applicable international packaging symbols listed in ISO 780:1997 are used. This standard was updated in 2015, and may also be applicable but was not reviewed by this standard.

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7.1.1 Major defects

a) Streaks (see 5.5.2 a)).

b) Voids (repeated) (see 5.5.2 b)).

c) Less than the required average density (see 5.5.3)).

d) Less than the required yield (see 5.5.6).

7.1.2 Minor defects

a) Blasting (see 5.5.2 a)).

b) Scatter (see 5.5.2 a)).

c) Smudging (see 5.5.4).

d) Insufficient adhesion (see 5.5.5).

7.2 Testing

7.2.1 Controlled performance tests

The cartridges shall be subjected to the performance tests described in 7.2.2 to 7.2.7 and tested in controlled conditions at 23 ± 2 °C and 50 ± 5% RH.

Note 1: All equipment and paper used to perform this test should be conditioned in the same temperature and humidity for at least 24 h prior to testing.

Note 2: Only the cartridges that do not exhibit any of the major defects listed in 7.1.1 a), b) and c) shall be tested for yield.

7.2.2 Printing for performance test

Using a laser print device for which the cartridge is intended, with all the settings at midpoint if a range of settings is available and the setting is not specified by the manufacturer, print 100 copies of the test pattern (see Figure 1) on white xerographic copy paper. Use the last ten copies for all the tests in 7.2.3 to 7.2.6. (Do not use the first 90 copies for any of the tests). Use copies 91 to 94 to test for adhesion and smudging, and copies 95 to 100 to test for density initially. After 90th copy, any test can be used. Xerographic copy paper used shall meet the minimum requirements:

a) minimum brightness of 104%, ISO 2469 (approximate equivalent is TAPPI 452 brightness 92) and;

b) grammage 75 g/m^2, ISO 534 (approximate equivalent is 20 lb basis weight under TAPPI for ease of purchase).

7.2.3 Printing quality

Examine all printed images for streaks, repetitive voids, blasting and background scatter using low-powered magnification (5X to 10X) with a measuring reticle.

7.2.4 Adhesion

Using two of the impressions printed with the pattern of Figure 1 (see 7.2.2), fold one test print with the print on the inside, approximately at the centre along the length of the bar. Crease the fold with the thumb and forefinger (not using the nails). Open the test print and examine it for compliance with 5.5.5. Repeat the test on the second impression.

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7.2.5 Smudging

Using two of the impressions printed with the pattern of Figure 1, place one sheet face down on a blank sheet of xerographic copy paper (see 7.2.2). Place a stack of paper on the test print to apply a pressure of 340 Pa. Draw the blank sheet out from under the stack of paper, horizontally and at right angles to the rows of impressions in 3 ± 1 s. Examine the test print and the side of the blank sheet in contact with the impressions for any evidence of smudging. Repeat the test on the second impression.

7.2.6 Density of printed images

Using five impressions of Figure 1, determine the absolute reflection density either with a reflectometer using an amber filter or with a densitometer using orthochromatic response. The test instrument shall be calibrated according to the manufacturer's instructions. Each test impression shall be backed by at least ten sheets of copy paper (see 7.2.2). Take five measurements[5] of each test print, and report the average and the coefficient of variation for each test print. Report the average density and median coefficient of variation of all measurements as the density and coefficient of variation for the cartridge.

7.2.7 Yield test

7.2.7.1 Purpose

The purpose of the test is to determine the number of prints of acceptable quality that can be obtained from a remanufactured toner cartridge under normal conditions of use. The test pattern used for this test shall be the one in Figure 2, which has approximately 10% coverage[6].

7.2.7.2 Procedure

a) Use a print device maintained in accordance with the manufacturer's instructions.

b) Use a properly cleaned print device for which the cartridge is intended and under the ambient conditions described in 7.2.1, with all settings at midpoint if a range of settings is available, unless otherwise instructed by the manufacturer. Start printing the pattern of Figure 2, interrupting only to reload the paper tray. Print only on one side of the paper. Periodically examine the resulting impressions for visible deterioration. If the impressions become noticeably faint or non-uniform in density, or if they exhibit other visual defects, stop the print device. Then remove the cartridge, agitate several times to redistribute the remaining toner, reinstall it and resume printing.

   Note: After redistribution of the toner, the cartridge may produce a number of additional satisfactory impressions. Do not perform this procedure more than once for any one cartridge.

   If the impressions remain satisfactory to the naked eye, continue printing until the number of pages reaches 80% of the nominal yield of the corresponding OEM cartridges, as determined by this method, or until the image becomes unsatisfactory, whichever occurs first.

c) Change to the test pattern of Figure 1, produce five impressions of that test pattern, and test for compliance with the requirements of 5.5.2 and 5.5.3. If those five test prints are not in compliance, stop the test, record the particulars of the failure (e.g. insufficient density), and rate the yield of the cartridge as less than "C" copies, where C is the total count to the nearest 100 pages.

d) If the last impression is still in compliance, switch back to Figure 2 and continue printing until failure occurs. Inspect for compliance after every 100 impressions, as described in 7.2.7.2 b).

Note: It is recommended that at the termination of the yield test the test cartridge be replaced in the print device with a control cartridge and a few more copies of Figure 2 be produced to ascertain that the printer is functioning normally.

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[5] The five density readings are taken in the four corners and in the centre of the rectangle.

[6] Although the internationally recognized test-pattern coverage is 5%, 10% was chosen in an attempt to lessen testing costs as the time and paper required for test duration is lessened.

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7.2.7.3 Record

Record the yield in the form of A<Y<B (i.e. the yield (Y) is greater than A but less than B), where A and B are the second-last and last count (i.e. the last “pass” count and the first “fail” count), respectively. Also, note the cause of the failure.

8 Additional requirements

8.1 Reporting requirements

The following shall be specified in reporting cartridge conformance to this standard:

a) warranty (see 4.6 and 6.3);

b) make and series of the control cartridges.

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Figure 1: Solid Coverage

(For illustration only, not to be used for testing)

Canadian General Standards Board

Qualification Program for Remanufactured Toner Cartridges — Standard Test Print 1

Remanufacturer: _____

Testing laboratory: _____ Date: _____

Cartridge type: _____ Report No.: _____

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Figure 2: 10% Coverage

(For illustration only, not to be used for testing)

EE 10% COVERAGE

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Canadian General Standards Board
Qualification Program for Remanufactured Toner Cartridges — Standard Test Print

Remanufacturer: _____

Testing laboratory: _____ Date: _____

Cartridge type: _____ Report No.: _____

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Bibliography

[1] ISO 5-4:2009, *Photography and graphic technology — Density measurements — Part 4: Geometric conditions for reflection density*.

[2] ASTM F1856-04 (2009), *Standard Practice for Determining Toner Usage for Printer Cartridges.*

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