



This standard provides guidance related to planning, design and maintenance of current and future community drainage systems.

Climate-resilient drainage systems help protect communities and their infrastructure from permafrost melt and flooding.



THE POWER OF STANDARDS: A NORTHERN SOLUTION

CSA S503:20 provides guidance to practitioners who plan, design, build, rehabilitate and maintain drainage systems in Northern Canada.

CSA Group developed the standard with funding from the Standards Council of Canada (SCC) and input from SCC's Northern Advisory Committee.

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CSA S503:20 – Community drainage system: Planning, design and maintenance in Northern communities

The challenge: Climate change and drainage systems

Community water drainage systems in Canada's North are different from systems in other regions of Canada. This is due to the unique climate, geology and geography of the North. The region:

- has long periods of extremely low temperatures
- features an extensive underlayer of permafrost
- is home to many small, remote communities that can be difficult to service with technical support and equipment

Northern communities are experiencing some of the most rapid climatic changes in the world. This has resulted in increased warming, changing precipitation patterns and more frequent and unpredictable extreme weather events. The effects of climate change can present various challenges for the design and operation of surface water drainage systems in the North.

About the standard

Objective: To increase the capacity of communities to prepare and implement effective drainage plans to address both existing and future drainage management challenges. This includes addressing deficiencies in past practices and the need to adapt to future climate change.

Details: The standard outlines the minimum planning, design and maintenance requirements for community drainage systems in Northern communities at both the site level and community level. The requirements apply to drainage systems used to collect and transport excess surface water that originates from precipitation, snowmelt or ice melt.

Results: Climate-resilient drainage systems protect buildings and infrastructure from the costly impacts of flooding. They improve the stability of underground permafrost and reduce the risk of sinking soil. This standard helps ensure that community drainage projects carried out by different localities, often separated by great distances, will all confer a similar level of resilience.

Impact: Helping communities adapt

The standard is currently making a difference on the ground. Communities across Nunavut have implemented it.

- They used the standard to inform their master drainage plans. They have based key steps, like geotechnical site investigations of permafrost and other ground conditions, on guidance the standard provides.
- Community master drainage plans influence where new subdivisions and other infrastructures are built. This steers development away from areas that are or may become prone to flooding and other drainage issues.

SCC is supporting community climate change adaptation by training communities on using the standard to develop drainage plans and for land use planning.

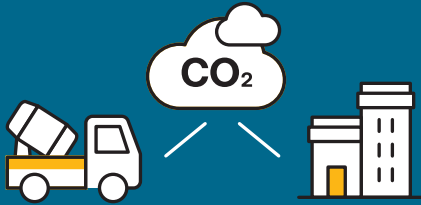


This standard provides guidance on methods and practices to produce concrete that sequesters carbon dioxide.

CarbonCure has locked in over 200,000 metric tons of carbon dioxide emissions. This is equivalent to removing 43,000 gasoline powered cars from the road for 1 year!

Capture harmful carbon dioxide emissions from the atmosphere.

Carbon dioxide injected into concrete.



THE POWER OF STANDARDS: CONCRETE CLIMATE ACTION

The Standards Council of Canada (SCC) and CarbonCure worked together to develop an informational Annex to the existing standard (CSA A23.1 and A23.2). It includes CarbonCure's patented technology as one of the acceptable methods of producing concrete.

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CSA A23.1:19/CSA A23.2:19 – Concrete materials and methods of concrete construction/ test methods and standard practices for concrete

The challenge: Race to net zero

Reducing greenhouse gases in the atmosphere, including carbon dioxide, is critical to limiting human-caused climate change and reducing its impacts. The cement industry, which produces a major building block of concrete, is responsible for about 7% of the world's carbon dioxide emissions. It is the largest contributor to embodied carbon in the built environment.

Canada's **CarbonCure** has found a way to permanently sequester or lock in carbon dioxide. They inject the carbon dioxide into the concrete as it is mixed. This mineralization:

- improves the concrete's strength, which produces concrete products that meet or exceed quality benchmarks
- decreases both greenhouse gas emissions and manufacturing costs
- creates a stronger concrete that is more durable, has a longer service life and needs fewer repairs

However, until recently, the standard for materials and methods of concrete construction did not allow for the use of this technology in Canada.

About the standard

Objective: Annex S of the standard provides information on concrete made with carbon dioxide to reduce the carbon footprint of cement and concrete.

Result: The Annex has been integrated into the National Model Construction Codes and provincial and territorial construction codes.



Impact: Locking it in

CarbonCure is already up and running at hundreds of concrete plants. It is used in thousands of projects around the world. Each of these is now permanently storing carbon dioxide that would otherwise be in our atmosphere. To date, CarbonCure alone has locked in over 200,000 metric tons of carbon dioxide emissions. This is the equivalent of removing over 43,000 gasoline powered cars from the road for one year.

Next steps

Ongoing education is needed to ensure cities update their codes to include this new technology so design professionals, contractors and construction workforces are aware of the options for maximizing carbon storage in the built environment.



The standard provides guidance on quantifying risk in the biomass supply chain.

Is it a family-owned farm? Do they have experience planting, harvesting, processing and collecting biomass? Is it economical or risky to transport the biomass?

Understanding risk increases investment.

Biomass is processed or refined to make low-carbon bioenergy.



THE POWER OF STANDARDS: MEASURING RISK

The Standards Council of Canada (SCC) worked with Ecostrat to support accreditation of the Biomass Supply Chain Risk Standard as a National Standard of Canada.

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CSA W209:21 – Biomass supply chain risk

The challenge: The biomass supply chain

Bioenergy is produced from biomass such as wood, organic waste and agricultural residue. It's a versatile, renewable energy source that can be turned into fuel to supply heat and electricity. Bioenergy can play a key role in decarbonizing Canada's energy sector.

One issue is that bio-based development projects are often faced with financial barriers. An example of this barrier relates to investors' reluctance to invest when there is unquantified risk related to the reliability of supply chains for quality biomass or feedstock.

By providing reliable, quantitative descriptions of this risk, it is possible to attract more investment in biofuels, bioenergy, bio-based heat and power, and clean hydrogen production.

About the standard

Objective: To create a validated method to measure feedstock supply chain risk. Published in 2021, the standard provides requirements, recommendations and guidance for understanding the potential risks to biomass supply chains. It is a powerful tool that financial markets can use to reduce concerns around investment risk.

Details: The development of the standard involved 3 years of input from more than 150 bioeconomy experts, financial institutions, capital providers, operators, developers, feedstock producers, industry organizations and academics.

Result: The standard is organized into 6 risk categories that represent supply chain risk. Each category identifies risk factors, risk indicators, guidance on best practices, and tools to measure and mitigate risk.

Impact: Accelerating bioenergy funding

The standard provides capital markets with a method to quantify bio-feedstock risk. It reduces the level of uncertainty that currently translates into low credit ratings for bioenergy companies. The standard will help:

- improve lender confidence
- increase the pool of capital available to the bioeconomy
- de-risk investment in biomass-based projects across Canada

Next steps

Already, the standard has been used to develop a mechanism to accelerate financing of biomass-based projects in Canada. The Bioeconomy Development Opportunity (BDO) Zone Initiative enables communities in Canada to leverage their biomass assets as anchors for clean energy economic development in their region. Regions that achieve AA or A ratings are awarded a BDO Zone designation. This marks them as one of the optimal areas in the country for bio-mass development investment.

BDO Zones can use the rating to attract investment into new facilities that produce sustainable aviation fuel and advanced biofuels, renewable chemicals, biogas and other bio-based manufacturing products. The BDO Zone Initiative is a catalyst for clean energy jobs in Canada. It's playing a key role in driving our low carbon future.



The ISO 37120 series helps cities measure and report on indicators related to their performance in city services and quality of life, while embracing the smart, resilient and sustainable city agendas.

The WCCD network of over 100 cities across 35 countries supports knowledge sharing and collaboration.

By implementing the ISO 37120 series, cities can streamline their systems and processes, and harness data to attract and inform city-wide investment.



THE POWER OF STANDARDS: A COMMON LANGUAGE

Supported by the Standards Council of Canada (SCC), the World Council on City Data (WCCD) has contributed significantly to the development and implementation of the ISO standards on indicators for city data. The WCCD is a not-for-profit organization headquartered in Toronto. They work in over 35 countries and across 100 cities.

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ISO/TC 268 – Sustainable cities and communities (ISO 37120, ISO 37122, ISO 37123)

The challenge: Smart, sustainable development

Cities around the world face the challenge of mitigating and adapting to climate change impacts. At the same time, they need to manage population growth and ensure a resilient economic future for their residents.

National, regional and local leaders, as well as planners and city staff, need a comprehensive dataset to establish and benchmark their progress on the critical agendas of smart, sustainable and resilient cities. They also need a mechanism to share knowledge, measure performance, and drive innovation and investment.

About the standard

Objective: To provide cities with a common language to measure their progress on the smart, sustainable and resilient city agendas.

Details: The ISO 37120 series includes:

- **ISO 37120:2018:** Indicators for city services and quality of life – measuring the performance of city services and overall quality of life for residents.
- **ISO 37122:2019:** Indicators for smart cities – measuring a city’s smart or innovative policies, programs and technologies.
- **ISO 37123:2019:** Indicators for resilient cities – measuring a city’s ability to prepare for, recover from and adapt to shocks and stresses.

Results: Working closely with SCC, the WCCD developed an implementation protocol. This protocol is to guide cities in collecting and reporting data in alignment with the ISO 37120 series. Through the WCCD’s visualization portal, cities can track year-over-year progress on annually reported data. They can then exchange lessons with participating cities across Canada and globally.

Impact: Critical tools for prosperous cities

The successful implementation of the ISO 37120 series is based on the caliber and quality of the data reported in conformity with the standards. Cities that successfully report ISO 37120 are eligible to report both ISO 37122 and ISO 37123.

The implementation of the ISO 37120 series through WCCD helps cities to:

- analyze their infrastructure deficits and investment decisions
- build accurate baselines
- monitor year-over-year progress
- attract foreign direct investment
- advance economic development through nationally and globally comparative data
- facilitate city-to-city learning and exchange of good practices

As the WCCD continues to lead globally in the design and implementation of new city data standards, the ISO 37120 series continues to evolve as a critical tool to help cities become smarter, more sustainable, resilient and inclusive.



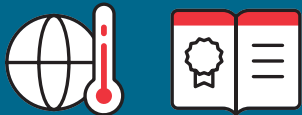
Helping standards developers consider climate change adaptation and mitigation.

How do I incorporate disaster preparedness, resilience to climate impacts, and GHG reductions into this standard?

The guidelines provide principles for incorporating climate change issues, impacts, risks and opportunities into new and existing standards.

Climate Change and Standards

A “how to” guide



THE POWER OF STANDARDS: BUILDING RESILIENCE AND PREPAREDNESS

With support from the Standards Council of Canada (SCC), ISO's Climate Change Coordination Committee (CCCC) developed the ISO Guide 84 to be used widely across sectors. The guide helps organizations build resilience and preparedness for future climate impacts. It addresses low-carbon transition risks and opportunities.

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ISO Guide 84:2020 – Guidelines for addressing climate change in standards

The challenge: Promoting climate action through standards

Global climate change is causing increased temperatures, variable precipitation, sea level rise and more frequent extreme weather events. These changes are threatening environmental, social, economic and structural systems around the world.

Action on adaptation and mitigation is needed to reduce the adverse impacts of climate change. Standards that consider climate change adaptation and mitigation can contribute directly to achieving sustainability and address climate change. Indirectly, standards are important for testing, product development, procedures, services, terminology, management systems or assessments.

About the standard

Objective: To help standards developers incorporate climate change adaptation and mitigation in planning, drafting, revising and updating standards.

Result: The International Organization for Standardization (ISO) published the ISO Guide 84:2020 in July 2020.

Impact: A standard for standards developers

ISO Guide 84 outlines a framework and general principles that standards developers can use to systematically address issues, impacts, risks or opportunities related to climate change adaptation and mitigation.

Considerations related to adaptation are intended to contribute to:

- increasing preparedness
- reducing disaster
- improving the resilience of organizations and their technologies, activities or products

Considerations related to mitigation consist of approaches that seek to avoid, reduce and limit the release of GHG emissions and/or increase GHG removals.

Next steps

The guide can be used during all stages of the standards development process. This includes the revision stage for existing standards. Developers are encouraged to collaborate with subject matter experts when possible. When standards developers address climate change in existing or new standards, the result can be an increased awareness of climate change issues among the user community across various market sectors.

The ISO CCCC is gathering feedback on the guide and following progress on incorporating climate change into international standards. Currently, the ISO Technical Committee 8/SC 11 Intermodal and Short Sea Shipping is using the guide to develop their standards.



This standard provides guidance on how to conduct a geotechnical site investigation for buildings located on permafrost.

What are the unique climatic and permafrost characteristics of the ground at this building site?

Geotechnical site investigations help ensure that building design, construction and maintenance consider the effects of permafrost.



THE POWER OF STANDARDS: STRENGTHENING INFRASTRUCTURE

In 2017, the Standards Council of Canada (SCC) and Bureau de normalization du Québec (BNQ) developed CAN/BNQ 2501-500 Geotechnical Site Investigation for Building Foundations in Permafrost.

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CAN/BNQ 2501-500 – Geotechnical site investigation for building foundations in permafrost

The challenge: Building in Northern Canada

Canada's North is warming 3 times faster than the global rate because of climate change. As a result, the North is experiencing:

- an increase in permafrost thaw and degradation
- reductions in sea ice
- an increase in coastal erosion
- an increase in severe storms
- an increase in variable precipitation

New and existing infrastructures are vulnerable to these impacts. Of particular concern is permafrost thaw. Many communities and services have been built on permafrost that is now thawing and degrading due to climate change.

About the standard

Objective: To ensure built infrastructure is prepared for a changing climate and considers the unique circumstances of Northern Canada. The standard was developed as one of 13 standards in the SCC's Northern Infrastructure Standardization Initiative (NISI).

Audience: This standard is primarily aimed at geotechnical consultants. It is also intended to be used by the owners and designers of buildings, contractors and regulators.

Impact: Investigations for resiliency

The standard establishes a consistent methodology for performing geotechnical site investigations in permafrost zones of Canada's North.

A geotechnical site investigation is important. The investigation considers the conditions at the building site. This includes:

- the distinctive characteristics of permafrost
- the seasonal and interannual climate conditions
- how climate change may affect ground conditions as a result

The investigation is carried out within a risk management framework. This framework assigns risk levels based on the:

- permafrost's sensitivity to climate change
- consequence of failure for the building's foundations

The standard was developed to help ensure geotechnical site investigations provide the information needed so Northern buildings and their foundations are designed, built and maintained in ways that reasonably account for the effects of permafrost. This includes changes in permafrost conditions over the service life of these structures.

Next steps

In the long term, the standard is expected to reduce maintenance issues and damage to infrastructure that could otherwise result from improper site investigation. This includes inadequate consideration of the future effects of climate change on ground conditions.

The standard was highlighted in the March 2023 edition of the Good Building Practice for Northern Facilities as a best practice for maintaining infrastructure in Canada's North.



This standard provides guidance and best practices for the design and construction of buildings that can withstand high winds.

Wind resistant house to-do list:

- ✓ fasteners
- ✓ garage doors
- ✓ cladding
- ✓ envelope components

The standard recommends building components that are high-wind resistant.



THE POWER OF STANDARDS: BETTER DESIGN AND CONSTRUCTION

The CSA Technical Committee on High Wind Safety for Low-Rise Residential and Small Buildings developed the standard.

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CSA S520:22 – Design and construction of low-rise residential and small buildings to resist high winds

The challenge: High wind events in Canada

Climate change is increasing the frequency of severe weather events in Canada. It too often reveals the vulnerability of our built environments to these types of stressors. High wind events, including tornadoes, can cause significant structural damage to house roofs. The impact of house roof damage or failure can be catastrophic. It can:

- lead to a total loss of the building and its contents
- risk the lives and health of the building's residents

Homeowners, insurers and other decision-makers are increasingly looking for methods to incorporate into new home construction and renovations to reduce this risk.

About the standard

This standard supports:

- people involved in the building and housing industry
- manufacturers wanting to prepare their products for high-wind resistance
- homeowners seeking to improve their homes
- property and casualty insurers or government agencies wishing to incentivize or apply high-wind reduction for residential buildings

The guidance in this standard is based on (and written to supplement) the requirements specified in Part 9 of the National Building Code of Canada.

Impact: Envisioning a wind-resilient home

This standard contains best practice guidance for the design and construction of low-rise woodframe buildings to withstand high winds corresponding to EF-2 tornado-level wind speeds of 113 to 157 mph (181 to 253 km/h). This standard can be followed for:

- all new construction
- major additions or alterations to existing structures

What does a wind-resilient house roof look like? The standard focuses on two main areas:

- **It provides guidance** on the use of fasteners to help connect the floor, walls and roof in ways that distribute the force of the wind through all the main structural components of a house. It reduces the potential for damage and all-out failure.
- **It specifies material and design** considerations that can reduce the potential for wind damage to other wind-sensitive components of most houses. Examples of components include garage doors, house cladding and other components of the building envelope.

Next steps

Severe wind is a significant driver of disaster losses in Canada. The Ontario Building Code is currently considering how to refer to this standard. Professional associations are providing training on:

- how to use the standard
- what it covers
- why it's a valuable tool to make homes in Canada more resilient to the impacts of climate change



These guidelines provide a consistent approach for implementing net zero strategies.

By promoting a common definition and approach, net zero claims can be compared, improved and scaled.

Net zero = balancing GHG emissions with increased GHG removal and sequestration.



THE POWER OF STANDARDS: GLOBAL COLLABORATION

The Net Zero Guidelines were developed as a deliverable of Our World 2050. It's a collaboration between International Standards Organization (ISO), UN Race to Zero campaign and UNFCCC Global Innovation Hub. The Standards Council of Canada (SCC) collaborated with the British Standards Institution (BSI) to implement the guidelines on an international level to achieve net zero goals.

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IWA 42:2022 – Net zero guidelines

The challenge: Aligning net-zero governance

Evidence from the Intergovernmental Panel on Climate Change (IPCC) shows that to keep the global temperature below 1.5°C above pre-industrial levels, we need to achieve net zero carbon dioxide emissions by the 2050s.

Net zero refers to the condition in which human-caused greenhouse gas (GHG) emissions are balanced by human-led removals. Different sectors and levels of government have widely adopted different net zero plans, strategies and goals. This has led to inconsistent and confusing guidance on net zero.

About the standard

Objective: To align the net zero governance space and to provide a universal reference point for current and future net zero strategies.

Details: The ISO Net Zero Guidelines were created by BSI through a 3-month open consensus process with over 1,200 global participants.

Impact: Net zero on the international stage

The net zero guidelines create a consistent approach for organizational decision-making related to existing or future net zero strategies.

The guidelines include:

- definition of net zero
- principles for incorporating net zero
- guidance on how to set net zero targets
- guidance on how to contribute to global targets

- guidance on taking action to address all GHG emissions (direct and indirect) in an organization's value chain
- recommendations for communication, credible claims and consistent reporting

Standardized net zero claims are easier to compare.

The guidelines are for:

- policymakers at national and subnational levels
- cities
- businesses
- non-governmental organizations
- intergovernmental organizations
- anyone looking to make or support a net zero claim

By promoting the alignment of voluntary net zero initiatives, claims, policies and regulation at different levels of decision-making, organizations and governments can effectively contribute to global net zero efforts.

Next steps

The guidelines were launched in 2022 at COP27. The goal was to promote the use of international standards such as this one for global GHG emission reduction. The Net Zero team is continuing to put the document into action. This involves re-engaging policy makers to drive consistency on globally accepted definitions and best approaches for net zero. Ultimately, their goal is to accelerate early adoption and promote the transition of net zero from standards to regulation.