# 6.1 Introduction to Standards

Talking head

Consider a USB port. Have you ever thought about how you can connect all kinds of different peripheral devices like a mouse, phone charger, or a printer to a computer as long as it has the right type of USB port? This works for laptops and devices from a variety of different companies. No matter the device, you can always plug in to a USB port knowing that information and power will transfer seamlessly. This is all because of standards.

Voice-over

What exactly is a standard? The International Electrotechnical Commission, an international standards organization, provides us with this definition [show definition of a standard]:

“A standard is an agreed way of doing something in a consistent and repeatable way. Standards set minimum requirements in terms of safety, reliability, efficiency and trust.” ([IEC](https://www.iec.ch/understanding-standards))

In the case of USB ports, the USB standards provide specifications for how USB-connected devices connect and communicate, so that USB connections are consistent and reliable.

Let’s look at a few other examples of standards.

There is a standard from the International Organization for Standardization, or ISO for short, that provides standard formats for dates and times. This standard, ISO 8601, tells us which format we should use to present a date and time so that it is understandable to people and systems around the world.

Another example is the Canadian standard “Accessible Design for the Built Environment”. This standard gives requirements for making indoor and outdoor facilities accessible to people with disabilities. It includes accessibility requirements for things like doorways, stairs, elevators, seating, and washrooms inside a building. This standard provides technical requirements that make public spaces and buildings more accessible.

Talking Head

You can see from these examples how standards lead to greater consistency and safety. There are many standards that we benefit from all the time, often without realizing.

Voice-over

Who is responsible for creating standards? There are organizations that develop standards, such as the CSA Group in Canada or the International Organization for Standardization (ISO). These organizations will facilitate the process of developing a standard. The standards themselves are written by committees or working groups of people who have knowledge of the subject matter and an interest in the standard being developed. These people draft a standard which then goes through a process of feedback and approval before the standard is published.

There are several different terms related to standards that you may encounter. These include [show terms on screen: standards, guidelines, codes, regulations] standards, guidelines, codes, and regulations. Some of the differences have to do with whether it is mandatory or voluntary to follow the document. [maybe add the word voluntary or mandatory beside each term in the list during the next few sentences.] A standard is voluntary, in that it should be followed but there aren’t legal consequences if it isn’t. Similarly, a guideline provides recommendations, but it isn’t mandatory that it be followed. Codes and regulations provide requirements that legally must be followed. In this module we use the term “standard” generally to refer to any of these types of documents.

Talking head

As you can see, standards are an important resource for engineers. Whether they are voluntary or mandatory, standards can help you ensure that your projects are safe and reliable and can be trusted by others. When you are developing a product or a project, you’ll want to make sure you are following relevant standards.

# 6.2 Reading a standard

[This video is based on the standard available here: <https://www.csagroup.org/wp-content/uploads/B651-18EN.pdf>. I’m envisioning that you might display different parts of the document as we are exploring it, and highlight the quotes that I’ve included below on screen where it makes sense.]

Talking Head

Now that you know what a standard it, let’s take a look at a real standard in some detail. We’ll use the Canadian standard “Accessible Design for the Built Environment”. You can find this document on the web, freely available from the CSA Group. This standard is over two hundred pages long. How should we approach it?

Voice Over

We can start on the title page. We can see that this is a standard produced by the CSA Group and that it has also been adopted as a National Standard of Canada by the Standards Council of Canada.

Next, we will want to look for a Table of Contents to help us see the layout of the standard and what we can find here. The Table of Contents starts on page 1 and continues to page 7. It shows us the 9 major sections of this standard. Section 0 provides an Introduction and section 1 explains the scope of the document – what is covered by this standard. Sections 2 and 3 include reference publications and definitions. Then we get into the details of the standard with sections for general requirements; interior circulation; interior facilities; residential accommodation – permanent and short-term; exterior circulation, spaces, and amenities; and vehicular access. We can use the table of contents to identify the sections of this standard that are relevant to us.

When approaching a standard, a good place to start is reading the Introduction and Scope, to understand the purpose of the standard and what kinds of things are covered. We can see in the very first paragraph of the Introduction that “this standard contains requirements for making buildings and other facilities accessible to persons with a range of physical, sensory, or cognitive disabilities…. It was developed to fulfill an expressed need for a national technical standard that covers accessibility issues in many different types of buildings and environmental facilities.”

In the Scope section, under Application, we can find when this standard should be applied, namely “in the design and construction of new facilities or exterior environments, or in modifications to existing facilities”.

We may also want to look at the Preface, which, in this case, provides some information about how this standard relates to previously published standards, and what major changes are found here compared to the most recent standard.

After reading the Introduction, Scope, and Preface, we will have a better sense of what this standard is about. Now we can return to the Table of Contents to identify sections of interest. If we were designing an outdoor space for pedestrians, [show section 8 of Table of Contents] we could focus on Section 8 for exterior circulation, spaces, and amenities. Here we can see the list of technical requirements for creating an outdoor pedestrian space. [show figure 64 on page 176] In some cases, we will also find diagrams that further explain the requirements.

Talking Head

There is a lot of variation in the length and contents of different standards, and they can seem intimidating. But having a few strategies like this to help you orient yourself and find the information you need can make reading standards much more manageable.

# 6.3 Finding Standards

Standards are expensive! A single standard can cost hundreds or thousands of dollars to purchase. So how can you access standards without having to pay? Your academic library will provide you with access to some standards for free. We’ll talk about how you can access these standards.

Rather than purchasing one standard at a time, academic libraries often will purchase access to a collection of standards from a standards organization. When searching for a standard, the first thing you’ll need to know is which organization created it.

In 2021, McMaster University students have access to the following standards collections [display list]:

* CSA Standards (from the Canadian Standards Association)
* ASCE Standards (from the American Society of Civil Engineers)
* ASTM Standards (from the American Society for Testing and Materials)
* IEEE Standards (from the Institute of Electrical and Electronics Engineers).

[go to library website, show Databases tab]. You can access any of these standards collections on the McMaster library website, through the Databases tab. For example, we can search for CSA standards [search term: CSA standards]. When I click on this link, I’ll need to authenticate with my MacID and password.

Now I have access to the CSA Standards database. I can search for standards using the search box. You can search by keyword, or, if you know which standard you need, you can search by the standard number or title.

If I want to find the Canadian Highway Bridge Design Code, I could search by the title or by the standard number, which is CSA S6:19. [show search for CSA S6:19]. The standard itself is the second search result. When I click on the standard number, I can see different documents associated with this standard. There’s the current standard, but also the same standard in French and previous versions of the standard that have since been withdrawn. If I click on the first option for the current version of the standard in English, I see an option to view this standard online or to download it. When I click ‘View Online’, you can see that I can now read all 1182 pages of this standard.

Of course, your university library doesn’t provide you with digital access to every standard you might ever need. Some standards might be available in print. You can try searching for a standard by number or by title in your library catalogue. In rare cases, a standard may be freely available online and findable using a search engine. And in some cases, you may find that your library doesn’t have a standard that you need. You can try requesting it through interlibrary loan or you can email your librarian to help you figure out what options are available to you.

As you can see, these strategies can help you efficiently and effectively search for standards. Think about your own needs and when you might need to access standards – now you know how to!