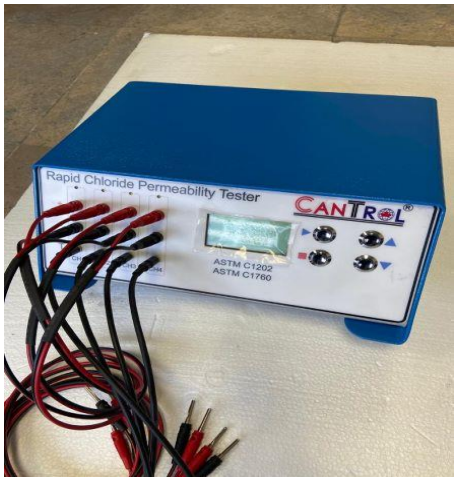
CANTROL®
Construction Materials
Testing Equipment

Instruction Manual

Rapid Chloride Permeability Test (RCPT)

according to standard (ASTM C1202)



Contents

Introduction:

One of the effective factors in reducing the durability of concrete is the penetration of chloride ions. Rapid Chloride Permeability Test (RCPT) allows the evaluation of the chloride permeability properties in concrete. In this test method, the amount of electric current passing through a cylindrical sample with a thickness of 50 mm and a diameter of 100 mm is measured over a period of 6 hours. At the end, the total passing charge in the Columbus unit, which is related to the resistance of the sample to the permeability of chloride ions, is recorded as the test result. It should be mentioned that the equipment of this test is used in the electrical conductivity of hardened concrete testing (ASTM C1760).

specifications:

Number of channels	4
Independent channels	Yes
Customizable test duration	Yes
Sampling rate (minutes)	from 1min.
Voltage (VDC)	5-60
Current measurement (mA)	0 - 600
Temperature measurement (°C)	0-100
Internal memory for saving data	Yes
PC connection	User-friendly PC software with full device control
Short circuit protection	Yes
Operating voltage	100-240V 50/60Hz 1ph
Dimensions of device	330x260x130 mm
Dimensions of each cell	180x150x150 mm
Weight of device	6.5 kg
Weight of each cell	3.5 kg
Power supply	110V,60Hz. / 220V,50Hz.

Sample and device preparation:

1- Preparation of concrete sample:

• The sample can be made in the laboratory by molding with 100 mm diameter and 200 mm height, as shown in the figure below, or obtained by using coring. According to ASTM C1202 test, the test specimen shall be 100 mm in diameter and 50 mm in high.

Figure 1: Molds for concrete sample production.

2- Sample preparation:

• Samples should be completely immersed in distilled water in the desiccator.

• If possible, place the specimens on a floor near the drain at the empty desiccator. Desiccator must remain in the same position permanently during the final seepage of water.

Figure 2: Vacuum pump and desiccator device.

• Clean the edge of the desiccator lid and lubricate with silicone oil.

• Check all valves are closed. Now put the lid on the desiccators.

• Connect the hose from the vacuum pump to one of the valves on the lid. To create a vacuum, open the valve and turn on the pump.

• Keep the vacuum pump on for about three hours, then close the valve and turn off the vacuum pump.

Connect another hose to the second valve on the lid and place the end of the hose in the container with distilled water. Now open the second valve and let the water flow into the desiccators. Water should completely cover the samples. No air should be allowed to enter the desiccators.

• Open the first valve that is connected to the pump and close the second valve and turn on the pump for another hour.

• Turn off the vacuum pump and disconnect the hoses from both valves, the valves must be closed while removing the hoses. Now slowly open the valve to allow air to enter the desiccators.

• Keep the sample in the desiccator for another 18 hours. Then remove the desiccator lid and take out the sample.

3- Choosing the rubber gasket for RCPT cell:

The table below shows the proposed type of gasket according to the sample diameter.

Table 2: Sample diameter and required gasket dimensions

Sample diameter	gasket dimensions
104 mm - 102 mm	99 × 127 × 10 mm
101 mm - 97 mm	93 × 127 × 10 mm

Figure 3: Rubber gasket

4- Installing gasket:

• Select the type of gasket according to the sample diameter as shown in Table 2.

• Clean gasket and spacer.

Lightly lubricate the bottom surfaces of the gasket with silicone oil.

• Press one of the gaskets on the sample from one side. Place the spacer in the center on the washer and press another gasket at the end of the sample.

Now place a cell on the table. Insert the installed gasket into the grooves of the cell. Place the other part of the cell to complete the arrangement.

• Make sure both connections (red and black) are in the same direction.

• Insert the four bolts with washers into the cell holes in each corner. Tighten the opposite screws with a wrench. The screws should not be too tight, which may damage the cell.

• To check for cell leaks, put it on paper and fill the cells with water by a funnel. Then check the water level or leaks on the paper.

Before starting the test, drain the water from the cell and fill with the solutions (3.0% Nacl and 0.3 N NaoH).

• Appropriate assembly is shown in Figure 4 below.

Figure 4: Assembled RCPT cells

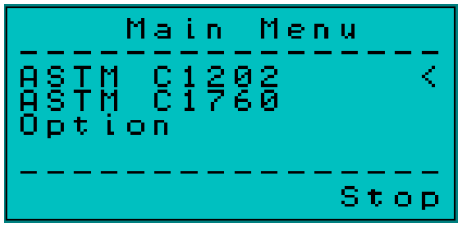
5- Connecting the cells to the RCPT device:

Cell number 1 should be connected to channel number 1, cell number 2 to channel number 2, and so on.

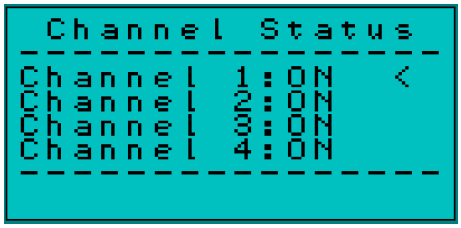
Figure 5: RCPT device

Before the test:

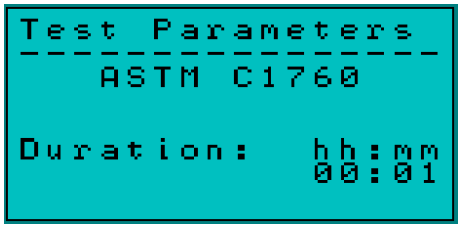
First, set the power supply status to 220 or 110 volts. After turning on the device, the screen shows the names of the 2 standards and settings as shown below.

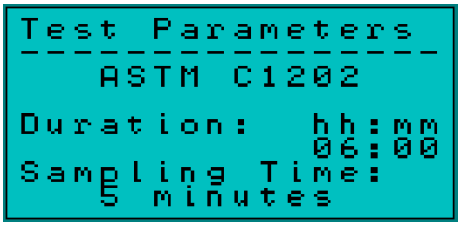


Select the desired standard with the up and down button ▲▼ and by pushing the start button ►, the next screen will show the status of 4 channels as shown below.



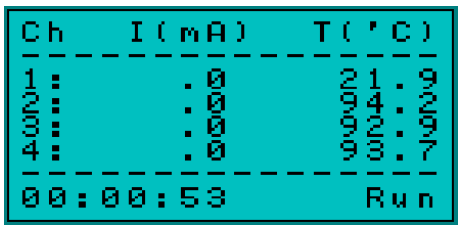
Push the stop button ■ to change the status of the channels, and by pushing the start button ►, the test information will be displayed as shown below. The default time is 6 hours for ASTM C1202 and 1 minute for ASTM C1760.

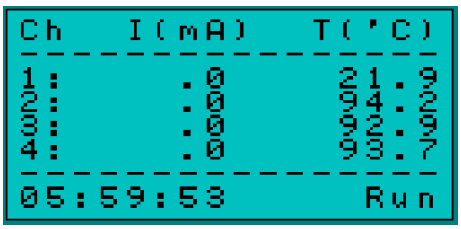




During the test:

Use the Start button ► to start the test. The test results will then be displayed as shown below.

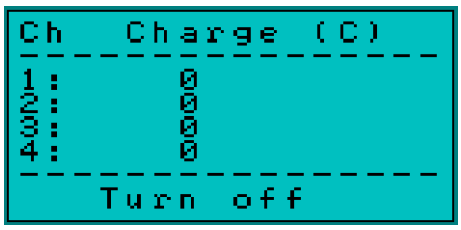




Each channel shows status, current, temperature in degrees Celsius, remaining time, and coulomb. Coulombs are stored after the selected sampling time and then updated in the desired interval. The test will continue until the selected time is reached, by pushing the stop button ■, the current exceeds 600 mA or the temperature exceeds the maximum temperature of 90 ° C.

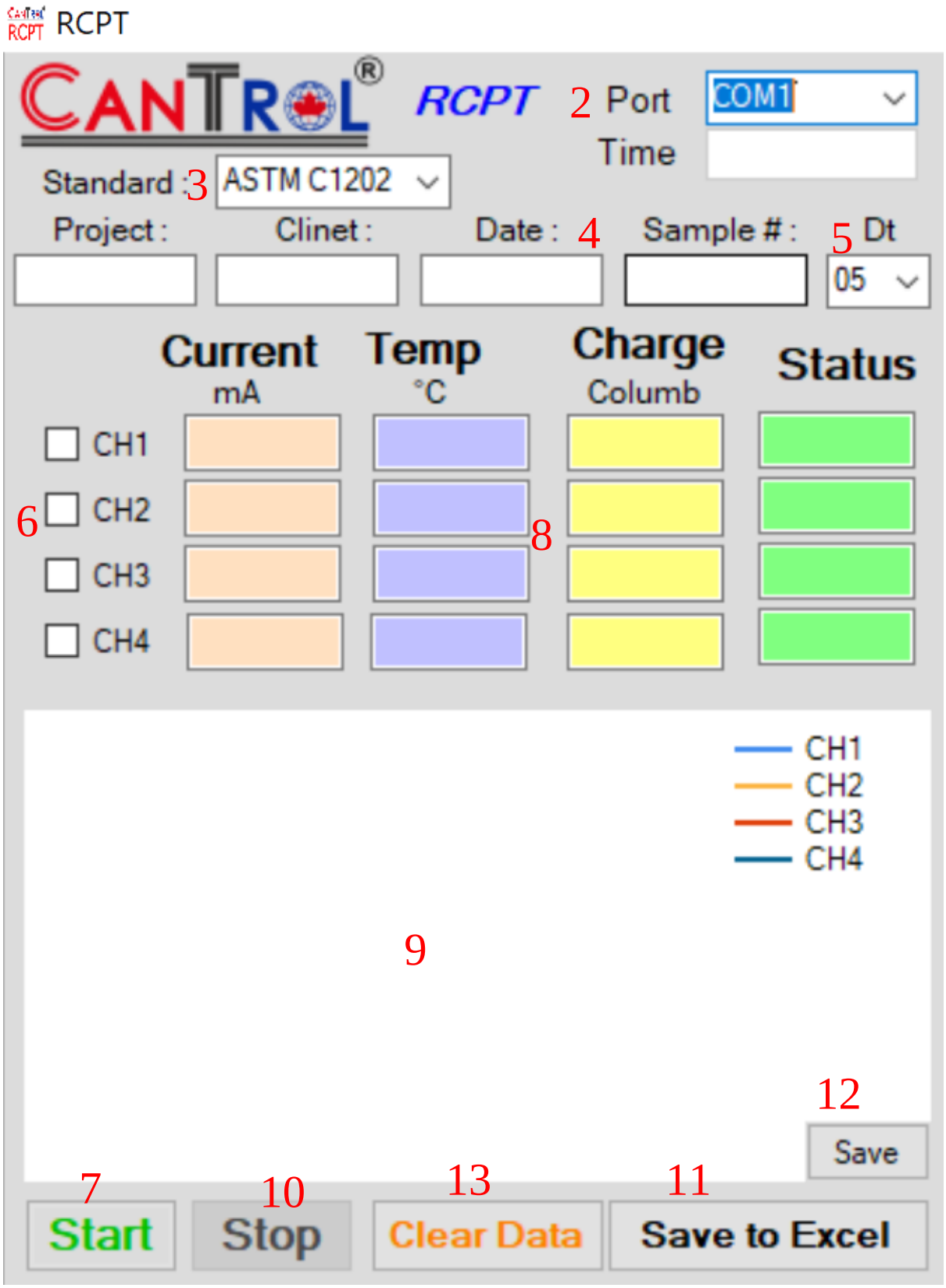
After the test:

The stop button ■ is used to stop the test. When a channel is stopped, the test results will be displayed as shown below.

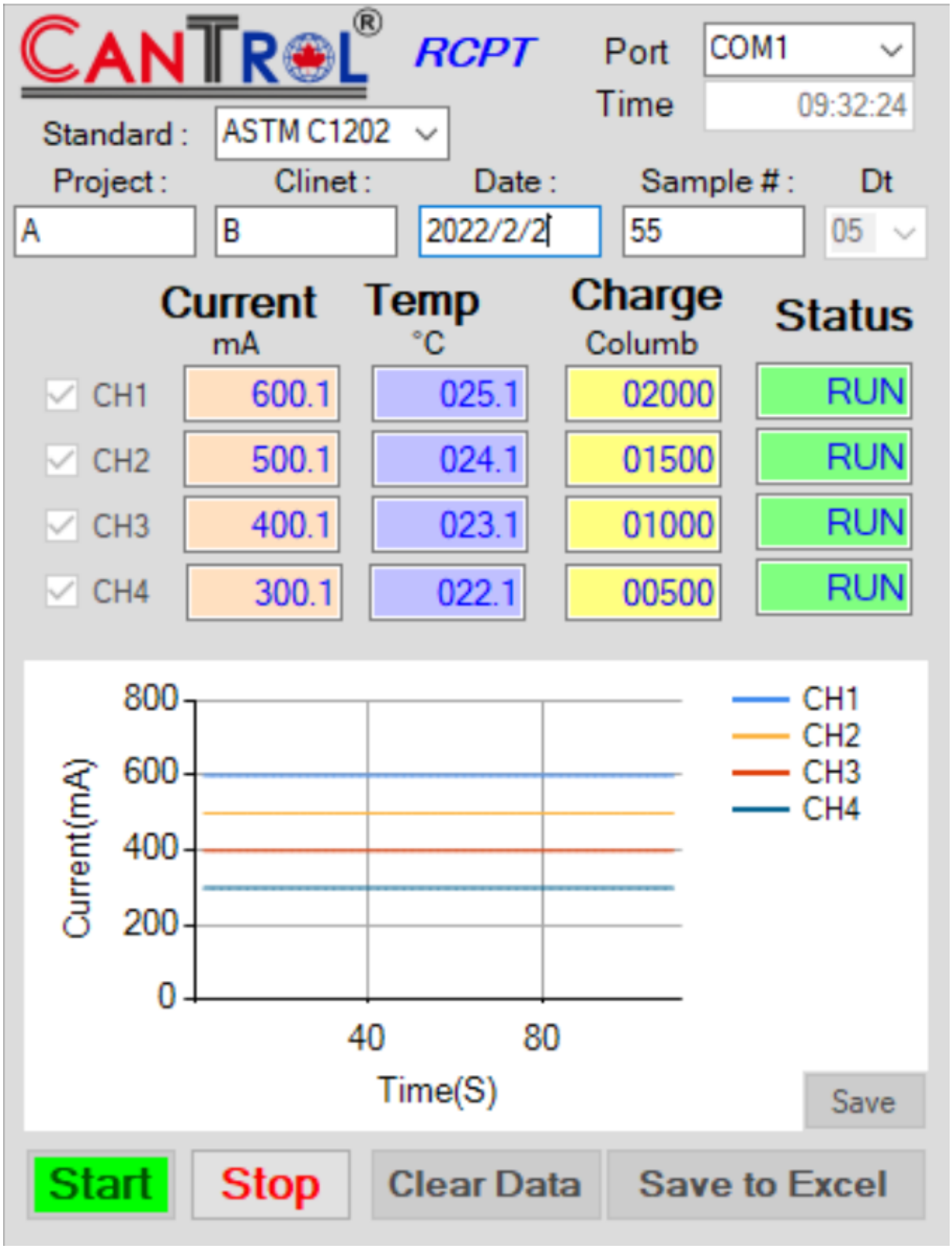


Test by Software:

1. Connect RS232 cable
2. Select port
3. Select standard type (ASTM C1760, ASTM C1202)
4. Fill sample specifications
5. Select sampling time (5, 10, 15, 20, 25 & 30 min)
6. Select channels
7. Start the test
8. See result in table
9. See result in graph
10. Stop the test
11. Save all data in MS Excel format
12. Save graph in picture formats
13. Clear memory for new test


RCPT
CANTROL
RCPT
2
Port
COM1
Time
Standard :
3
ASTM C1202
Project :
Clinet :
Date :
4
Sample # :
5
Dt
05
Current
mA
Temp
°C
Charge
Columb
Status
CH1
CH2
CH3
CH4
6
8
CH1
CH2
CH3
CH4
9
12
Save
7
Start
10
Stop
13
Clear Data
11
Save to Excel

RUN


CANTROL
RCPT
Port
COM1
Time
09:32:24
Standard :
ASTM C1202
Project :
Clinet :
Date :
Sample # :
Dt
A
B
2022/2/2
55
05
Current
mA
Temp
°C
Charge
Columb
Status
CH1
600.1
025.1
02000
RUN
CH2
500.1
024.1
01500
RUN
CH3
400.1
023.1
01000
RUN
CH4
300.1
022.1
00500
RUN
800
600
400
200
0
Current(mA)
40
80
Time(S)
CH1
CH2
CH3
CH4
Save
Start
Stop
Clear Data
Save to Excel