

CERTIFICATE OF CONFORMITY



1. **HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS**
2. **Certificate No:** FM18CA0010X
3. **Equipment:** TC-Standard X2; TC-Standard+ X2; TC-MIDI X2; TC MIDI+ X2; TC-Double X2 & TC-Double+ X2
(Type Reference and Name) Sample Gas Cooler
4. **Name of Listing Company:** Bühler Technologies GmbH
5. **Address of Listing Company:** Harkortstrasse 29
Ratingen, D-40880
Germany
6. The examination and test results are recorded in confidential report number:

3062014 dated 4th October 2018
7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

CSA-C22.2 No. 213-15, CAN/CSA-C22.2 No. 61010-1:2012
8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.
10. **Equipment Ratings:**

TC-Standard Models:

Non-incendive for Class I, Division 2, Groups A, B, C and D; T4 hazardous locations with an ambient temperature rating of 0°C of up to 50°C.

Certificate issued by:



J.E. Marquedant
VP, Manager, Electrical Systems

4 October 2018

Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

SCHEDULE



Canadian Certificate Of Conformity No: FM18CA0010X

TC-MIDI and TC-Double Models:

Non-incendive for Class I, Division 2, Groups A, B, C and D; T4 hazardous (classified) locations with an ambient temperature rating of 0°C of up to 60°C.

11. The marking of the equipment shall include:

TC-Standard Models:

Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 50°C

TC-MIDI and TC-Double Models:

Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 60°C

12. **Description of Equipment:**

General - The TC-6 sample gas chillers are intended to cool and dry the sample gas before going into the gas analysers. Sample gases contain vapour which has to be withdrawn before it reaches the gas analyser. The Gas flows through a heat exchanger (impinger) inserted into a cooling block. The latter then is cooled to a preset temperature (5°C mostly).

Depending on the required cooling capacity the size of the heat exchanger and therefore chiller is chosen and depending on the kind of gas to be cooled different heat exchanger materials are provided (stainless steel, glass or PVDF).

A gas cooler (chiller) might be prepared for more than one heat exchanger. The cooling block is cooled by different combinations of Peltier-elements. The temperature is sensed by an RTD.

Construction – The equipment is housed in a brushed stainless steel IP20 enclosure.

Ratings - TC-Standard operate at 24VDC, 115 VAC or 230 VAC, selectable by ordering, with an ambient temperature rating of 0°C of up to 50°C. and TC-MIDI and TC-Double Models operate at 115 VAC or 230 VAC, selectable by ordering, with an ambient temperature rating of 0°C of up to 60°C.

4496 211b2d1fgh0jkl0n0 TC-Standard X2 - Sample Gas Cooler (fitted with 1 heat exchangers)

- b = Gas cooler model: 1 or 2
- d, = Supply voltage; 1, 2 or 4
- f & g = Heat exchanger; 10, 15, 20, 25, 30, or 35
- h = Peristaltic Pumps; 0, 1, 3
- j & k = Moisture detector / Filter; 00, 01,10, or 11
- l = Status Outputs; 0 or 1
- n = Delta T control; 0 or 1

4496 212b2d2fgh0jkl0n0 TC-Standard X2 - Sample Gas Cooler (fitted with 2 heat exchangers)

- b = Gas cooler model: 1 or 2
- d = Supply voltage; 1, 2 or 4
- f & g = Heat exchanger; 10, 15, 20, 25, 30, or 35
- h = Peristaltic Pumps; 0, 2, or 4
- j & k = Moisture detector / Filter; 00, 01,02, 10, 11, 20, 21, 22

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

SCHEDULE



Canadian Certificate Of Conformity No: FM18CA0010X

- l = Status Outputs; 0 or 1
- n = Delta T control; 0 or 1

4496 212b2d2fgh0jkl0n0 TC-Standard+ X2 - Sample Gas Cooler (with 2 heat exchangers in series)

- b = Gas cooler model: 1 or 2
- d = Supply voltage; 1, 2 or 4
- f & g = Heat exchanger; 22, 27, 32 & 37
- h = Peristaltic Pumps; 0, 2, 4
- j & k = Moisture detector / Filter; 00, 01, 10, or 11
- l = Status Outputs; 0 or 1
- n = no value assigned.

4496 311 b2defghijklmno Thermoelectric Cooler, TC-MIDI + X2(fitted with 1 heat exchangers)

- b = Gas cooler types 1 or 2
- d = Supply Voltage; 1 or 2
- e = Gas paths; 1or 2
- f,g = Heat exchangers; 60,61, 65, 66, 70, 75, 80 or 85
- h = Peristaltic pumps; 0, 2, or 4
- i = Sample gas pumps; 0, 1, 2, 6, or 7
- j,k = Moisture detector / Filter; 00, 01, 02, 10, 11, 20 21, or 22
- l,m = Status output; 00 or 10
- n,o = Delta T control; 00 or 10

4496 312 b2d1fghijklm00 Thermoelectric Cooler, TC-MIDI + X2(fitted with 2 heat exchangers)

- b = Gas cooler types 1 or 2
- d = Supply Voltage; 1 or 2
- f,g = Heat exchangers; 22, 27, 32, or 37
- h = Peristaltic pumps; 0, 2, or 4
- i = Sample gas pumps; 0, 1, 2, 6, or 7
- j,k = Moisture detector / Filter; 00, 01, 02, 10, or 11
- l,m = Status output; 00 or 10

4496 611a2c1efghijkl000 Thermoelectric Cooler, TC-Double X2

- a = Gas cooler types 1 or 2
- c = Voltage; 1 or 2
- e,f = Heat exchangers; 10,15, 20,25,30, or 35
- g = Peristaltic pumps; 0, 2, or 4
- h = Sample gas pumps; 0, 1, or 2
- i,j = Moisture Detector/Filter; 00, 01, 10, or 11
- k,l = Status output; 00 or 10

4496 611a2c1efghijkl000 Thermoelectric Cooler, TC-Double+ X2

- a = Gas cooler types 1 or 2
- c = Voltage; 1 or 2
- e,f = Heat exchangers; 22, 27, 32, or 37
- g = Peristaltic pumps; 0, 2, or 4
- h = Sample gas pumps; 0, 1, or 2
- i,j = Moisture Detector/Filter; 00, 01, 10, or 11
- k,l = Status output; 00 or 10

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

SCHEDULE



Canadian Certificate Of Conformity No: FM18CA0010X

13. Specific Conditions of Use:

1. *When installed as Class I Division 2 equipment, the thermoelectric cooler shall be mounted within a tool-secured IP54 enclosure.*

14. Test and Assessment Procedure and Conditions:

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

15. Schedule Drawings

A copy of the technical documentation has been kept by FM Approvals.

16. Certificate History

Details of the supplements to this certificate are described below:

Date	Description
4 th October 2018	Original Issue.

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. 1151 Boston-Providence Turnpike, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmaprovals.com www.fmaprovals.com

CERTIFICATE OF CONFORMITY

1. HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS

2. Certificate No: FM18CA0010X
3. Equipment:
(Type Reference and Name) TC-Standard X2; TC-Standard+ X2; TC-MIDI X2; TC-MIDI+ X2; TC-Double X2 & TC-Double+ X2 Sample Gas cooler
4. Name of Listing Company: Bühler Technologies GmbH
5. Address of Listing Company: Harkortstraße 29, Ratingen D-40880, Germany
6. The examination and test results are recorded in confidential report number:
3062014 dated 4th October 2018

7. FM Approvals LLC, certifies that the equipment described has been found to comply with the following Approval standards and other documents:

CSA C22.2 No. 213:2021, CSA C22.2 No. 61010-1:2019

8. If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
9. This certificate relates to the design, examination and testing of the products specified herein. The FM Approvals surveillance audit program has further determined that the manufacturing processes and quality control procedures in place are satisfactory to manufacture the product as examined, tested and Approved.

10. Equipment Ratings:

TC-Standard

Nonincendive for Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 50°C

TC-Midi & TC Double

Nonincendive for Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 60°C

Certificate issued by:



J.E. Marquedant
VP, Manager - Electrical Systems

9 October 2024

Date

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmaprovals.com www.fmaprovals.com

F 348 (Jul 24)



SCHEDULE

Canadian Certificate of Conformity No: FM18CA0010X

11. The marking of the equipment shall include:

TC-Standard

Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 50°C

TC-Midi & TC Double

Class I Division 2, Groups A, B, C, D; T4 Ta = 0°C to 60°C

12. **Description of Equipment:**

General - The TC- Standard; TC-MIDI & TC-Double sample gas chillers are intended to cool and dry the sample gas before going into the gas analyzers. Sample gases contain vapor which has to be withdrawn before it reaches the gas analyzer. The Gas flows through a heat exchanger (impinger) inserted into a cooling block. The latter then is cooled to a pre-set temperature (5°C mostly). Depending on the required cooling capacity the size of the heat exchanger and therefore chiller is chosen and depending on the kind of gas to be cooled different heat exchanger materials are provided (stainless steel, glass or PVDF).

A gas cooler (chiller) might be prepared for more than one heat exchanger. The cooling block is cooled by different combinations of Peltier-elements. The temperature is sensed by an RTD.

The TC-Standard X2 / TC-MIDI X2 series of sample coolers are designed specifically for high cooling capacities and high ambient temperatures.

The TC-Standard+ X2 / TC-MIDI+ X2 series are designed specifically for the requirements in automated measuring systems (AMS) according to EN 15267-3. The series connection of the heat exchangers will cool in two cycles to minimize wash out effects.

The TC-Double X2 series are designed specifically for high cooling capacities, high ambient temperatures and to cool in two cycles to minimize wash out effects.

The TC-Double+ X2 incorporates two cooling blocks that can be set do different temperatures.

Construction – The equipment is housed in a brushed stainless-steel IP20 enclosure.

Ratings - TC-Standard operate at 24VDC, 115 VAC or 230 VAC, selectable by ordering, with an ambient temperature rating of 0°C of up to 50°C. and TC-MIDI and TC-Double Models operate at 115 VAC or 230 VAC, selectable by ordering, with an ambient temperature rating of 0°C of up to 60°C.

See Annex for Model Codes

13. **Specific Conditions of Use:**

1. When installed as Class I Division 2 equipment, the thermoelectric cooler shall be mounted within a tool-secured IP54 enclosure which is capable of accepting one or more of the Class I Division 2 wiring methods per the Canadian Electric Code (CSA C22.1).

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA

T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

F 348 (Jul 24)



SCHEDULE

Canadian Certificate of Conformity No: FM18CA0010X

14. Test and Assessment Procedure and Conditions:

This Certificate has been issued in accordance with FM Approvals Canadian Certification Scheme.

15. Schedule Drawings

A copy of the technical documentation has been kept by FM Approvals.

16. Certificate History

Details of the supplements to this certificate are described below:

Date	Description
4th October 2018	Original Issue.
9 October 2024	<u>Supplement 1:</u> Report Reference: RR242035 dated 9 October 2024. Description of the Change(s): <ol style="list-style-type: none">1. Addition of product variants due to changes to electronics2. CSA C22.2 No. 213:2015 updated to CSA C22.2 No. 213:20213. CSA C22.2 No. 61010-1:2012 updated to CSA C22.2 No. 61010-1:2019

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA

T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

F 348 (Jul 24)



ANNEX

4496 211b2d1fgh0jkl0n0 TC-Standard X2 - Sample Gas Cooler (fitted with 1 heat exchangers)

Description of Equipment:

b = Gas cooler model: 1 or 2
d = Supply voltage; 1, 2 or 4
f & g = Heat exchanger; 10, 15, 20, 25, 30, or 35
h = Condensate drain; 00, 10 or 30
j & k = Moisture detector/Filter; 00, 01,10, or 11
l = Status Outputs; 00 or 10
n = Delta T control; 00 or 10

4496 211b2d1fg0000l0n0p TC-Standard X2 - Sample Gas Cooler (fitted with 1 heat exchanger for H2/O2 applications)

Description of Equipment:

b = Gas cooler model: 1 or 2
d = Supply voltage; 1 or 2
f, g = Heat exchanger; 10, 15, 10 or 15
l = Status Outputs; 00 or 10
n = Delta T control; 00 or 10
p = heat exchanger optimized for high-purity hydrogen/oxygen; -H2 or -O2

4496 212b2d2fgh0jkl0n0 TC-Standard X2 - Sample Gas Cooler (fitted with 2 heat exchangers)

Description of Equipment:

b = Gas cooler model: 1 or 2
d = Supply voltage; 1, 2 or 4
f & g = Heat exchanger; 10, 15, 20, 25, 30, or 35
h = Condensate drain; 0, 2, or 4
j & k = Moisture detector/Filter; 00, 01, 02, 10, 11, 20, 21, 22
l = Status Outputs; 0 or 1
n = Delta T control; 0 or 1

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA
T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmaprovals.com www.fmaprovals.com

F 348 (Jul 24)



SCHEDULE

Canadian Certificate of Conformity No: FM18CA0010X

FM Approvals

4496 212b2d2fgh0jkl0n0 TC-Standard+ X2 - Sample Gas Cooler (with 2 heat exchangers in series)

Description of Equipment:

b = Gas cooler model: 1 or 2
d = Supply voltage; 1, 2 or 4
f & g = Heat exchanger; 22, 27, 32 or 37
h = Condensate drain; 0, 2, 4
j & k = Moisture detector/Filter; 00, 01,10, or 11
l = Signal Outputs; 0 or 1
n = no value assigned.

4496 311 b2defghijklmno TC-MIDI X2(fitted with 1 heat exchangers)

Description of Equipment:

b = Gas cooler types 1 or 2
d = Supply Voltage; 1 or 2
e = Gas path; 1 or 2
f,g = Heat exchangers; 10, 15, 20, 25, 30 or 35
h = Condensate drain; 0, 1 or 3
i = Sample gas pumps; 0, 1, 2, 6, or 7
j,k = Moisture detector/Filter; 00, 01, 10 or 11
l,m = Signal output; 00 or 10
n,o = Delta T control; 00 or 10

4496 311 b2defg0000lmnop TC-MIDI X2 (fitted with 1 heat exchangers for H2/O2 applications)

Description of Equipment:

b = Gas cooler types 1 or 2
d = Supply Voltage; 1 or 2
e = Gas path; 1 or 2
f,g = Heat exchangers; 10, 15, 60, 65
l,m = Signal output; 00 or 10
n,o = Delta T control; 00 or 10
p = heat exchanger optimized for high-purity hydrogen/oxygen; -H2 or -O2

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA

T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

F 348 (Jul 24)



SCHEDULE

Canadian Certificate of Conformity No: FM18CA0010X

FM Approvals

4496 312 b2d1fghijklm00 TC-MIDI + X2(fitted with 2 heat exchangers)

Description of Equipment:

b = Gas cooler types 1 or 2
d = Supply Voltage; 1 or 2
f,g = Heat exchangers; 60, 65, 61, 66, 70, 75, 80 or 85
h = Condensate drain; 0, 2, or 4
i = Sample gas pumps; 0, 1, 2, 6, or 7
j,k = Moisture detector/Filter; 00, 01, 02, 10, 11, 20, 21 or 22
l,m = Signal outputs; 00 or 10
n, o = Delta T Control; 00 or 10

4496 611a2c1efghijkl000 TC-Double X2

Description of Equipment:

a = Gas cooler types 1 or 2
c = Voltage; 1 or 2
e,f = Heat exchangers; 10, 15, 20, 25, 30 or 35
g = Condensate drain; 0, 2, or 4
h = Sample gas pumps; 0, 1, or 2
i,j = Humidity sensor/Filter; 00, 01, 10, or 11
k,l = Signal outputs; 00 or 10

4496 611a2c1efghijkl000 TC-Double+ X2

Description of Equipment:

a = Gas cooler types 1 or 2
c = Voltage; 1 or 2
e,f = Heat exchangers; 22, 27, 32, or 37
g = Peristaltic pumps; 0, 2, or 4
h = Sample gas pumps; 0, 1, or 2
i,j = Moisture Detector/Filter; 00, 01, 10, or 11
k,l = Status output; 00 or 10

To verify the availability of the Approved product, please refer to www.approvalguide.com

THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE

FM Approvals LLC. One Technology Way, Norwood, MA 02062 USA

T: +1 (1) 781 762 4300 F: +1 (1) 781 762 9375 E-mail: information@fmapprovals.com www.fmapprovals.com

F 348 (Jul 24)

