

U.S. Department of Labor

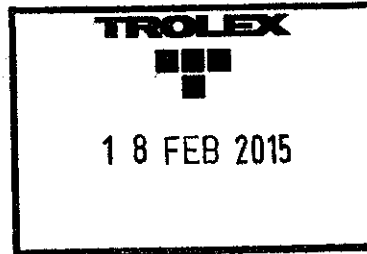
Mine Safety and Health Administration
Approval and Certification Center
765 Technology Drive
Triadelphia, West Virginia 26059



February 12, 2015

Approval No. 18-A150002-0
A&CC PAR 101367

Trox, Ltd
Attention: Mr. Lewis Price
Hazel Grove, Stockport, Cheshire
United Kingdom, SK7 5DY



Dear Mr. Price:

The review of your application dated April 24, 2012, Company Code No. 040512 for the Models TX6355 Sentro Wireless Gas Monitor, is complete.

The design of this equipment meets the applicable requirements of Title 30 Code of Federal Regulations, Part 18 (30 CFR Part 18). We assign Approval No. 18-A150002-0 to this design.

The following apply to Approval No. 18-A150002-0:

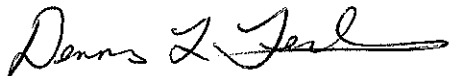
1. You must build each Model TX6355 Sentro Wireless Gas Monitor bearing Approval No. 18-A150002-0 according to the drawings and specifications on file at the MSHA Approval and Certification Center. A list of these drawings and specifications is enclosed.
2. Our approval label information must be legibly reproduced with permanent lettering on a wear resistant material and must be prominently displayed on an exterior surface of the Model TX6355 Sentro Wireless Gas Monitor (see the enclosed official approval label information required for this equipment). All of the approval label information must appear on the approval label. Until such time it is tested for performance and listed by a Nationally Recognized Test Laboratory, the Model TX6355 Sentro Wireless Gas Monitor shall also be marked that it is not accepted by MSHA for compliance with 30 CFR 75.351 or 75.1103.
3. You are not permitted to make changes to the design of this Model TX6355 Sentro Wireless Gas Monitor without our approval.
4. We may require you to make changes to the design, or to modify the Model TX6355 Sentro Wireless Gas Monitor in the field, in the interest of safety.
5. We have the right to revoke this approval, for cause, at any time.

6. You must make the Model TX6355 Sentro Wireless Gas Monitor available upon request by MSHA, but not more than once a year, except for cause, for post-approval audit at a mutually agreeable site at no cost to MSHA.
7. You must notify MSHA of all product defects of which you become aware.
8. The following requirement applies to this Model TX6355 Sentro Wireless Gas Monitor:
 - a. The Model TX6355 Sentro Wireless Gas Monitor is MSHA approved for use with the Energizer E95 battery only.
 - b. Do not disassemble in an area where permissibility is required, except to change eModules.
 - c. The Model TX6355 Sentro Wireless Gas Monitor is not to be used as an air quality detector per 30 CFR 75.320.

You will receive an invoice for the cost to process your application.

If you have any comments or questions relative to this letter, please contact Patrick E. Retzer at 304-547-2024 or Ronald O. Gast at 304-547-2030.

Sincerely,



Dennis L. Ferlich
Chief, Approval and Certification Center

Enclosures

REVISED
03/09/2015
Data Sheet 6
By: Patrick Retzer &
Ronald Gast
Date: 02-12-15

DRAWING LIST

Trolex LTD,
Sentro Wireless TX6355 Gas Monitor
Built According to Drawing No. P5536.282
Approval No. 18-A150002-0
Investigation No. IA-26272

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REVISION</u>
MSHA Drawing List for TX6355 Sentro Wireless Gas Monitor	P5536.282	B
General Arrangement	P5596-10-M	C
General Arrangement	P5596-10-01-M	A
Sentro Wireless Block Diagram	P5596.08-M	A
Circuit Diagram, Control PCB	P5536.202-M (2 Shts)*	A
PCB, Control	P5536.203-M	A
Circuit Diagram, Display PCB	P5536.204-M (2 Shts)*	A
PCB, Display	P5536.205-M	A
PCB, Connector	P5536.212-M	A
Circuit Diagram TX6355 Wireless Output Board	P5596.01-M (4 Shts)*	C
PCB, TX6355 Output (Wireless)	P5596.02-M	D
TX6355 Sentro Wireless Gas Sensor	P5536.285 (2 Shts)*	A
General Arrangement 4 Series Flamm Module	P5553.95-M	A

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REVISION</u>
4 Series Flamm Gas Sensor Block Diagram	P5553.64-M	A
Circuit Diagram, CPU Board	P5553.01-M (2 Shts)*	A
PCB, CPU Board	P5553.02-M	A
Circuit Diagram, 4 Series Flamm Baseboard	P5553.40-M (2 Shts)*	A
PCB, 4 Series Flamm Baseboard	P5553.41-M	A
PCB, Connector Board	P5553.21-M	A
General Arrangement, Infrared Module	P5553-113-M	A
Block Diagram, Infrared Gas Sensor	P5553.116-M	A
Circuit Diagram, Infrared CPU Board	P5553.11-M (2 Shts)*	A
PCB, Infrared CPU Board	P5553.12-M	A
Circuit Diagram, Infrared Baseboard	P5553.13-M (2 Shts)*	A
PCB, Infrared Baseboard	P5553.14-M	A
General Arrangement, LED IR Module	P5553-170-M	A
Block Diagram, LED IR Gas Sensor	P5553.169-M	A
Circuit Diagram, LED IR Baseboard	P5553.166-M (2 Shts)*	D
PCB, LED IR Baseboard	P5553.167-M	D
General Arrangement, Electrochemical Module	P5553-24-M	A
Block Diagram, Electrochemical Gas Sensor	P5553.22-M	A
Circuit Diagram, Toxic Baseboard	P5553.03-M (2 Shts)*	B
PCB, Toxic Baseboard	P5553.04-M	A

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REVISION</u>
General Arrangement, Electrochemical Module	P5553-24-M	A
Circuit Diagram, Oxygen Baseboard	P5553.05-M (2 Shts)*	A
PCB, Oxygen Baseboard	P5553.06-M	A
^{1, ND} G.A. of Exd Sensor Housing Type MSH-P	DYN/015	A3
^{1, ND} G.A. of IECEX Certified Sensor Housing Type MSH-P	DYN/018	A3
^{1, ND} G.A. OF Exd Sensor Housing Type MSHia-P	DYN/021	A3
^{1, ND} G.A. OF IECEX Certified Sensor Housing Type MSHia-P	DYN/024	A3
^{1, ND} Premier Analogue Board Circuit EMC Version	DYN114	A3
^{1, ND} Single Platinum Processor Board – Circuit Diagram	DYN118	A4
^{2, ND} Soldered intermediate of optoelectronic module	ESAT.411619 001 AD	O.1.3
^{2, ND} Soldered intermediate of optoelectronic module Bill of Materials	ESAT.411619.001 BOM (3 Shts.)*	O.1.1
^{2, ND} Small-Size Explosive Gas Measuring Transducer MIPEX-02-X-X-X.1 X Assembly drawing	ESAT.413347.005AD (5 Shts)*	O.1.5
^{2, ND} Transducteur de Gaz Explosif de Petite Dimension MIPEX-02-X-X-X.1 X Manuel D'Exploitation	ESAT.413347.005 ME (20 Shts)*	1.132
^{2, ND} Explosion Safety Document	ESAT.413347.005 SD (4 Shts)*	1.93

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REVISION</u>
2, ND Small-Size Explosive Gas Measuring Transducer MIPEX-02-X-X- X.1 X	ESAT.413347.005 (11 Shts)*	O10
2, ND Small-Size Explosive Gas Measuring Transducer MIPEX-02-X-X-X.1 X User Manual	ESAT.413347.005 UM (20 Shts)*	1.20
2, ND Transducer's housing Assembly drawing	ESAT.413371.001 AD	O.1.0
2, ND Transducer's housing Assembly drawing	ESAT.413371.001 AD	O.1.1
2, ND Transducer's housing	ESAT.413371.001	O.1.1
2, ND The Plastic housing	ESAT.413371.004	O.1.0
2, ND The Plastic housing Assembly drawing	ESAT.413371.004AD	O.10
2, ND Optoelectronic module Assembly drawing	ESAT.418541.001AD	O.1.2
2, ND Optoelectronic module Schematic electrical diagram	ESAT.418541.001 SED	O.1.0
2, ND The base part	ESAT.724100.001	O.1.1
2, ND The middle part of the housing	ESAT.724100.002	O.1.1
2, ND The mirror cover part	ESAT.724100.003 (3 Shts)*	O.1.1
2, ND The base part of plastic housing	ESAT.724100.005	O.0.1
2, ND The middle part of plastic housing	ESAT.724100.006	O.0.1
2, ND The mirror cover part of plastic housing	ESAT.724100.007 (3 Shts)*	O.0.1
2, ND Cover end plate	ESAT.754485.001	O10
2, ND Label	ESAT.757312.002	O.1.3

<u>TITLE</u>	<u>DRAWING NO.</u>	<u>REVISION</u>
2, ND Label	ESAT.757312.004	O.1.4

* Multi-sheet drawing filed as a single entry.

ND Non-disclosure drawing. Must have written consent from drawing owner to release.

¹ Dynamet LTD. Drawing

² Optosense LLC Drawing

Factory Inspection Form: See Mr. Ian Burroughs certified statement dated August 15, 2014, submitted in lieu of a Factory Inspection Form.

User's Manual: See TX6355 Sentro Wireless User Manual, P/N: TX6355-UM-EN-01F, filed in the correspondence folder with this investigation

Troxex Ltd.

**Model TX6355 Sentro Wireless
Permissible Gas Monitor**



APPROVAL NO. 18-A150002-0

TESTED FOR INTRINSIC SAFETY IN METHANE-AIR MIXTURES ONLY

WARNINGS:

1. The Model TX6355 Sentro Wireless Gas Monitor is MSHA approved for use with the Energizer E95 battery only.
2. Do not disassemble in an area where permissibility is required, except to change eModules.
3. The Model TX6355 Sentro Wireless Gas Monitor is not to be used as an air quality detector per 30 CFR 75.320.



Revised Approval Modification Program (RAMP) Acceptance issued to:

Company: Trolex Ltd.	Investigation No.: IA-26272
Attention: Mr. Alister Henderson	Co Appl Code No.: 210415
Address: Newby Road, Hazel Grove Stockport SK7 5DY, UK	Approval/Cert. No.: 18-A150002-0

Model(s): TX6355 Sentro Wireless Gas Monitor**Description of change(s):** The following changes are included in this RAMP:

1. The manufacturer has updated the Toxic Baseboard PCB layout and has made minor component changes in order to achieve EMC improvements. See Evaluation Report for details.
2. Removal of the condition that the TX6355 Sentro Wireless shall be marked that it is not accepted by MSHA for compliance with 30 CFR 75.351 or 75.1103 following testing at the NRTL, "QPS Evaluation Services" to ANSI/ISA 92.00.02 (Toxic Gas Performance) for CO gas.
3. The safe distance from blasting circuits has been specified.

<u>Title</u>	<u>Drawing No.</u>	<u>Revision</u>
MSHA Drawing List for TX6355 Sentro Wireless Gas Monitor	P5536.282	C
General Arrangement, Electrochemical Module	P5553.24-M	B
Electrochemical Gas Sensor Block Diagram,	P5553.22-M	B
PCB Toxic Baseboard (NOTE: Replaces P5553.04-M rev. A)	P5553.185.MSHA	A

PAR No: 107544

Investigator: Gail Nicola


Page 1 of 2

- 8 FEB 2015

<u>Title</u>	<u>Drawing No.</u>	<u>Revision</u>
Circuit Diagram Sensing Module – Toxic Baseboard (NOTE: Replaces P5553.03-M rev. B)	P5553.184.MSHA	A
TX6355 Sentro Wireless Gas Monitor Safe Distance From Blasting Circuits Justification	P5596.23	A

Attachments (check all that are applicable):

☒ Evaluation Report ☐ Test Sheet(s) ☒ Revised Approval Plate Design ☒ Revised Condition(s) of Use

Approved by: 	Date: <u>2-2-16</u>
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Trolex Ltd.

Model TX6355 Sentro Wireless

Permissible Gas Monitor



APPROVAL NO. 18-A150002-0

TESTED FOR INTRINSIC SAFETY IN METHANE-AIR MIXTURES ONLY

WARNINGS:

1. The Model TX6355 Sentro Wireless Gas Monitor is MSHA approved for use with the Energizer E95 battery only.
2. Do not disassemble in an area where permissibility is required, except to change eModules.
3. The Model TX6355 Sentro Wireless Gas Monitor is not to be used as an air quality detector per 30 CFR 75.320.
4. Maintain 40 inches between the TX6355 Sentro Wireless Gas Monitor and any blasting circuits, explosives and detonators.



Revised Approval Modification Program (RAMP) Acceptance issued to:

Company: Trolex Ltd.	Investigation No.: IA-26272
Attention: Mr. Alister Henderson	Co Appl Code No.: 010316
Address: Newby Road, Hazel Grove Stockport, Cheshire SK7 5DY, UK	Approval/Cert. No.: 18-A150002-0

Model(s): Model TX6355 Sentro Wireless Gas Monitor

Description of change(s): The following changes are included in this RAMP:

- a) Revised Circuit Diagram/BOM drawing P5553.184.MSHA to:
- i. Remove Carbon Monoxide sensors Alphasense CO-CF and City Technology 4CF+. These CO Sensors were not tested by Nationally Recognized Testing Laboratory and, thus, are not acceptable to MSHA for compliance with 30 CFR 75.351 or 75.1103.
 - ii. Add Carbon Monoxide sensor Alphasense CO-AX. The maximum output current available from this sensor is 0.4 mA and the maximum output voltage from this sensor is assumed to be approx. 1.25V. Also, this CO Sensor is not tested by Nationally Recognized Testing Laboratory and, thus, is not acceptable to MSHA for compliance with 30 CFR 75.351 or 75.1103.
 - iii. Add Chlorine sensor City Technology 4CL. The maximum output current available from this sensor is 0.075 mA and the maximum output voltage from this sensor is assumed to be approx. 1.25V.
 - iv. Add Hydrogen sensor City Technology 4HYT but it was previously accepted in the original approval PAR 101367, drawing P5553.03-M.
- b) Revised eModule List drawing P5536.285 to:
- i. Correct the eModule part numbers.
 - ii. List NRTL tested CO sensors for two eModule part numbers.
 - iii. List low H₂ cross-sensitivity CO sensor (CO-AX) for three eModule part numbers.

- iv. Add note 1 for Methane and Carbon Dioxide gases.
- c) Added a Conditions of Use drawing P5596.1800.
 - i. This drawing lists all the 'conditions of use' for the Model TX6355 Sentro Wireless Gas Monitor and referenced in the approval plate label.
- d) Added the fifth 'conditions of use' on the Conditions of Use drawing to indicate that only the model number TX6355.04.02 is Nationally Recognized Testing Laboratory (NRTL) tested and therefore accepted by MSHA for compliance with 30CFR 75.351 or 75.1103. Note that the model number TX6355.04.02 must only be fitted with a CO sensing eModule part numbers TX6350.04.250.50 or TX6350.04.250.500. Further note that eModule part numbers TX6350.04.250.50 or TX6350.04.250.500 must be fitted with Alphasense CO-AF or City Technology 4CM Carbon Monoxide sensors only.
- e) Revised the Approval Plate Design due to the space limitation.

Revised Conditions of Use:

1. See Conditions of Use drawing P5596.1800.
2. For model no. TX6355.04.01: "Not accepted by MSHA for compliance with 30 CFR 75.351 or 75.1103".
3. For model no. TX6355.04.02: "Must only be fitted with a CO sensing eModule with part no. TX6350.04.250.50 or TX6350.04.250.500".

A copy of the Conditions of Use drawing P5596.1800 must be provided to the user with each Model TX6355 Sentro Wireless Gas Monitor Equipment.

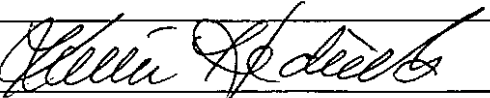
The changes introduced in this RAMP have no impact on the intrinsic safety of the Model TX6355 Sentro Wireless Gas Monitor.

<u>Title</u>	<u>Drawing No.</u>	<u>Revision</u>
MSHA Drawing List for TX6355 Sentro Wireless Gas Monitor	P5536.282	D
Circuit Diagram Sensing Module – Toxic Baseboard (Schematic)	P5553.184.MSHA, Shts. 1 – 2	B

<u>Title</u>	<u>Drawing No.</u>	<u>Revision</u>
TX6355 Sentro Wireless Gas Sensor (eModule List)	P5536.285, Shts. 1 – 2	C
TX6355.04.nn Sentro Wireless Gas Detector – Conditions of Use	P5596.1800	A

Attachments (check all that are applicable):

☐ Evaluation Report ☐ Test Sheet(s) ☒ Revised Approval Plate Design ☒ Revised Conditions of Use

Approved by: 	Date: 4-7-16
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**Revised Approval Modification Program (RAMP) Acceptance issued to:**

Company: Trolex Ltd	Investigation No.: IA-26272
Attention: Alister Henderson	Co. Appl. Code No.: 220217
Address: Newby Rd, Hazel Grove, Stockport SK7 5DY, UK	Approval/Cert. No.: 18-A150002-0

Model(s): TX6355 Sentro Wireless Gas Monitor**Description of change(s):** The following change is included in this RAMP:

- Alternate connector PCB added for the e-Modules. The alternate is modified from the original by removal of one track that was previously used for +14.4V; this voltage was not used in any of the modules.

The change introduced in this RAMP has no impact on the intrinsic safety of the Model TX6355 Sentro Wireless Gas Monitor.

Title	Drawing No.	Revision
MSHA Drawing List for TX6355 Sentro Wireless Gas Monitor	P5536.282	E
PCB, Connector Board	P5553.21.01.MSHA	A

Attachments (check all that are applicable):

☐ Evaluation Report ☐ Test Sheet(s) ☐ Revised Approval Plate Design ☐ Revised Conditions of Use

Approved by:

Date: 03-28-2017

- 3 APR 2017

**Revised Approval Modification Program (RAMP) Acceptance issued to:**

Company: Trolex Ltd	Investigation No.: IA-26272
Attention: Alistar Henderson	Co. Appl. Code No.: 220120
Address: Newby Rd, Hazel Grove, Stockport SK7 5DY, UK	Approval/Cert. No.: 18-A150002-0

Model: TX6355 Sentro Wireless Gas Monitor**Description of changes:****Revised Condition of Use for item (5)**

5. Only equipment with model number TX6355.04.02 and fitted with a CO sensing eModule with part number TX6350.04.250.50 or TX6350.04.250.500 is approved by QPS (NRTL tested) to ANSI/ISA 92.00.01 (Toxic Gas Performance) for CO gas detection. Therefore, only this equipment is accepted by MSHA for compliance with 30CFR75.351 or 75.1103.

The changes introduced in this RAMP has no impact on the intrinsic safety of the Model TX6355 Sentro Wireless Gas Monitor.

Title	Drawing No.	Revision
TX6355.04.nn Sentro Wireless Gas Detector - Conditions of Use	P5596.1800	B

Attachments (check all that are applicable):

☐ Evaluation Report ☐ Test Sheet(s) ☒ Revised Approval Plate Design ☒ Revised Conditions of Use

Approved by: *Kevin Hedrick*

Date: May 12, 2020



Revised Approval Modification Program (RAMP) Acceptance issued to:

Company: Trolex Ltd	Investigation No.: IA-26272
Attention: Maciej Kulakowski	Co Appl Code No.: 220120
Address: Newby Rd, Hazel Grove, Stockport SK7 5DY, UK	Approval/Cert. No.: 18-A150002-0

Model(s): TX6355 Sentro Wireless Gas Monitor**Description of change(s):** The following changes are included in this RAMP:

- Addition of an alternative display screen (LCD) due to potential obsolescence of existing display.

The change introduced in this RAMP has no impact on the intrinsic safety of the Model TX6355 Sentro Wireless Gas Monitor.

<u>Title</u>	<u>Drawing No.</u>	<u>Revision</u>
MSHA Drawing List for TX6355 Sentro Wireless Gas Monitor	P5536.282	F
Sentro Wireless Revised Display MSHA Certification Schematic / Sentro Wireless Revised Display MSHA Certification BOM	P5536.286.MSHA, (sheets 1 to 2)*	A
Sentro Wireless Revised Display MSHA Certification Layout	P5536.287.MSHA, (Sheets 1 to 2)*	A

* Multi-sheet drawing filed as a single entry.

Attachments (check all that are applicable):

☒ Evaluation Report ☐ Test Sheet(s) ☐ Revised Approval Plate Design ☐ Revised Condition(s) of Use

Approved by: KEVIN HEDRICK

Digitally signed by KEVIN HEDRICK
Date: 2020.08.27 08:54:29 -04'00'

Date: August 27, 2020