

**THE NETHERLANDS**  
(N E D E R L A N D)



**COMMUNICATION**

Concerning <sup>(1)</sup>:

- ~~approval granted~~
- ~~approval extended~~
- ~~approval refused~~
- ~~approval withdrawn~~
- ~~production definitively discontinued~~

of a type of CNG/LNG component pursuant to Regulation number 110.


**Approval number: E4\*110R05/00\*0374\*04**

1. CNG/LNG component considered:

- ~~Container(s) or cylinder(s)~~<sup>(+)</sup>
- ~~Tank(s) or vessel(s)~~<sup>(+)</sup>
- ~~CNG accumulator(s)~~<sup>(+)</sup>
- ~~Pressure indicator~~<sup>(+)</sup>
- ~~Pressure relief valve~~<sup>(+)</sup>
- ~~Automatic valve(s)~~<sup>(+)</sup>
- ~~Excess flow valve~~<sup>(+)</sup>
- ~~Gas tight housing~~<sup>(+)</sup>
- ~~Pressure regulator(s)~~<sup>(+)</sup>
- ~~Non return valve(s) or check valve(s)~~<sup>(+)</sup>
- ~~Pressure relief device (PRD)(temperature triggered)~~<sup>(+)</sup>
- ~~Manual valve~~<sup>(+)</sup>
- ~~Flexible fuel lines~~<sup>(+)</sup>
- ~~Filling unit or receptacle~~<sup>(+)</sup>
- ~~Gas injector(s)~~<sup>(+)</sup>
- ~~CNG Compressor~~<sup>(+)</sup>
- ~~Gas flow adjuster~~<sup>(+)</sup>
- ~~Gas/air mixer~~<sup>(+)</sup>
- ~~Electronic control unit~~<sup>(+)</sup>
- ~~Pressure and temperature sensor(s)~~<sup>(+)</sup>
- ~~CNG filter(s)~~<sup>(+)</sup>
- ~~PRD (pressure triggered)~~<sup>(+)</sup>
- ~~Fuel rail~~<sup>(+)</sup>
- ~~Heat exchanger(s)/vaporizer(s)~~<sup>(+)</sup>
- ~~Natural gas detector(s)~~<sup>(+)</sup>



- ~~LNG filling receptacle(s)<sup>(+)</sup>~~
- ~~LNG pressure control regulator(s)<sup>(+)</sup>~~
- ~~LNG pressure and/or temperature sensor(s)<sup>(+)</sup>~~
- ~~LNG manual valve(s)<sup>(+)</sup>~~
- ~~LNG automatic valve(s)<sup>(+)</sup>~~
- ~~LNG non return valve(s)<sup>(+)</sup>~~
- ~~LNG pressure relief valve(s)<sup>(+)</sup>~~
- ~~LNG excess flow valve(s)<sup>(+)</sup>~~
- ~~LNG fuel pump(s)<sup>(+)</sup>~~
- 

2. Trade name or mark : Pressure Regulator 1784NG series  
Brand names:  
- RegO Products  
- Macro Technologies LLC
3. Manufacturer's name and address : Engineered Controls International LLC  
100 RegO Drive 27244  
Elon, North Carolina  
United States of America
4. If applicable, name and address of manufacturer's representative : N.A.
5. Submitted for approval on : 17-11-2014
6. Technical service responsible for conducting approval tests : Kiwa Nederland B.V.  
P.O. Box 137  
7300 AC Apeldoorn  
The Netherlands
7. Date of report issued by that service : 06-02-2023
8. Number of report issued by that service : 140700203\_P000277088
9. Approval : ~~granted/refused/extended/withdrawn~~<sup>(1)</sup>
10. Reason(s) of extension (if applicable) : The currently homologated Pressure Regulator 1784NG series is updated to the latest Revision of the ECE Regulation 110
11. Place : Zoetermeer
12. Date : 13 February 2023
13. Signature :   
R.F.R. Clement
14. The documents filed with the application or extension of approval can be obtained upon request.

<sup>(1)</sup> Strike out what does not apply.

## ADDENDUM

1. Additional information concerning the type approval of a type of CNG/~~LNG~~ components pursuant to Regulation number 110.
  - 1.1. Natural Gas Storage System
    - 1.1.1. Container(s) or cylinder(s) (for CNG system)
      - 1.1.1.1. Dimensions :
      - 1.1.1.2. Material :
    - 1.1.2. Tank(s) or vessel(s) (for LNG system)
      - 1.1.2.1. Capacity :
      - 1.1.2.2. Material :
    - 1.1.3. CNG accumulator
      - 1.1.3.1. Dimensions :
      - 1.1.3.2. Material :
      - 1.1.3.3. Capacity :
  - 1.2. Pressure indicator
    - 1.2.1. Working pressure(s) <sup>(2)</sup> :
    - 1.2.2. Material :
  - 1.3. Pressure relief valve (discharge valve)
    - 1.3.1. Working pressure(s) <sup>(2)</sup> :
    - 1.3.2. Material :
  - 1.4. Automatic valve(s)
    - 1.4.1. Working pressure(s) <sup>(2)</sup> :
    - 1.4.2. Material :
  - 1.5. Excess flow valve
    - 1.5.1. Working pressure(s) <sup>(2)</sup> :
    - 1.5.2. Material :
  - 1.6. Gas-tight housing
    - 1.6.1. Working pressure(s) <sup>(2)</sup> :
    - 1.6.2. Material :
  - 1.7. Pressure regulator(s)
    - 1.7.1. Working pressure(s) <sup>(2)</sup> : 3.0 MPa (30 bar)
    - 1.7.2. Material : See report 140700203 and its extension
  - 1.8. Non-return valve(s) or check valve(s)
    - 1.8.1. Working pressure(s) <sup>(2)</sup> :
    - 1.8.2. Material :
  - 1.9. Pressure relief device (temperature triggered)
    - 1.9.1. Working pressure(s) <sup>(2)</sup> :
    - 1.9.2. Material :
  - 1.10. Manual valve
    - 1.10.1. Working pressure(s) <sup>(2)</sup> :
    - 1.10.2. Material :



|         |                                    |   |
|---------|------------------------------------|---|
| 1.11.   | Flexible fuel lines                |   |
| 1.11.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.11.2. | Material                           | : |
| 1.12.   | Filling unit or receptacle         |   |
| 1.12.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.12.2. | Material                           | : |
| 1.13.   | Gas injector(s)                    |   |
| 1.13.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.13.2. | Material                           | : |
| 1.14.   | Gas flow adjuster                  |   |
| 1.14.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.14.2. | Material                           | : |
| 1.15.   | Gas/air mixer                      |   |
| 1.15.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.15.2. | Material                           | : |
| 1.16.   | Electronic control unit            |   |
| 1.16.1. | Basic software principles          | : |
| 1.17.   | Pressure and temperature sensor(s) |   |
| 1.17.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.17.2. | Material                           | : |
| 1.18.   | CNG filter(s)                      |   |
| 1.18.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.18.2. | Material                           | : |
| 1.19.   | PRD (pressure triggered)           |   |
| 1.19.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.19.2. | Material                           | : |
| 1.20.   | Fuel rail(s)                       |   |
| 1.20.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.20.2. | Material                           | : |
| 1.21.   | Heat Exchanger(s)/Vaporizer(s)     |   |
| 1.21.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.21.2. | Material                           | : |
| 1.22.   | Natural gas detector(s)            |   |
| 1.22.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.22.2. | Material                           | : |
| 1.23.   | LNG filling receptacle(s)          |   |
| 1.23.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.23.2. | Material                           | : |
| 1.24.   | LNG pressure control regulator(s)  |   |
| 1.24.1. | Working pressure(s) <sup>(2)</sup> | : |
| 1.24.2. | Material                           | : |



- 1.25. LNG pressure and/or temperature sensor(s)
  - 1.25.1. Working pressure(s) <sup>(2)</sup> :
  - 1.25.2. Material :
- 1.26. LNG manual valve(s)
  - 1.26.1. Working pressure(s) <sup>(2)</sup> :
  - 1.26.2. Material :
- 1.27. LNG automatic valve(s)
  - 1.27.1. Working pressure(s) <sup>(2)</sup> :
  - 1.27.2. Material :
- 1.28. LNG non-return valve(s)
  - 1.28.1. Working pressure(s) <sup>(2)</sup> :
  - 1.28.2. Material :
- 1.29. LNG pressure relief valve(s)
  - 1.29.1. Working pressure(s) <sup>(2)</sup> :
  - 1.29.2. Material :
- 1.30. LNG excess flow valve(s)
  - 1.30.1. Working pressure(s) <sup>(2)</sup> :
  - 1.30.2. Material :
- 1.31. LNG fuel pump(s)
  - 1.31.1. Working pressure(s) <sup>(2)</sup> :
  - 1.31.2. Material :
- 1.32. CNG Compressor
  - 1.32.1. Working pressure(s) <sup>(2)</sup> :
  - 1.32.2. Material :

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<sup>(2)</sup> Specify the tolerance



Report 140700203\_P000277088  
06-02-2023

# Test report

**Pressure Regulator 1784NG series**



## **Applicant**

Engineered Controls International, LLC  
100 RegO Drive 27244  
Elon, North Carolina  
United States of America

**Trust  
Quality  
Progress**

## Contents

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This report may only be duplicated as a complete set without any modifications and with permission of the legitimate owner. The test results in this report are exclusively related to the samples offered and tested.

Tests marked in this report with the IRN number are part of the accreditation scope (RvA L248) unless stated differently. Measurement uncertainty of testing in the context of ISO/IEC 17025.

Test reports can, in some cases, contain besides the numeric measured values also the qualification "pass" or "fail". In this assessment, compliance with the specification limit from the applicable product standard is used. The measurement complies with the requirement if the probability of its being within the limit is at least 50%.

This does not take into account the measurement uncertainty associated with the test method.

It is explicitly stated that in the case of a "pass" or "fail", the measured result is corrected for the measurement uncertainty and/or the relevant test conditions for the measured result.

Unless otherwise noted the measurement uncertainty and conditions are as specified in the test specifications.

This report is only valid when signed by the test person and reviewer.

- RDW designation number for E4 and e4: RDWT-CAC-04
- KBA designation number for E1 and e1: KBA-P00033-12

Conclusions for compliance with e.g. product standard requirements are not part of the lab scope (RvA L248).

In case when information is supplied by the customer it is possible that it can affect the validity of results.

In case of dispute regarding this test report please contact Kiwa Nederland B.V.

Version: 004

## TEST REPORT

Pressure Regulator 1784NG series

In accordance with ECE R110

|                               |   |  |  |
|-------------------------------|---|--|--|
| <b>Report number</b>          | : | <b>140700203</b>   |  |
| <b>Job reference</b>          | : | <b>P000277088</b>  |  |
| Date of issue                 | : | 06-02-2023   |  |
| Total number of pages         | : | 13 (including appendices)  |  |
| <b>Testing laboratory</b>     | : | <b>KIWA Nederland B.V.</b>   |  |
| Testing location/address      | : | Wilmsdorp 50   |  |
|                               | : | 7327 AC Apeldoorn<br>The Netherlands   |  |
| <b>Applicant's name</b>       | : | <b>Engineered Controls International, LLC</b>  |  |
| Address                       | : | 100 RegO Drive 27244<br>Elon, North Carolina<br>United States of America   |  |
| <b>Manufacturers location</b> | : | <b>Engineered Controls International, LLC</b>  |  |
| Address                       | : | 100 RegO Drive 27244<br>Elon, North Carolina<br>United States of America   |  |
| <b>Scope</b>                  | : | Testing of Pressure Regulator 1784NG series regarding the requirements as derived from the below mentioned Test specifications.                |  |
| <b>Test specifications</b>    | : |  |  |
| Standards                     | : | Regulation 110 Addendum 109: Regulation No. 110<br>Revision 6 - Amendment 4<br>05 series of amendments– Date of entry into force: 22 June 2022 |  |
| Non-standard test method      | : | N.A.   |  |
| <b>Component description</b>  | : | Pressure Regulator 1784NG series   |  |
| Manufacturer                  | : | Engineered Controls International, LLC   |  |
| Trade Mark                    | : | Pressure Regulator 1784NG series   |  |
| Model/Type reference          | : | Pressure Regulator 1784NG series<br>(a full overview can be found in chapter 2: Description of the product)                                    |  |



Sample number(s) : N.A.  
Intake date sample(s) : N.A.  
Date(s) of testing : N.A.

**Remarks** : N.A.

**Summary** : Complies with the requirements as far as identified in the attached test- and result sheets.

**Tested by** : Eric Harmsen  
(name + signature)

A handwritten signature in black ink, appearing to read "Eric Harmsen", written over a light blue horizontal line.

**Reviewed by** : Regina Adelmann  
(name + signature)

A handwritten signature in purple ink, appearing to read "Regina Adelmann", written over a light blue horizontal line.

## 1 Summary of testing

On request of Engineered Controls International, LLC the items as mentioned under Test item description are tested according to the Test specifications (see page 3 of this report).

Based on the product(s) information the test plan is not subject to any special interpretations or modifications.

The following modifications are made to the Pressure Regulator 1784NG series

- The currently homologated Pressure Regulator 1784NG series is updated to the latest Revision of the ECE Regulation 110

As a result, no tests are carried out

### Notes

- The described test results are only valid for the tested materials and objects.
- RDW designation number for E4 and e4: RDWT-CAC-04
- KBA designation number for E1 and e1: KBA-P00033-12

## 2 Description of the product

The information below is based on the test results on the models under testing and the information of the manufacturer.

### Pressure Regulator 1784NG series

|                    |   |  |   |
|--------------------|---|--|---|
| Approval number(s) | : | E4*110R05/00*0374*04                                       |   |
| Marking number(s)  | : | E4-110R-050374 "C"   |   |
| Manufacturer       | : | Engineered Controls International, LLC                     |   |
| Brand name(s)      | : | RegO Products<br>Macro Technologies LLC                    |   |
| Type(s)            | : | 1784NG45<br>1784NG45Y<br>1784NG86<br>1784NG86W<br>1784NGC3 | 1784NG145<br>1784NGB<br>1784NBG93<br>1784NGC<br>1784NGA |
| Working pressure   | : | 3.0 MPa (30 Bar)   |   |
| Classification     | : | Class 1  |   |
| Temperature range  | : | -40°C up to 85°C   |   |
| Material(s)        | : | see report 140700203 and its extensions                    |   |

### 3 Report history

**Report number** : **140700203**  
**Project number** : **140700203**  
 Approval number : E4-110R-010374 "C"  
 Report date : 17-11-2014  
 Author : Regina Adelmann  
 Description : Initial report  
 Pressure Regulator 1784NG series

**Report number** : **140700203**  
**Project number** : **150602051**  
 Approval number : E4\*110R01/00\*0374\*01  
 Marking number : E4-110R-010374 "C"  
 Report date : 08-07-2015  
 Author : Regina Adelmann  
 Description : Extension 01

Alternate Construction with a small gasket to seal a potential leak path at the ID of the diaphragm

**Report number** : **140700203**  
**Project number** : **180101490**  
 Approval number : E4\*110R02/00\*0374\*02  
 Marking number : E4-110R-020374 "C"  
 Report date : 30-01-2018  
 Author : Regina Adelmann  
 Description : Extension 02

The currently homologated Pressure Regulator 1784NG series is updated to the latest Supplement version of the ECE Regulation 110.

The certificate number for the Regulation 110 has been rewritten to the updated 1958 Agreement revision 3

**Report number** : **140700203**  
**Project number** : **171100716**  
 Approval number : E4\*110R02/00\*0374\*03  
 Marking number : E4-110R-020374 "C"  
 Report date : 13-04-2018  
 Author : Edwin Bradwagt  
 Description : Extension 03

The currently homologated Pressure Regulator 1784NG series is extend with an alternative non-metallic material EB 6008ECO

**Report number** : **140700203**  
**Project number** : **P000277088**  
Approval number : E4\*110R05/00\*0374\*04  
Marking number : E4-110R-050374 "C"  
Report date : 06-02-2023  
Author : Eric Harmsen  
Description : Extension 04

The following modifications are included:

The currently homologated Pressure Regulator 1784NG series is updated to the latest Revision of the ECE Regulation 110.

## 4 Measurement uncertainty

### Measurement uncertainty of testing in the context of ISO/IEC 17025

#### Applied equipment

The applied equipment in the department Automotive are in the calibration database ICS2000, in this database the equipment of the department is stated with the applicable measurement uncertainty. This database is controlled by the calibration department.

#### Applied measurement uncertainty

In the laboratory the OM 3.10.7 applies.

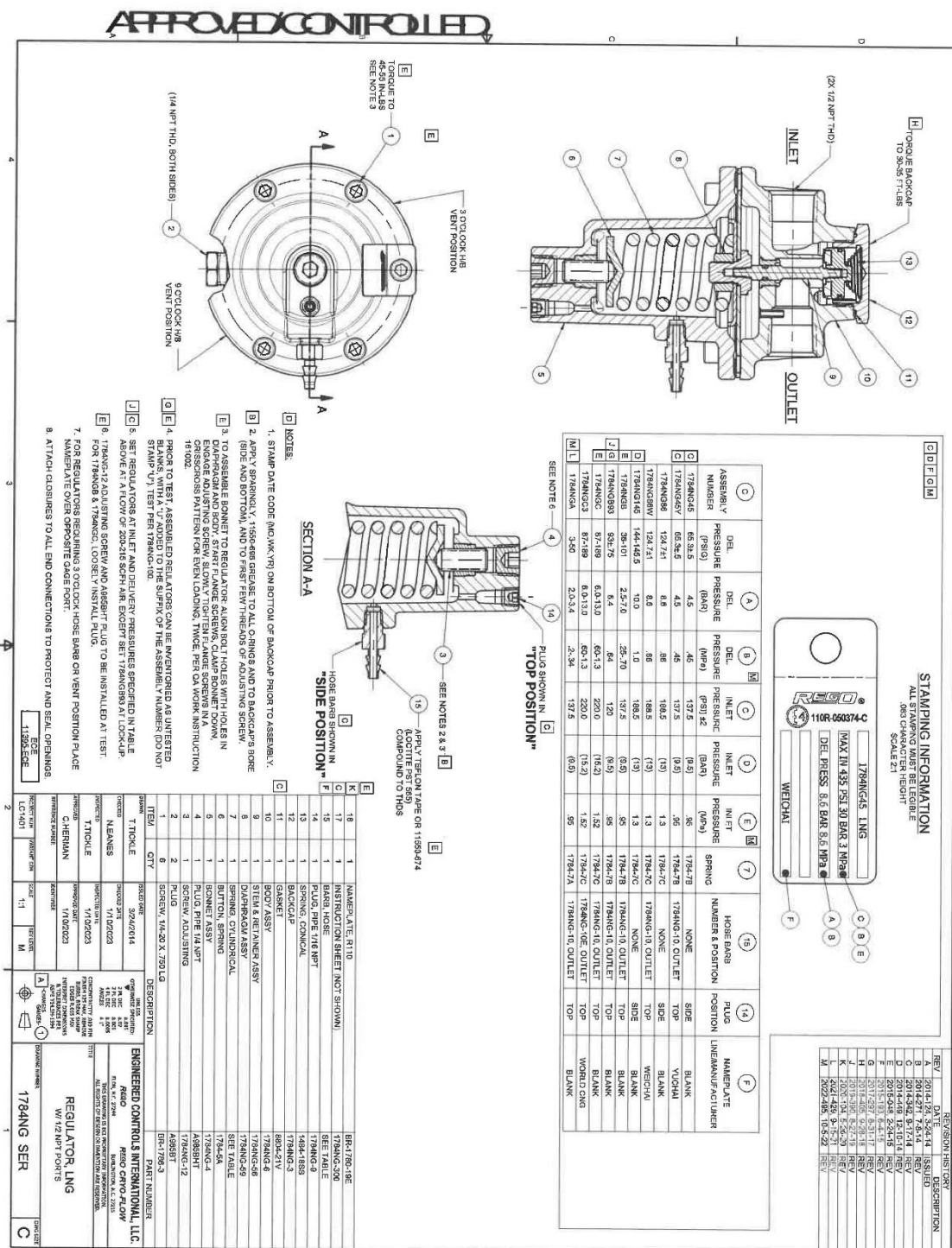
Unless otherwise specified in the test specifications the measurement uncertainty and conditions applied are:

|  |  |
|--|--|
| Voltage  | $\pm 2 \% \text{ Reading}$                             |
| High voltage test device (SPS) 500 – 3750 Vac                                      | $\pm 5 \% \text{ Reading}$                             |
| Resistance   | $\pm 2 \% \text{ Reading}$                             |
| Protective wire and insulation test device   | $\pm 5 \% \text{ Reading}$                             |
| Sliding gauge  | $\pm 0.1 \text{ mm}$                                   |
| Measuring tape   | $\pm 1 \text{ mm}$                                     |
| Cooling and heating $< -10 \text{ }^{\circ}\text{C}$                               | $\pm 5 \text{ }^{\circ}\text{C}$                       |
| Cooling and heating $-10 \text{ }^{\circ}\text{C} / +100 \text{ }^{\circ}\text{C}$ | $\pm 3 \text{ }^{\circ}\text{C}$                       |
| Cooling and heating $> 100 \text{ }^{\circ}\text{C}$                               | $\pm 5 \% \text{ Reading}$                             |
| Climate chamber  | $\pm 2 \text{ }^{\circ}\text{C} / \pm 3 \% \text{ RV}$ |
| Ambient temperature  | $\pm 1 \text{ }^{\circ}\text{C} (10-30)$               |
| Time $\leq 1 \text{ hour}$   | $\pm 0.2 \text{ s}$                                    |
| Time $> 1 \text{ hour}$  | $\pm 0.1 \% \text{ Reading}$                           |
| Torque   | $\pm 5 \% \text{ Reading}$                             |
| Bending moment   | $\pm 5 \% \text{ Reading}$                             |
| Standard weight  | $\pm 5 \% \text{ Reading}$                             |
| Weighing $< 30 \text{ g}$  | $\pm 0.1 \% \text{ Reading}$                           |
| Weighing $> 30 \text{ g}$  | $\pm 2 \% \text{ Reading}$                             |
| Pressure (gas + air) general   | $\pm 5 \% \text{ Reading}$                             |
| Barometer reading  | $\pm 5 \text{ mbar}$                                   |
| Pressure (water)   | $\pm 5 \% \text{ Reading}$                             |
| Burst water pressure   | $\pm 1 \% \text{ Reading}$                             |
| Gas tightness $0-100 \text{ cm}^3/\text{h}$  | $\pm 5 \text{ cm}^3/\text{h}$                          |
| Gas tightness $> 100 \text{ cm}^3/\text{h}$  | $\pm 5 \% \text{ Reading}$                             |
| Actual Flow rate (general)   | $\pm 5 \% \text{ Reading}$                             |

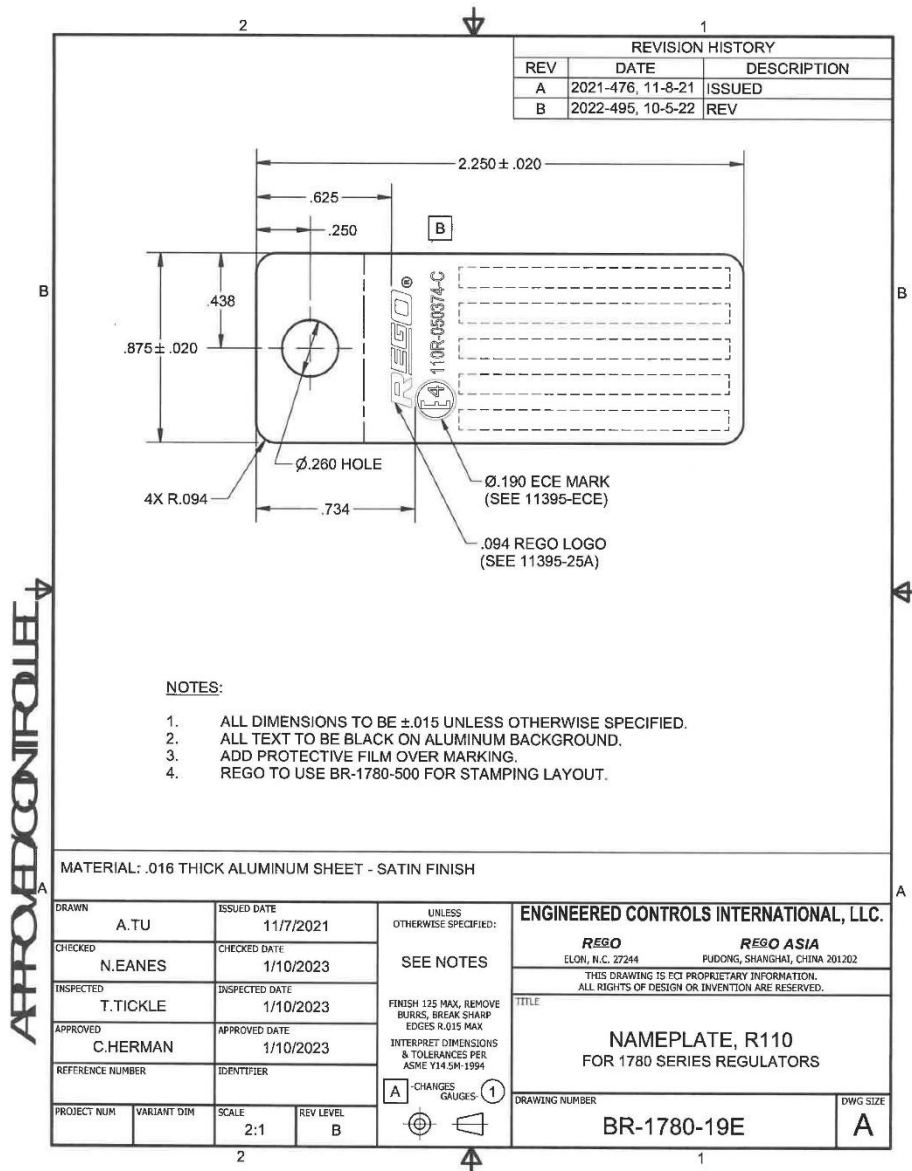
## 5 Appendices

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## Appendix 1 – Drawings







## 6 End of report