

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

COMMUNICATION

Concerning ⁽¹⁾:

- ~~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- ~~approval withdrawn~~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*0396*06

1. CNG/LNG component considered:

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



- ~~LNG filling receptacle(s)⁽⁺⁾~~
- LNG pressure control regulator(s)⁽¹⁾
- ~~LNG pressure and/or temperature sensor(s)⁽⁺⁾~~
- ~~LNG manual valve(s)⁽⁺⁾~~
- ~~LNG automatic valve(s)⁽⁺⁾~~
- ~~LNG non return valve(s)⁽⁺⁾~~
- ~~LNG pressure relief valve(s)⁽⁺⁾~~
- ~~LNG excess flow valve(s)⁽⁺⁾~~
- ~~LNG fuel pump(s)⁽⁺⁾~~
-

2. Trade name or mark : LNG Economizer ECL/ECR series
- Brand names: RegO Products
Macro Technologies
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 : 30-03-2015
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 : 23-01-2023
8. Number of report issued by that service : 150201360_P000277090
9. Approval : ~~granted/refused/extended/withdrawn~~⁽¹⁾
10. Reason(s) of extension (if applicable) : The currently homologated LNG Economizer ECL 602 series is updated to the latest Revision of the ECE Regulation 110
11. Place : Zoetermeer
12. Date : 07 February 2023
13. Signature :
- 

The image shows a blue ink signature 'R.F.R. Clement' written over a circular official stamp. The stamp contains the text 'RDW' and a coat of arms. The signature is written in a cursive style.
14. The documents filed with the application or extension of approval can be obtained upon request.

⁽¹⁾ 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) ⁽²⁾ :
 - 1.2.2. Material :
 - 1.3. Pressure relief valve (discharge valve)
 - 1.3.1. Working pressure(s) ⁽²⁾ :
 - 1.3.2. Material :
 - 1.4. Automatic valve(s)
 - 1.4.1. Working pressure(s) ⁽²⁾ :
 - 1.4.2. Material :
 - 1.5. Excess flow valve
 - 1.5.1. Working pressure(s) ⁽²⁾ :
 - 1.5.2. Material :
 - 1.6. Gas-tight housing
 - 1.6.1. Working pressure(s) ⁽²⁾ :
 - 1.6.2. Material :
 - 1.7. Pressure regulator(s)
 - 1.7.1. Working pressure(s) ⁽²⁾ :
 - 1.7.2. Material :
 - 1.8. Non-return valve(s) or check valve(s)
 - 1.8.1. Working pressure(s) ⁽²⁾ :
 - 1.8.2. Material :
 - 1.9. Pressure relief device (temperature triggered)
 - 1.9.1. Working pressure(s) ⁽²⁾ :
 - 1.9.2. Material :
 - 1.10. Manual valve
 - 1.10.1. Working pressure(s) ⁽²⁾ :
 - 1.10.2. Material :



1.11.	Flexible fuel lines	
1.11.1.	Working pressure(s) ⁽²⁾	:
1.11.2.	Material	:
1.12.	Filling unit or receptacle	
1.12.1.	Working pressure(s) ⁽²⁾	:
1.12.2.	Material	:
1.13.	Gas injector(s)	
1.13.1.	Working pressure(s) ⁽²⁾	:
1.13.2.	Material	:
1.14.	Gas flow adjuster	
1.14.1.	Working pressure(s) ⁽²⁾	:
1.14.2.	Material	:
1.15.	Gas/air mixer	
1.15.1.	Working pressure(s) ⁽²⁾	:
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) ⁽²⁾	:
1.17.2.	Material	:
1.18.	CNG filter(s)	
1.18.1.	Working pressure(s) ⁽²⁾	:
1.18.2.	Material	:
1.19.	PRD (pressure triggered)	
1.19.1.	Working pressure(s) ⁽²⁾	:
1.19.2.	Material	:
1.20.	Fuel rail(s)	
1.20.1.	Working pressure(s) ⁽²⁾	:
1.20.2.	Material	:
1.21.	Heat Exchanger(s)/Vaporizer(s)	
1.21.1.	Working pressure(s) ⁽²⁾	:
1.21.2.	Material	:
1.22.	Natural gas detector(s)	
1.22.1.	Working pressure(s) ⁽²⁾	:
1.22.2.	Material	:
1.23.	LNG filling receptacle(s)	
1.23.1.	Working pressure(s) ⁽²⁾	:
1.23.2.	Material	:
1.24.	LNG pressure control regulator(s)	
1.24.1.	Working pressure(s) ⁽²⁾	: ECL and ECR series up to 3.8 MPa ECL 502 series up to 1.6 MPa ECL 602 series up to 2.4 MPa
1.24.2.	Material	: See report 150201360 and its extensions



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

⁽²⁾ Specify the tolerance



Report 150201360_P000277090
23-01-2023

Test report

LNG Economizer ECL 602 series



Applicant

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

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Progress**

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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
LNG Economizer ECL 602 series

In accordance with ECE R110

Report number	:	150201360	
Job reference	:	P000277090	
Date of issue	:	23-01-2023	
Total number of pages	:	14 (including appendices)	
Testing laboratory	:	KIWA Nederland B.V.	
Testing location/address	:	Wilmersdorf 50 7327 AC Apeldoorn The Netherlands	
Applicant's name	:	Engineered Controls International, LLC	
Address	:	100 RegO Drive 27244 Elon, North Carolina United States of America	
Manufacturers location	:	Engineered Controls International, LLC	
Address	:	100 RegO Drive 27244 Elon, North Carolina United States of America	
		Shanghai RegO Flow Technology Co., LTD 34th Building, No. 6999, Chuansna Rd Smart International Industrial Park Pudong, Shanghai China	
Scope	:	Testing of LNG Economizer ECL 602 series regarding the requirements as derived from the below mentioned Test specifications.	
Test specifications	:		
Standards	:	Regulation 110 Addendum 109: Regulation No. 110 Revision 6 - Amendment 4 05 series of amendments– Date of entry into force: 22 June 2022	
Non-standard test method	:	N.A.	
Component description	:	LNG Economizer ECL 602 series	
Manufacturer	:	Engineered Controls International, LLC	
Trade Mark	:	RegO Products	
		Macro technologies LLC	
Model/Type reference	:	LNG Economizer ECL 602 series	
		(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 "E. 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 LNG Economizer ECL 602 series

- The currently homologated LNG Economizer ECL 602 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.

LNG Economizer ECL 602 series

Approval number(s)	:	E4*110R05/00*0396*06
Marking number(s)	:	E4-110R-050396 "L"
Manufacturer	:	Engineered Controls International, LLC
Brand names:		RegO Products Macro Technologies LLC
Type(s)	:	ECL 19, 22, 70, 90, 95, 100, 123, 140, 150, 175, 200, 225, 299, 325, 340, 502B ECR 140 ECL502-070NX, 090NX, 095NX, 100NX, 120NX, 123NX, 140NX, 145NX, 150NX, 175NX ECL602A, ECL602B, ECL602C
Working pressure:		ECL and ECR series up to 3.8 MPa ECL 502 series up to 1.6 MPa ECL 602 series up to 2.4 MPa
Classification	:	Class 5
Temperature range	:	-162°C up to 85°C
Material(s)	:	see drawings

3 Report history

Report number : **150201360**
Project number : **150201360**
Approval number : E4-110R-010396-L
Report date : 30-03-2015
Author : Regina Adelmann
Description : Initial report
Economizer ECL/ECR series

Report number : **150201360**
Project number : **151001075**
Approval number : E4-110R-010396-L
Report date : 08-01-2016
Author : Henry Rooks
Description : Extension 01
The current homologated LNG ECL/ECR series is extended with the low pressure unit ECL502B-series

Report number : **150201360**
Project number : **160800572**
Approval number : E4-110R-010396-L
Report date : 12-10-2016
Author : Regina Adelmann
Description : Extension 02
The body material of the LNG ECL/ECR series has been changed from B16 UNSC36000 rod to UNS C37700 forging.
There are no dimensional or internal machining changes.

Report number : **150201360**
Project number : **180101488**
Approval number : E4*110R02/00*0396*03
Marking number : E4-110R-020396-L
Report date : 30-01-2018
Author : Regina Adelmann
Description : Extension 03
Reason for extension; The currently homologated LNG Economizer ECL/ECR 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 : **150201360**
Project number : **180800424**
Approval number : E4*110R02/00*0396*04
Marking number : E4-110R-020396-L
Report date : 25-10-2018
Author : Henry Rooks
Description : Extension 04
Reason for extension:
The currently homologated LNG Economizer ECL/ECR series is updated with model ECL502-xxxNX
The new Gylon 3505 gasket is replacing the old Teflon liner for the whole ECL series.

Report number : **150201360**
Project number : **P000131916**
Approval number : E4*110R02/00*0396*05
Marking number : E4-110R-020396-L
Report date : 05-09-2022
Author : Regina Adelman
Description : Extension 05
The following modifications are included:
- Modification ECL502 NX series to ECL602 series

Report number : **150201360**
Project number : **P000131916**
Approval number : E4*110R02/00*0396*05
Marking number : E4-110R-020396-L
Report date : 05-10-2022
Author : Regina Adelman
Description : Correction 01 of extension 05
- Change of manufacturer location
The following modifications are included:
- Modification ECL502 NX series to ECL602 series

Report number : **150201360**
Project number : **P000277090**
Approval number : E4*110R05/00*0396*06
Marking number : E4-110R-050396 "L"
Report date : 23-01-2023
Author : Eric Harmsen
Description : Extension 06

The following modifications are included:

The currently homologated LNG Economizer ECL 602 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.

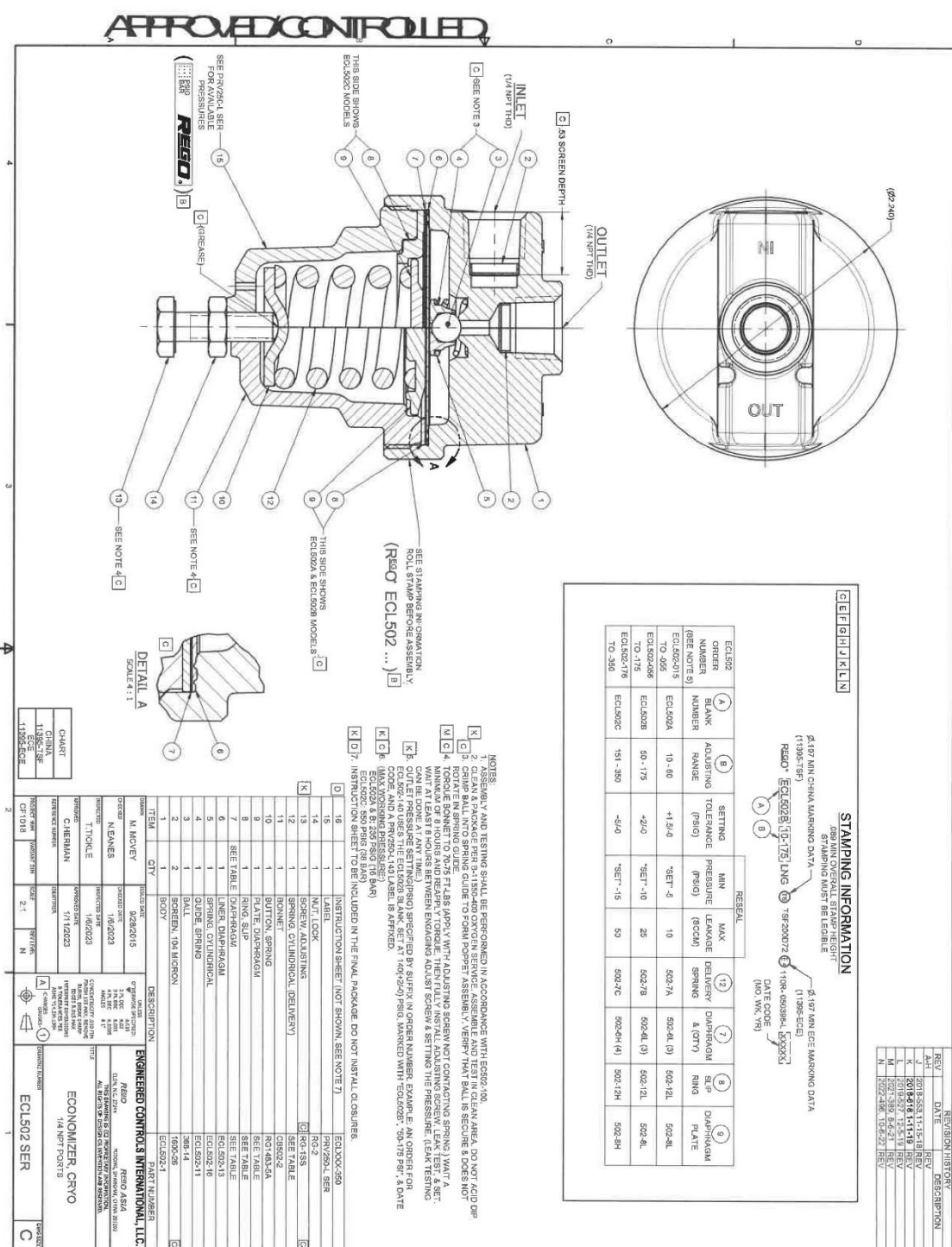
Unless otherwise specified in the test specifications the measurement uncertainty and conditions applied are:

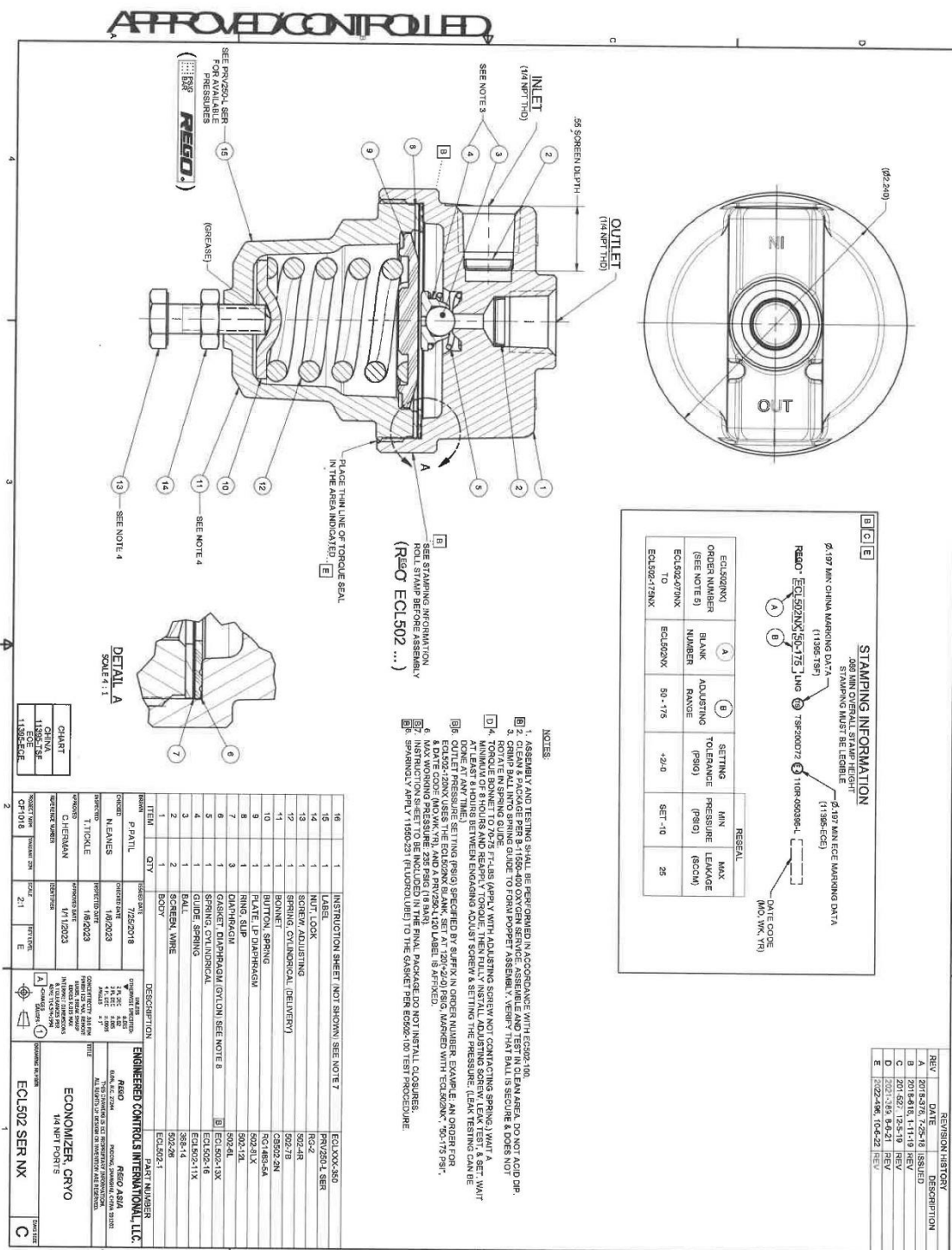
Voltage	$\pm 2 \% \text{ Reading}$
High voltage test device (SPS) 500 – 3750 Vac	$\pm 5 \% \text{ Reading}$
Resistance	$\pm 2 \% \text{ Reading}$
Protective wire and insulation test device	$\pm 5 \% \text{ Reading}$
Sliding gauge	$\pm 0.1 \text{ mm}$
Measuring tape	$\pm 1 \text{ mm}$
Cooling and heating $< -10 \text{ }^{\circ}\text{C}$	$\pm 5 \text{ }^{\circ}\text{C}$
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)	$\pm 5 \% \text{ Reading}$

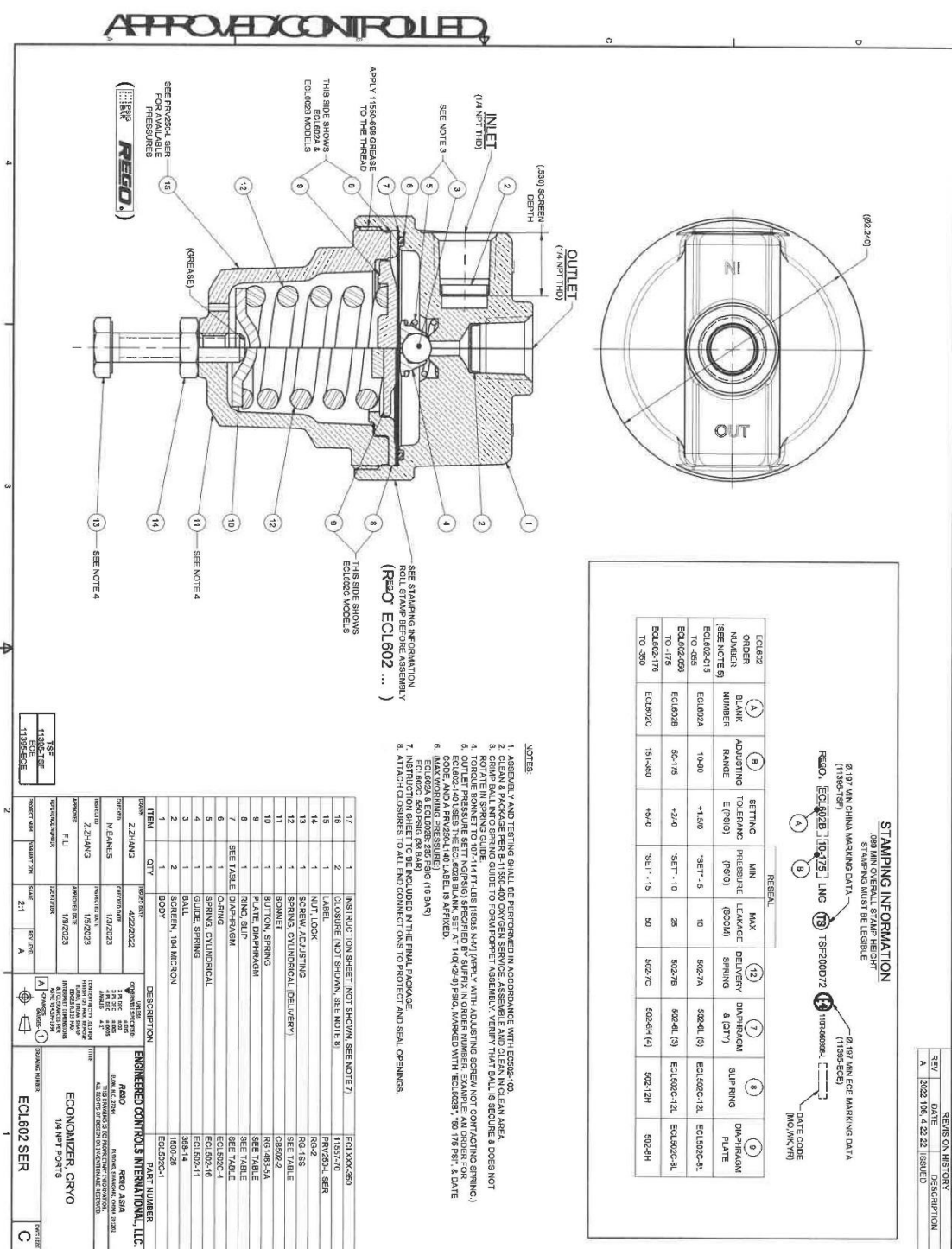
5 Appendices

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Appendix 1 – Drawings







6 End of report