SLOVAK LEGAL METROLOGY, n. o.
Products certification body - NB 1432
Hviezdoslavova 31, 974 01 Banská Bystrica

# DECISION ON CERTIFICATION

***number*** ***B/MI-004/2013-020- 0***

| | |
|---|---|
| **Product** | heat meter |
| **Type** | **US-1, US-2, US-3, US-4, US-5** |
| **Manufacturer** | BAYLAN Ölçü Aletleri San. Ve Ticaret Ltd. Şti.<br>Atatürk Organize San. Bölgesi 10046 Sokak No: 14<br>Çigli / Izmir, Turkey |
| **Applicant** | manufacturer |
| **Application No** | B 17/2013/MI-004 |
| **Final protocol No** | 013/1432/13 MI-004 |

**Product classification**

heat meter according to Annex MI-004 of the Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments (MID) as later amended.

**Standards and regulations used by certification**

Governmental Ordinance of the Slovak Republic No. 294/2005 Coll.
(which implements the Directive 2004/22/EC as later amended)
OIML R 75-1 2002, OIML R 75-2 2002
EN 1434-1: 2007, EN 1434-4: 2007
WELMEC 8.14, WELMEC 11.1, WELMEC 11.3,WELMEC 7.2

**Certification procedure** **1b**

**Summary of evaluation**

On the basis of tests, measurements, investigations, assessments and evaluations results, the Final protocol was worked out, upon which the conformity of product performances with the technical requirements stated in regulations and recommendations given above was found

**Decision on certification**

☑approve ☐ reject

| Date of issue | Decision approved by |
|---|---|
| 2013-03-20 | Ing. Štefan Kráľ, PhD.<br>representative of notified body |

SLOVAK LEGAL METROLOGY SLM 1432

# ES CERTIFIKÁT TYPU

*EC - type examination certificate*

**SK 13 - 020 MI-004** Rev. 0 Add. 0

| | |
|---|---|
| V súlade s<br>*In accordance with* | nariadením vlády Slovenskej republiky č. 294/2005 Z. z. o meradlách v znení nariadenia vlády č. 445/2010 Z. z., ktorým sa transponuje smernica Európskeho parlamentu a Rady 2004/22/ES z 31. marca 2004 o meradlách v platnom znení do právneho poriadku Slovenskej republiky<br>*Government Ordinance of the Slovak Republic No 294/2005 Coll. on measuring instruments as amended by Government Ordinance No 445/2010 Coll., which implements, in the Slovakia, the Directive 2004/22/EC of the European Parliament and of the Council of 31 March 2004 on measuring instruments as later amended* |
| Žiadateľ<br>*Issued to (applicant)* | BAYLAN Ölçü Aletleri San. Ve Ticaret Ltd. Şti.<br>Atatürk Organize San. Bölgesi 10046 Sokak No: 14<br>Çigli / Izmir, Turkey |
| Druh meradla<br>*In respect of*<br>Obchodná značka/Typ<br>*Trade mark/Type* | merač tepla<br>*heat meter*<br>**US-1, US-2, US-3, US-4, US-5** |
| Základné požiadavky<br>*Essential requirements* | príloha č. 1 a príloha MI-004 k nariadeniu vlády SR č. 294/2005 Z. z.<br>*Annex No 1 and Annex MI-004 to SR Government Ordinance No 294/2005 Coll.* |

| | | | |
|---|---|---|---|
| Použité harmon. normy a normat. dokumenty<br>*Harmonised standards and normative documents used* | OIML R 75-1 2002<br>OIML R 75-2 2002<br>EN 1434-1: 2007<br>EN 1434-4: 2007 | Ďalšie použité dokumenty<br>*Further applied documents* | WELMEC 8.14<br>WELMEC 11.1<br>WELMEC 11.3<br>WELMEC 7.2 |

| | |
|---|---|
| Popis a dokumentácia<br>*Description and documentation* | Základné parametre, popis meradla a podmienky schválenia sú uvedené v záverečnom protokole číslo 013/1432/13 MI-004, ktorý je súčasťou tohto ES certifikátu typu. Všetky výkresy, diagramy a dokumentácia sú archivované v zložke označenej Baylan_US-..._0.<br>*The principal characteristics, instrument description and approval conditions are set out in the Final protocol No 013/1432/13 MI-004, which is part of this EC - type examination certificate. All the designs, schematic diagrams and documentation are recorded in reference folder Baylan_US-..._0.* |
| Notifikovaná osoba<br>*Notified Body* | 1432 |
| Platný do<br>*Valid until* | 2023-03-20 |
| Vystavený dňa<br>*Date of issue* | 2013-03-20 |

SLOVAK LEGAL METROLOGY SLM 1432

Ing. Štefan Kráľ, PhD.
zástupca notifikovanej osoby
*Representative of Notified Body*

SNAS
Reg. No. 058/P-017

Ak sa na meradlo vzťahujú aj ďalšie technické predpisy, ktoré zahŕňajú iné aspekty meradla, ES certifikát typu platí len za predpokladu zhody meradla s týmito predpismi.

*Where the instrument is subject to other Directives covering other aspects, this EC - type examination certificate is valid, assuming that the instrument conforms to the provisions of those Directives.*

**SLOVENSKÁ LEGÁLNA METROLÓGIA, n. o.**
*Certifikačný orgán pre výrobky*
*Hviezdoslavova 31, 974 01 Banská Bystrica, Slovakia*
**SKTC-177**

Date: 20.03.2013

Number of pages: 13

# FINAL PROTOCOL

## No. 013/1432/13 MI-004

| | |
|---|---|
| **Product:** | heat meter |
| **Type:** | ***US-1, US-2, US-3, US-4, US-5*** |
| **Manufactucer** | BAYLAN Ölçü Aletleri San. Ve Tic. Ltd. Şti.<br>Atatürk Organize San. Bölgesi 10046 Sokak No: 14<br>Çiğli / Izmir, Turkey |
| **Applicant:** | BAYLAN Ölçü Aletleri San. Ve Tic. Ltd. Şti.<br>Atatürk Organize San. Bölgesi 10046 Sokak No: 14<br>Çiğli / Izmir, Turkey |
| **Application No.:** | 2013/MI-004/B017 |
| **Assignment No.:** | 2013/MI-004/B017 |
| **Certification scheme:** | 1b |
| **Distribution list:** | SKTC – 177 (NB 1432)<br>Applicant |



## 1 General provision

This Final Protocol shall be used as an evidence for the authorised body SKTC-177 (notified body 1432), Hviezdoslavova 31, 974 01 Banská Bystrica, Slovakia, authorising it to issue Decision on certification and EC - type examination certificate in accordance with § 11, Art. 10 of Law No 264/1999 Coll. on technical requirements on products and on conformity assessment and on amendments and supplements of some acts, in compliance with the Government Ordinance of the Slovak Republic No 294/2005 Coll. on measuring instruments (hereinafter referred to as „Government Ordinance") as amended by Government Ordinance of the Slovak Republic No 445/2010 Coll. for product type:

heat meter
type ***US-1, US-2, US-3, US-4, US-5***

### 1.1 Product description

1.1.1 Characteristics

The ultrasonic heat meters series *US-...* are compact measuring instrument intended for metering of energy consumption in heating systems (exchange circuits) filled with water as heat conveying liquid. The complete heat meter consists of ultrasonic flow sensor, pair of temperature sensors and heat meter calculator. Flow sensor may be installed into the horizontal or vertical pipe lines. All installation requirements are described in User Guide issued by BAYLAN company.

For installation is required:

- a distance of minimum 25 cm between signal cables and other installations,
- min. 10xDN length of straight pipe before the meter, and min. 5xDN length of straight pipe after the meter (DN is the diameter of meter).

For external view of measuring instrument see figures 1, for installation see figure 2 and for main dimensions see figure 3 in Annex 1.

The meaning of signs in the type marking and order codes is as follows:

**BAYLAN US DNxx - Px - Cxx**

**Type Number**

**Meter size**
DN15: $q_p$= 1,5m$^3$/h, G3/4", PN16
DN20: $q_p$= 2,5m$^3$/h, G1", PN16
DN25: $q_p$= 3,5m$^3$/h, G1 1/4", PN16
DN32: $q_p$= 6,0m$^3$/h, G1 1/2", PN16
DN40: $q_p$= 10 m$^3$/h, G2", PN16

**Power supply**
P6: 6 years battery life
P11: 11 years battery life

**Communication**
C01: Wired M-Bus
C02: Pulse output
C03: 4~20mA DC linear output
C12: Wired M-Bus and Pulse output
C13: Wired M-Bus and 4~20mA DC linear output
C23: Pulse output and 4~20mA DC linear output

1.1.2 Principle of operation

Quantity of heat is determined by measurement of flow rate ($q$) and temperature difference $\Delta\Theta = \Theta_{in} - \Theta_{out}$. between the inlet $\Theta_{in}$ (flow temperature) and outlet $\Theta_{out}$ (return temperature) of the heat exchange circuit. Flow and return temperatures are measured by a pair of resistance temperature sensors with *Pt1000* elements on the base of resistance measured. Signals from temperature and flow sensors are transmitted to electronic calculator, which evaluates (calculates) and indicates the quantity of heat exchanged.

1.1.3 Essential parts

- ultrasonic flow sensor;
- pair of temperature sensors;
- heat meter calculator.

1.1.3.1 Flow sensor

Ultrasonic flow sensor of type *US-1, US-2, US-3, US-4, US-5* (manufacturer *BAYLAN,* Turkey) consist of brass housing with installed ultrasound transducers. The flow sensors $q_p$ = (1,5 – 10) $m^3$/h have intended place for temperature sensor.
The velocity of flow is measured by using the principle of ultrasound. It can measure the average velocity along the path of an emitted beam of ultrasound by averaging the difference in measured transit time between the pulses of ultrasound propagating into and against the direction of the flow. The flow measurement is based on an acoustic wave time of flight principle. The flow meter body is equipped with 2 ultrasonic transducers facing 2 acoustic reflectors.

| **Flow sensors** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | DN (mm) | Flow Rate ($m^3$/h) | | | $q_i$/ $q_p$ | Dimensions (mm) | | | Connection |
| | | $q_i$ | $q_p$ | $q_s$ | | Lenght | Width | Height | |
| *US-1* | 15 | 0,03 | 1,5 | 3,0 | 1:50 | 110 | 110 | 96 | G3/4" |
| *US-2* | 20 | 0,05 | 2,5 | 5,0 | | 13 | 110 | 105 | G1" |
| *US-3* | 25 | 0,07 | 3,5 | 7,0 | | 160 | 110 | 114 | G1 ¼" |
| *US-4* | 32 | 0,12 | 6,0 | 12,0 | | 180 | 110 | 120 | G1 ½" |
| *US-5* | 40 | 0,2 | 10 | 20 | | 200 | 110 | 130 | G2" |
| Acuracy class | | | | | | | | 2 | |
| Pressure Loss ΔP(at $q_P$) | | | | | | | | ≤25kPa | |
| PS/PN | | | | | | | | 1,6 MPa | |
| Max admissible temperature | | | | | | | | 95 °C | |
| Nominal meter factor | | | | | | | | 100L/pulse | |

1.1.3.2 Temperature sensors

Platinum resistance temperature sensors *Pt 1000*, manufacturer *JUMO*, of type *902475/50/1500*, in accordance with EN 60751:2008 in two-wire configuration installed onto flow pipe (red sign marked sensor) and in the return pipe (blue sign marked sensor. The standard length of the cable is 1,5 m.
The temperature sensor set shall have identical performance in temperature measurement.
It is designed for use with the energy calculator for measurement of the temperature of flow medium in a district heating net.

| **Temperature sensor** | |
|---|---|
| Manufacturer / Type | *JUMO 902475/50/1500* |
| Temperature range | 0-105 °C |
| Temperature differenc range | 3-105 K |
| Temperature resolution | 0,01 °C |
| Lenght of cable | 1,5 m |
| diameter | 5 mm |
| Response time for temperature sensor | 2s with 50% temperature varies |

Detailed temperature sensors data, values of parameters etc. may be found in Technical specification listed in section 2.3.1.

1.1.3.3 Calculator

The calculator of type *US-1, US-2, US-3, US-4, US-5* (manufacturer *BAYLAN*, Turkey) receives and evaluates signals from the attached flow and temperature sensors. The calculator calculates a quantity of heat taking into account the flow, the temperature difference measurements between the flow and return sides of the heat exchanger circuit and thermal coefficients in compliance with EN 1434-1:2007. It is also the control, display and data store unit for the meter. The real - time circuit providing the control unit with the actual date and time is permanently backed-up. Metrology relevant measured and calculated values are indicated on the 8-digits LCD display. Measured values and computed results are recorded and stored in the permanent memory. The integrated function of the calculator ensures storage and review of relevant data for 18 months. Accumulated flow and heat consumption are logged once per hour.
The detailed descriptions and operation of the calculator, block and connections schemes, wiring diagrams and values of parameters may be found in manufacturer's documentations.
Blok scheme of calculator see on Fig. 5.

| **Calculator** | |
|---|---|
| Manufacturer | BAYLAN |
| Maximum value of thermal power | DN15 : 225, DN20: 376, DN25: 526, DN32: 900, DN40: 1500 |
| Type | *US-1, US-2, US-3, US-4, US-5* |
| Environmental class | A |
| Electromagnetic class | E1 |
| Mechanical class | M1 |
| Limits of temperature | 0 to 100 °C |
| Limits of temperature difference | 3 to 70 K |
| Display unit options | kWh, MWh, GJ |
| Dynamic behaviour | Measure flow rate 4 times per second and measure temperature1 times per four second |
| Physical dimensions | Length: 110 mm, Width: 80 mm, Height: 51 mm |
| Battery power supply requirements | Point 1.1.5 |

1.1.3.4 Display

Back illumination LCD display including 8-digits, measuring units and information field

- Display unit options kWh, MWh, GJ
- Cumulated Heat Energy 0,1 kWh~9999999.9 kWh
- Volume 0,01 $m^3$
- Instant Heat Power 0,1 kW
- Temperature 0,01°C
- Time to LCD off (sleep mode) 10 min.

1.1.4 Alternative parts

- M-Bus interface (standard communication protocol),
- Pulse output (optional);
- Analog output 4~20mA DC (Optional)
- IrDA (optical interface).

The above mentioned alternative parts are outside the scope of Annex MI-004 of MID. No legally relevant data can be altered via communication interfaces and modems. Data. Data transferred via these alternative parts are not considered as a metrological relevant data.

1.1.5 Non-essential parts

- one 3,6V lithium battery for calculator, model ER18505 (4000 mAh, life ≥ 6 years);
- two 3,6V lithium battery for calculator, model ER17505 (3600 mAh each, life ≥ 11 years);
- 24V DC – external supply for special version (optional)
- Non-return valve (if required).

1.1.6 Essential functions

- measurement and displaying of the volume of accumulated water in $m^3$;
- measurement and displaying of the flow and return temperatures;
- calculation and displaying of temperature difference;
- calculation of accumulated energy in kWh or GJ.
- measurement of instant flow rate in $m^3/h$;
- operation time in years or days or hours;
- display date, time;
- display record of last 18 months

1.1.7 Non-essential functions

- display segment test;
- display software version number;
- display meter ID, software ID, type ID, M-bus address;
- display meter type;
- display various faults.

The detailed descriptions and operation of the heat meter, block and connections schemes, wiring diagrams and values of parameters may be found in documentations listed in section 2.3.1.

## 1.2 Principal technical and metrological data

| Parameter | Symbol | Unit | Value |
|---|---|---|---|
| Accuracy class | - | - | 2 |
| Limits of temperature | $\Theta_{min}$ | °C | 4 |
| | $\Theta_{max}$ | °C | 95 |
| Limits of temperature difference | $\Delta\Theta_{min}$ | K | 3 |
| | $\Delta\Theta_{max}$ | K | 70 |
| Nominal diameter (connections) | DN | mm | 15; 20; 25; 32; 40 |
| Body thread/Connection thread | - | - | DN15 – G ¾"<br>DN20 – G1"<br>DN25 – G1 ¼"<br>DN32 – G1 ½"<br>DN40 – G2" |
| Permanent flow rate | $q_p$ | $m^3/h$ | DN15 – 1,5<br>DN20 – 2,5<br>DN25 – 3,5<br>DN32 – 6<br>DN40 – 10 |
| Maximum flow rate | $q_s$ | $m^3/h$ | DN15 – 3,0<br>DN20 – 5,0<br>DN25 – 7,0<br>DN32 – 12,0<br>DN40 – 20,0 |
| Minimum flow rate | $q_i$ | $m^3/h$ | DN15 – 0,03<br>DN20 – 0,05<br>DN25 – 0,07<br>DN32 – 0,12<br>DN40 – 0,2 |
| Low flow threshold value | DN15<br>DN20<br>DN25 | $m^3/h$ | 0,02 |
| | DN32<br>DN40 | | 0,03 |
| Maximum admissible working pressure | $P_{max}$ | bar | 16 |
| Maximum thermal power | $P_s$ | kW | DN15 – 225<br>DN20 – 376<br>DN25 – 526<br>DN32 – 900<br>DN40 – 1500 |
| Pulse Output | - | - | 100 L/impulse |
| Installation position | - | - | H/V |
| Installation place | - | - | flow |
| Protection degree | - | - | IP65 |
| Climatic class | - | °C | + 5 to + 55 |
| Environmental class | - | - | A |
| Mechanical class | - | - | M1 |

| | | | |
|---|---|---|---|
| Electromagnetic class | - | - | E1 |
| Heat medium | - | - | water |
| Indicating device | - | - | LCD 8 digits |
| Units displayed | - | - | kWh, MWh, GJ, °C, $m^3$/h, L, gal. |
| Resolution of LCD | | kWh<br>MWh<br>GJ<br>m3 | 99 999 99,9<br>99 999,999<br>999 999,99<br>999 999,99 |
| Software version | - | DN15<br>DN20<br>DN25<br>DN32<br>DN40 | BYL US1<br>BYL US2<br>BYL US3<br>BYL US4<br>BYL US5 |
| Checksum/ CRC16 Algorithm | - | DN15<br>DN20<br>DN25<br>DN32<br>DN40 | 0x8B3A<br>0x5B8D<br>0xc1d0<br>0x7E0A<br>A6AC |

Software: BYL US1 (can be shown in the display). A CRC check digit is calculated for the entire software including the metrology and application parts.
User can operate to check information on LCD of the meter by pressing the button on top cover, including temperature, flow rate, energy, meter type, software version, etc.

## 1.3 Technical and metrological requirements

- construction, technical and metrological parameters of the heat meter shall comply with the documentation presented within the process of type certification;
- all the characteristics of the measuring instrument (including those not mentioned) shall meet the respective requirements of Government ordinance.

## 1.4 Marking and inscriptions

The following data shall be marked on the heat meter:

a) manufacturer's name or mark;
b) type of heat meter (*US-...*),
c) year of manufacture and serial number;
d) accuracy class (2);
e) limits of flow rate ($q_i$, $q_p$, $q_s$);
f) limits of temperature ($\Theta_{min}$, $\Theta_{max}$);
g) limits of temperature difference ($\Delta\Theta_{min}$, $\Delta\Theta_{max}$);
h) place of the flow sensor installation (flow);
i) indication of the direction of flow;

j) maximum admissible working pressure, PS in bar
k) nominal pressure, PN
l) environmental class (A);
m) mechanical class (M1);
n) electromagnetic class (E1);
o) EC-type examination certificate number (SK 13 – 020 MI-004);
p) conformity mark according to § 7 of Government ordinance on measuring instruments (CE marking with supplementary metrology marking).

The flow direction shall be marked on a flow sensor body in form of an arrow. Any inscriptions on the heat meter and relevant information on the LCD display shall be in the EC official language; the international abbreviations are admitted. The heat meter inscriptions and marking shall comply with the requirement of Article 9, Annex 1 to Government ordinance.

### 1.5 Recommendations for the final product testing and verification

It is recommended to perform the final product testing (module D) or verification (module F) of the heat meter's compliance with the technical requirements in line with OIML R 75-2 2002 or with EN 1434-5: 2007. The metrological examination should be carried out according to 7.6 of mentioned Recommendation at least at the following three temperature differences ($\Delta\Theta$) and flow rates ($q$):

Technical requirements in line with OIML R 75-2 2002
a) $\Delta\Theta_{min} \leq \Delta\Theta \leq 1{,}2\ \Delta\Theta_{min}$ and $0{,}9\ q_p \leq q \leq q_p$
b) 10 K $\leq \Delta\Theta \leq$ 20 K and $0{,}2\ q_p \leq q \leq 0{,}22\ q_p$
c) $\Delta\Theta_{max}$ - 5 K $\leq \Delta\Theta \leq \Delta\Theta_{max}$ and $q_i \leq q \leq 1{,}1 q_i$

Technical requirements in line with EN 1434-5: 2007
a) $\Delta\Theta_{min} \leq \Delta\Theta \leq 1{,}2\ \Delta\Theta_{min}$ and $0{,}9\ q_p \leq q \leq q_p$
b) 10 K $\leq \Delta\Theta \leq$ 20 K and $0{,}1\ q_p \leq q \leq 0{,}11\ q_p$
c) $\Delta\Theta_{max}$ - 5 K $\leq \Delta\Theta \leq \Delta\Theta_{max}$ and $q_i \leq q \leq 1{,}1 q_i$

At any of the specified temperature differences and flow rates the error (of indication) shall not exceed the maximum permissible error.
Upon the request of the notified body carrying out the verification (in case of module F only), the applicant applying for the heat meter conformity assessment shall submit declaration on conformity to the certified type and the operation instruction in EC official language.

### 1.6 Security measures

The heat meter shall be protected against unauthorised manipulation by the sealing marks which secure (see Fig. 8) connections:

a) flow temperature sensor ..... 1 ×
b) return temperature sensor ..... 1 ×
c) calculator box ..... 1 x
d) flow sensor body against dismantling..... 1 x sticker

### 1.7 Validity period of verification

The validity period of verification is generally specified by legislation of the country where the heat meter is used.

### 1.8 Information on product samples

The following tests were carried out:
Metrological tests according to OIML R75-2 on

- 2 samples of heat meters type *US-1* serial numbers 13010085 and 13010004;
- 2 samples of heat meters type *US-2* serial numbers 13010033 and 13010025;
- 2 samples of heat meters type *US-5* serial numbers 13010043 and 13010045;

EMC test

- 1 sample of heat meter type *US-3* serial number 4000021;

IP protection test

- 1 sample of heat meter type *US-2* serial number 4000006.

Upon the tests completion, the samples were returned back to the manufacturer. Type examination was carried out in manner Art.2 (a) of Annex B, to the Government ordinance.

## 2 Test procedures and findings

### 2.1 Scope of assessment

The product conformity assessment was performed in accordance with § 12 Art. 3 b) of Act No 264/1999 Coll. and in accordance with Government ordinance No 294/2005 Coll. as amended by Government Ordinance of the Slovak Republic No 445/2010 Coll. The product was evaluated in terms of the technical requirements on heat meters, in line with Annexes 1 and MI-004 to Government ordinance.

## 2.2 Place and way of tests and measurement performance, assessment and evaluation

The conformity assessment was carried out in SKTC-177 (NB 1432) based on the presented documentation and on results contained in the test reports, as specified in the point 2.3. Examination of heat meter samples was carried in accordance with the harmonised standard EN 1434-1:2007 and/or International recommendation OIML R 75-2 2002 in testing laboratories of:

- Manufacturers testing laboratory (*BAYLAN*, Izmir, Turkey) witnessed by SASTEK A.Ş., Ankara, Turkey – metrological tests;
- *TESTCOM* Praha laboratories department of CMI, Czech republic – EMC tests;
- *ESIM* testing laboratory – IP protection tests, Ankara, Turkey;
- *SLM CV* Banská Bystrica – software evaluation.

## 2.3 Documentation submitted and used for assessment purposes

2.3.1 Technical documents

- Technical specifications for BAYLAN Ultrasonic Heat meter (35 pages) issued by manufacturer;
- Ultrasonic User Guide for US-... Ultrasonic heat meter (16 pages) issued by manufacturer;
- Component list (1 page);
- Datasheet of temperature sensor pair *PT1000* of type 902475/20/1500 issued by manufacturer of sensor (JUMO);
- Software review (set of documents from manufacturer);
- Meter software explanation issued by manufacturer;
- Drawing no. EC-579 "US-... Exploded View" of 26.06.2012 (1 page);
- Drawing no. EC-577 "US-... Meter View" (1 page) 26.06.2012of;
- Drawing no. EC-578 "US-... Detailed View" of 26.06.2012 (1 page);
- Drawing no. EC-580 "US-... Sealing Plan" of 26.06.2012 (1 page);
- Drawing no. EC-573 "US-... PCB scheme of 01.03.2013 (1 page);
- Drawing no. S-413 "Baylan US-1 Heat meter marking" of 26.06.2012 (1 page);
- Drawing no. S-414 "Baylan US-2 Heat meter marking" of 26.06.2012 (1 page);
- Drawing no. S-415 "Baylan US-3 Heat meter marking" of 26.06.2012 (1 page);
- Drawing no. S-416 "Baylan US-5 Heat meter marking" of 26.06.2012 (1 page);
- Drawing no. S-4173 "Baylan US-1 Heat meter marking" of 26.06.2012 (1 page);
- Drawings no. EC-574 "Baylan US-... LCD" of 01.03.2013 (4 pages);

2.3.2 Submitted documents

- Test and Inspection Report No. HM/04-13 of 04.03.2013 (metrological tests of heat meter type *US-1* according to OIML R 75-2), issued by SASTEK. A.Ş., Ankara (29 pages);
- Test and Inspection Report No. HM/05-13 of 04.03.2013 (metrological tests of heat meter type *US-3* according to OIML R 75-2), issued by SASTEK. A.Ş., Ankara (29 pages);
- Test and Inspection Report No. HM/06-13 of 06.03.2013 (metrological tests of heat meter type *US-5* according to OIML R 75-2), issued by SASTEK. A.Ş., Ankara (29 pages);
- EMC Test report No 8551-PT-E0041-13 (1 page) with Annex 1 (36 pages) of 08.03.2013 issued by CMI, TESTCOM Praha EMC laboratory;
- Software test report No. 2013/MI-004/B017/SW08 of 19.03.2013 issued by SLM NB 1432;
- IP test report No. LVD-2013039 of 14.02.2013 issued by ESIM, Turkey (15 pages);
- Check list to type evaluation report No 2013/MI-004 /B017 related to ultra-sonic heat meters series *US-*.....(references according to OIML R 75-1 and OIML R 75-2 of 22.03.2013.

2.3.3 Standards and regulations used

- SR Government ordinance No 294/2005 Coll. on measuring instruments as amended by Government Ordinance of the Slovak Republic No 445/2010 Coll.;
- OIML R 75-1 2002;
- OIML R-75-2 2002;
- EN 1434-1: 2007;
- EN 1434-4: 2007;
- WELMEC Guide 7.2., WELMEC Guide 11.3.

## 3 Test results

By assessment of the determined values of the products characteristics it was stated that the properties of the assessed type of product are in conformity with the provisions of the Slovak Government Ordinance No 294/2005 Coll. as amended by Government Ordinance of the Slovak Republic No 445/2010 Coll. and with requirements of the International recommendation OIML R 75-1 2002 and OIML R 75-2 2002 concerning the respective product.

## 4 Conclusion

It follows from the results of tests, measurements, findings and assessment as specified in this Protocol that the characteristics of the respective product type are in conformity with the provisions of the Slovak Government ordinance No 294/2005 Coll. as amended by Government Ordinance of the Slovak Republic No 445/2010 Coll.and with the requirements of International recommendation OIML R 75-1 2002 and OIML R 75-2 2002.

## 5 Annexes

**Annex 1** – Figures

Fig. 1: Illustrative view on heat meters series *US-*.... of BAYLAN company
Fig. 2: Installation of heat meters series *US-*....
Fig. 3: Main dimensions of heat meters series *US-*...
Fig. 4: Display of heat meter type *US-*...
Fig. 5: Block scheme of calculator
Fig. 6: Explode view of heat meters series *US-*..
Fig. 7: PIN assignment and dimension of heat meters series *US-*..
Fig. 8: Sealing plan on heat meters series *US-*..
Fig. 9: Name plate and marking of heat meter – sample of type *US-2*
Fig. 10: Cross section of heat meters series *US-*...

Note:
The documentation specified in the points 2.3.1 and 2.3.2 and preserved by SLM – Products Certification Body is the integral part of the Final protocol.

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