REVERSE LOGISTICS ON WATER METER INDUSTRY AND PRODUCTION STUDY WITH MAXIMUM RECYCLED MATERIAL RATIO

TANKUT KAAN DEMİRKURT

Graduate School

Izmir University of Economics

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ABSTRACT

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Demirkurt, Tankut Kaan

Master's Program in Logistics Management

Advisor: Muhittin Hakan DEMİR

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Reverse logistics applications are becoming increasingly important, even mandatory, with the increase in raw material costs, delays in raw material supply and pollution of the environment by non-recycled products. Reverse logistics brings companies to the fore in their competition with their competitors, both in terms of economic and environmentalist approach. Even if there are studies on recycling in the literature, there is no study on recycling and how to include recycled materials in production in the water meter sector. The purpose of this study is to ensure that domestic water meters are produced by using maximum recycled materials and to verify that the meters pass all tests according to the relative standards. The tests have been carried out with reference to OIML R49-2 and EN ISO 4064-2 standards, and the ratio of inclusion of recycled raw materials in production was determined according to these test results. Tests have shown that 100% of the recycled brass material can be used in production, and the water meters meet the relative standards when plastic raw material is mixed

with 20% of recycled plastic material and %80 of non-recycled material.

Keywords: reverse logistics, recycling, water meter, test, production.

ÖZET

SU SAYACI SEKTÖRÜNDE TERS LOJİSTİK VE EN FAZLA GERİ DÖNÜŞTÜRÜLMÜŞ MALZEME ORANI İLE ÜRETİM ÇALIŞMASI

Demirkurt**,** Tankut Kaan

Lojistik Yönetimi Yüksek Lisans Programı

Tez Danışmanı: Muhittin Hakan DEMİR

Mart, 2022

Ters lojistik uygulamaları hammadde maliyetlerinin artması, hammadde tedariğinde yaşanan gecikmeler ve geri dönüştürülmeyen ürünlerin çevreyi kirletmesi ile birlikte giderek önemli, hatta zorunlu bir hal almaktadır. Ters lojistik, firmaları rakipleri ile olan rekabetlerinde hem ekonomik, hem de çevreci yaklaşım açısından öne taşımaktadır. Literatürde geri dönüşüm üzerine çalışmalar olsa da, su sayacı sektöründe geri dönüşüm ve geri dönüştürülmüş malzemelerin üretime nasıl dahil edileceği ile ilgili bir çalışma bulunmamaktadır. Bu çalışmadaki amaç, maksimum geri dönüştürülmüş malzeme kullanarak ev tipi su sayaçlarının üretilmesini sağlamak ve sayaçların ilgili standartlara göre tüm testlerden geçtiğinden emin olmaktır. Testler OIML R49-2 ve EN ISO 4064-2 standardları referans alınarak gerçekleştirilmiş, geri dönüştürülmüş hammaddelerin üretime dahil edilme oranları da bu test sonuçlarına göre belirlenmiştir. Yapılan testler, üretimde geri dönüştürülmüş pirinç malzemenin %100 oranında kullanılabileceğini, geri dönüştürülmüş plastik malzemelerin ise, en fazla %20 oranında ana hammaddeye karıştırıldığında su sayacının ilgili standartları

sağladığını göstermiştir.

Anahtar Kelimeler: ters lojistik, geri dönüşüm, su sayacı, test, üretim.

Dedicated to my family.

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Lastly, the most important value in my life, my family deserves my biggest thank. I cannot find any words to describe my feelings about my family but I am feeling stronger with them and there is nothing that I cannot do with their support.

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ABBREVIATIONS

V_a: Actual volume, total water volume passing through the water meter.

V_i: Indicated volume, water volume indicated by the water meter.

MPE: Maximum permissible error.

Q: Flow rate, Q = dV/dt where actual volume is V, and time is t.

Q_4: Overload flow rate, maximum flow rate at which the meter is to operate for a short time within the maximum permissible errors.

Q_3: Permanent flow rate, maximum flow rate within the rated operating conditions at which the meter is to operate within the maximum permissible errors.

Q_2: Transitional flow rate, flow rate between the permanent flow rate and the minimum flow rate that divides the flow rate range into two zones, the upper flow rate zone and the lower flow rate zone, each characterized by its own maximum permissible errors.

Q_1: Minimum flow rate, minimum flow rate at which the meter is to operate within the maximum permissible errors.

MAP: Maximum admissible pressure, maximum internal pressure which a meter can withstand permanently, within its rated operating conditions, without deterioration of its metrological performance.

mAT: Minimum admissible temperature, minimum water temperature which a meter can withstand permanently, within its rated operating conditions, without deterioration of its metrological performance

MAT: Maximum admissible temperature, maximum water temperature which a meter can withstand permanently, within its rated operating conditions, without deterioration of its metrological performance.

DN: Nominal diameter, alphanumeric designation of size for components of a pipework system, which is used for reference purposes.

R: the ratio of Q_3/Q_1, which means measurement ability of the water meter in low flowrates.

CHAPHER 1: INTRODUCTION

1.1 Logistics and Reverse Logistics

Logistics come out of “logistikos” in Greek language and “logistique” in French language which means logic, calculation and military management factors. Logistics term dates the first days of human history. Since the first days of human history, people were stocking their food and doing several stock controls in caves and they were transporting and distributing their wares. In the First World War and the Second World War, the importance of logistic activities was understood and it became very important. In these two wars, transportation, stocking, distribution optimization and control activities have been carried out by military services. Before the ‘80s, the logistics term was commonly used militarily. However, after the ‘80s, the logistics term was starting to be used in the business sector as well.

Logistics is a very big field and it covers transportation, stock management, packing, material and equipment, order, forecast, production management, purchasing, customer services, customs clearance services and site selection. Therefore, there are lots of descriptions of logistics in the literature.

Supply Chain Management Council Professionals (CSCMP) defined logistics in 1991, and this definition is accepted and well received in the literature. According to the Supply Chain Management Council Professionals (CSCMP), which has a world-renowned Logistics Center in Chicago, USA, and has more than 15,000 members, *Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements.*

Rogers and Tibben-Lembke (1999) describe Reverse Logistics including the goal and the processes (the logistics) involved:

> *“The process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal.”*

The European Working Group on Reverse Logistics, RevLog (1998), puts

forward the following definition:

> *"The process of planning, implementing and controlling flows of raw materials, in process inventory, and finished goods, from a manufacturing, distribution or use point to a point of recovery or point of proper disposal"*

1.2 Problem Statement

Problems experienced in the supply of raw materials and delays in shipments have led companies to establish recycling systems within their own structures. Many companies have increased their investments in this field. It is thought that these investments will become more important in the future. Recycling facilities reduce foreign dependence on raw materials, and make companies very advantageous economically and in terms of supply. In addition, recycling systems reduce environmental pollution by ensuring that materials are used repeatedly. Recycling of the water meter in the water meter production sector is completed with the steps of collecting and disassembling the scrap meters, separating the plastic and non-plastic parts, recycling and bringing the recycled material into production. The recycling steps are available for improvement, because the history of recycling in the water meter industry does not go a long way back. Even though a recycling system has been established in the company where this study was conducted, there is no clear data on how and at what ratio the recycled materials will be brought into production. In addition to that, it has not been observed that there is a recycling study in the water meter sector in the literature.

1.3 Purpose of the Study

The purpose of this study is to produce water meters that pass all the tests according to related standards by using a maximum amount of recycled materials. In this study, it was determined how and at what ratio the recycled materials should be used in production after the recycling of scrap water meters. While determining this ratio, TS EN 1982 Copper and copper alloys - Ingots and castings standard, TS EN 12164 Copper and copper alloys - Rod for free machining purposes, TS EN ISO 4064 Water meters for cold potable water and hot water and OIML R49 International Recommendation Water meters For cold potable water and hot water documents were used. First of all, the recyclable parts of the water meter are defined. Recyclable parts are examined in two branches as plastic and non-plastic parts. Both types of materials

are recycled and turned into to raw materials. In the production of water meters, the recycled materials were mixed with the main raw material at different ratios and the necessary tests were carried out according to the OIML R49 and EN ISO 4064 standards. According to the test results, the optimum mixing ratios of the recycled materials and the main raw material were determined.

1.4 Structure of the Study

In accordance with the purpose of the study, the remaining chapters of this study are written as follows.

In CHAPTER 2: LITERATURE RESEARCH, previous studies on reverse logistics applications, waste management and main effects on water meter accuracy in the literature have been searched. Even if there are some studies on reverse logistics and the water meter sector separately, it is seen that there is no study on reverse logistics in the water meter sector, and this is a gap in the literature. This study aims to fill this gap in the literature.

In CHAPTER 3: METHODOLOGY;

- Water meter parts (recyclable and non- recyclable) will be defined.
- A flowchart of the water meter recycling process will be drawn.
- Plastic and non-plastic parts recycling processes will be defined.
- Test conditions, to be applied tests to the water meters will be defined.
- To determine the maximum recycled material ratio in the production process, by using 100% recycled material, water meters will be tested. If water meters cannot pass, the recycled material ratio will be decreased and water meters will be tested again. At the end of this study, all water meters must pass all the tests with a determined maximum recycled material ratio.

In CHAPTER 4: RESULTS, test results will be summarized, and the maximum recycled material ratio will have been determined.

Lastly, in CHAPTER 5: CONCLUSION AND FUTURE WORK, findings and comments will be shared according to applied test results. In addition to that, there will be suggestions to improve this study and topic.

CHAPTER 2: LITERATURE RESEARCH

Reverse logistics applications in the manufacturing industry have increased considerably, especially in recent years, academic studies continue to increase as well. Raw material costs, difficulties in raw material supply, environmental pollution and related global warming factors have made reverse logistics practices inevitable. In this part of the thesis, previous studies on water meters and reverse logistics applications in the literature will be reviewed.

In Coşkun, Ayşen (2011) study, the factors that affect the reverse logistics activities of the manufacturers were examined and an application was made in the white goods sector. In this study, the reasons for the continuation of reverse logistics activities of the manufacturers operating in the white goods sector were investigated and this study was carried out in two different companies. There are some differences and similarities in the reasons why companies continue their logistics activities. The similarities can be listed as reducing the use of raw materials and having a green image. The differences are Company A attributes the reason for continuing its logistics activities to economic factors, while Company B mostly stated corporate identity as the priority criterion. While monitoring reverse logistics applications, Company A cares about production returns, but Company B cares about customer returns.

The study, which was written by Orhan, Mücahit Abdullah (2020) is about modeling reverse logistics applications in drug waste. With the development of the health sector, patients' access to drugs has become easier. The increase of expired drugs and their improper disposal threaten human health and the environment. In order to collect and dispose of these drugs correctly, a system dynamics model has been created within the reverse logistics and green supply chain activities. According to the model, it is stated that leaving the unused drugs to the pharmacies by the patients or their relatives, the pharmaceutical warehouses collecting these wastes from the pharmacies, and the municipality taking these drugs from the temporary storage areas of the pharmaceutical warehouses and destroying them correctly will bring great benefits to both the environment and human health.

In Key Factors Affecting Water Meter Accuracy paper, written by Francisco Arregui, Enrique Cabrera Jr., Ricardo Cobacho and Jorge García-Serra and was presented by Francisco Arregui at the IWA Water Loss Conference in Halifax, Canada in September 2005, key factors, that affect water meter accuracy, have been examined.

It was seen that mounting position, suspended solids, fatigue tests, and depositions, leaks and user's storage tanks, partial blockage of the inlet strainer and water meter type are affecting the water accuracy.

In "Domestic water meter optimal replacement period to minimize water revenue loss" paper, written by Aluta Moahloli, Annlizé Marnewick, and JHC Pretorius, the author's aim was to determine the optimal point at which domestic water meters are to be replaced. Water meter age, total registered volume, water meter inaccuracies depending on time are examined statistically and optimal domestic water meter replacement period is found as between 10-17 years for a particular municipality that studied on.

In "Effects of particulates on water meter accuracy through expected life" paper, written by B. Skyler Buck, Michael C. Johnson, and Steven L. Barfuss. Effects of particulates on water meter accuracy according to water meter types are examined by the authors. There are several water meter types such as displacement piston, fluidic oscillator, multijet, nutating disc and single jet. The result shows that, multijet and fluidic-oscillator types could tolerate the effects of sand passing through them over the course of a full life cycle.

Although there are studies on recycling, reverse logistics, the factors affecting the accuracy of the water meter and the optimum replacement period of the water meter in the literature, the recycling application in the water meter industry is a gap in the literature. This study aims to fill this gap in the literature.

CHAPTER 3: METHODOLOGY

3.1 Flowchart of Water Meter Recycling Process:

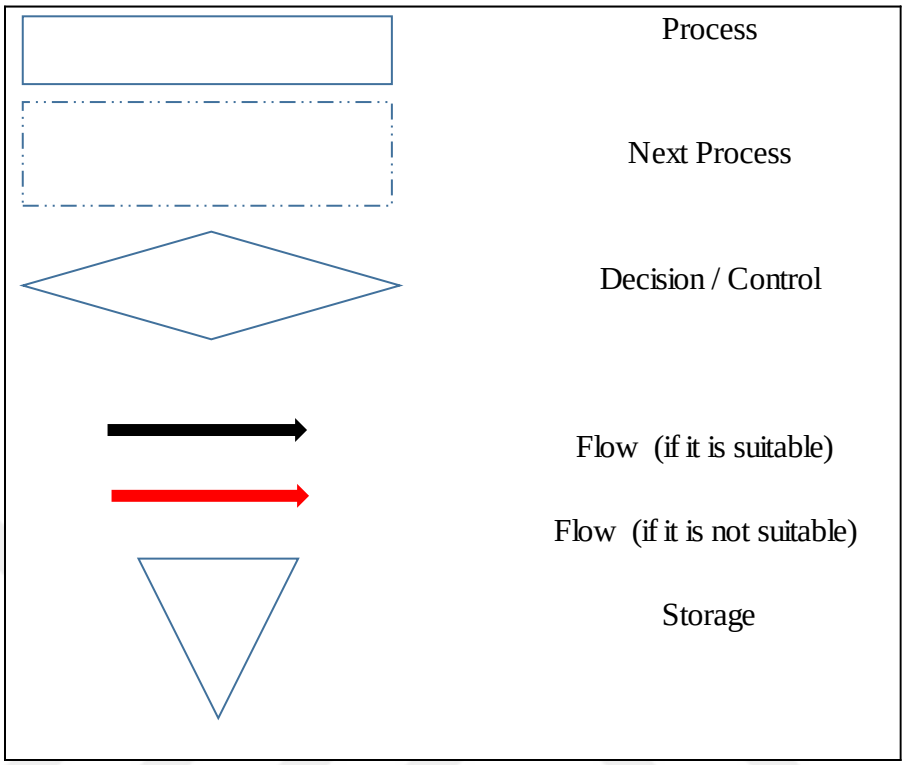

Figure 1. Information Flow Symbols

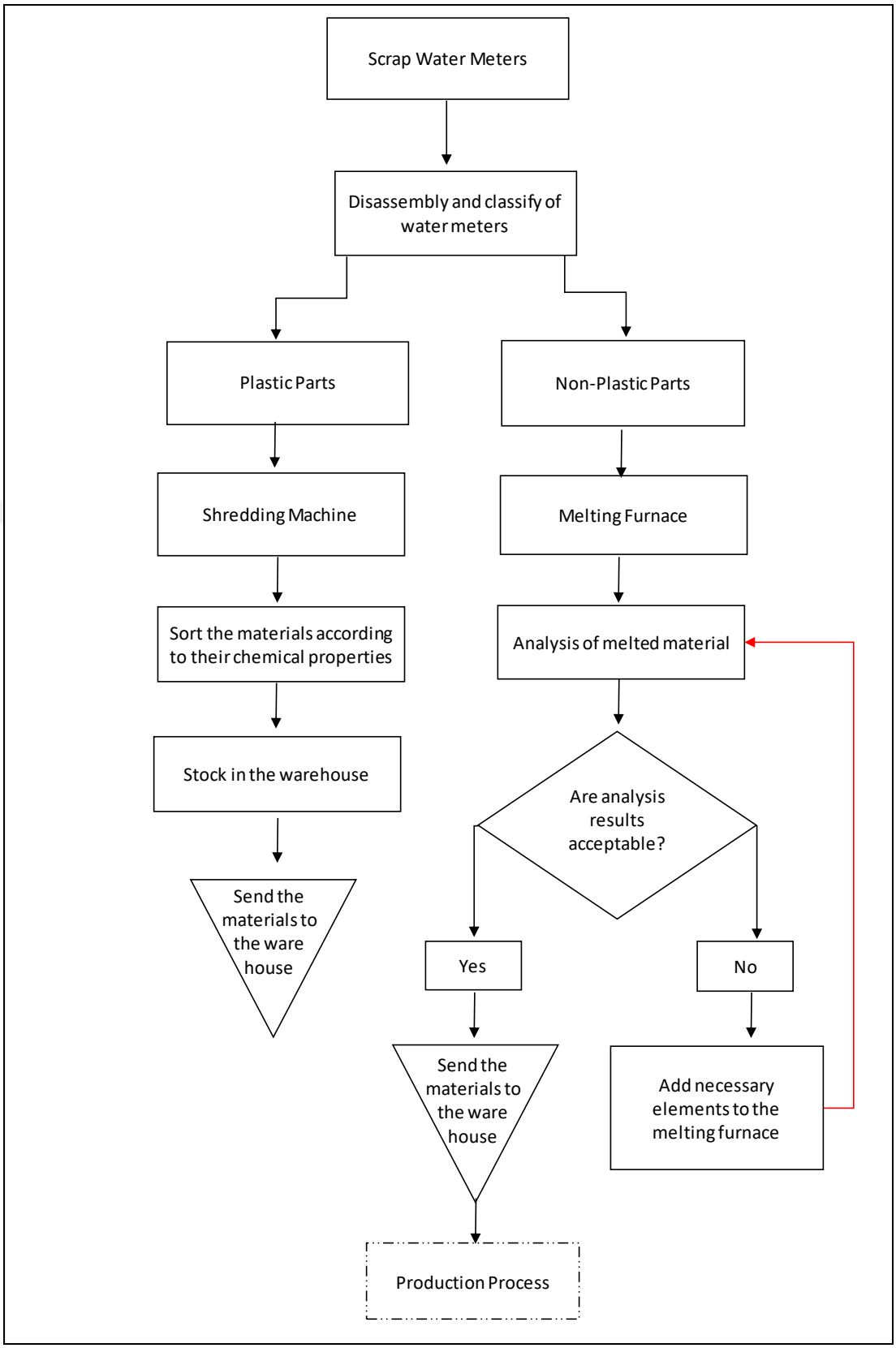

Figure 2. Water Meter Recycling Process - Process Flow Chart

3.2. Recycling

3.2.1 Non-Plastic Parts Recycling

The water meter bodies are made of brass material which can be recycled infinite times. After disassembling and classifying the scrap water meters, Non-Plastic parts are melted in a melting furnace. After all materials are melted, a quality control technician takes samples from the melting furnace to make an analysis. For lower bodies, the analysis must meet the related standard which name is EN 1982 Copper and copper alloys - Ingots and castings. For upper bodies, the analysis must meet the related standard which name is EN 12164 Copper and Copper alloys – Rod for free machining purposes.

Table 1. CuZn39Pb1Al-C (CC754S) Material Tolerances

CuAn39Pb1Al-B (CB754S) and CuZn39Pb1Al-C (CC754S) Material Table				
Composition *"EN 1982 Copper and copper alloys - Ingots and castings."*				
Element	Ingots		Casting	
	Min.	Max.	Min.	Max.
Al	0,10	0,8	-	0,8
Cu	58,0	62,0	58,0	63,0
Ni	-	1,0	-	1,0
Pb	0,5	2,4	0,5	2,5
Sn	-	1,0	-	0,1
Zn	Remainder		Remainder	
Fe	-	0,7	-	0,7
Mn	-	0,5	-	0,5
P	-	0,02	-	0,02
Si	-	0,05	-	0,05

Table 2. CuZn40Pb2 (CW617N) Material Tolerances

CuZn40Pb2 (CW617N)	
Composition % (mass fraction) *"EN 12164 Copper and Copper alloys – Rod for free machining purposes."*	
Element	Min Max

Table 2. (Continued)

Cu	57,0 59,0
Al	- 0,05
As	- -
Fe	- 0,3
Mn	- -
Ni	- 0,3
Pb	1,6 2,5
Sn	- 0,3
Zn	Remainder -
Other Total	- 0,2

In Table 5 and Table 6, there are the tolerances of materials which inside of the melted material. Analysis results must be meet the tolerances of standards which is shown at Table 5 and Table 6. If not, necessary elements are added to the melting furnace and analysis must be repeated. This process continues until melted material meets the tolerances of the standard.

3.2.2 Plastic Parts Recycling:

After disassembling the water meters, plastic parts are sent to the shredding machine. In this machine plastic parts are crushed. By this way, plastic part dimensions are ready for plastic injection. Crushed and recycled plastic materials are added to the main raw material at a certain rate and used in production. These mixing ratios are

determined according to the experience of employees and this is not based on certain, clear and analytic data.

3.3 Test Conditions and Descriptions

3.3.1 Reference Conditions

All tests are applied at reference conditions according to OIML R-49 and EN ISO 4064-2 standards as specified below.

Working (water) temperature: (20 ± 5) °C

Ambient temperature range: 15 °C to 25 °C

Ambient relative humidity range: 60 % (± 15%)

Ambient atmospheric 96 kPa (± 10 kPa) [0.96 Bar (± 0.10 Bar]

Note: During each test, the temperature and relative humidity shall not vary by more than 5°C or 10 % respectively within the reference range.

3.3.2 Maximum Permissible Errors

A water meter shall be designed and manufactured such that its errors (of indication) do not exceed the maximum permissible errors (MPEs) as defined in 3.4.1 Reference conditions.

A water meter shall be designated as either accuracy class 1 or accuracy class 2, according to the requirements of Accuracy Class 1 and Accuracy Class 2.

Accuracy Class 1 water meters:

The MPE for the upper flow rate zone ($Q_2 \leq Q \leq Q_4$) is ±1 %, for temperatures from 0.1°C to 30°C, and ±2 % for temperatures greater than 30 °C.

The MPE for the lower flow rate zone ($Q_1 \leq Q < Q_2$) is ±3 % regardless of the temperature range.

Accuracy Class 2 water meters.

The MPE for the upper flow rate zone ($Q_2 \leq Q \leq Q_4$) is ±2 %, for temperatures from 0.1°C to 30°C, and ±3 % for temperatures greater than 30 °C.

The MPE for the lower flow rate zone ($Q_1 \leq Q < Q_2$) is ±5 % regardless of the temperature range.

- In this study, tests will be applied to a water meter which accuracy class 2 water meters.

3.3.3 Meter Temperature Classes

The meters fall under water temperature classes corresponding to the various ranges, chosen by the manufacturer from the values given in Table 7.

The water temperature shall be measured at the inlet side of the meter.

Table 3. Temperature Classes

Class	**mAT °C**	**MAT °C**
T30	0,1	30
T50	0,1	50
T70	0,1	70
T90	0,1	90
T130	0,1	130
T180	0,1	180
T30/70	30	70
T30/90	30	90
T30/130	30	130
T30/180	30	180

- In this study, domestic water meters which have T50 water temperature class are tested.

3.3.4 Test Descriptions

Table 4. Applied Tests

Applied Tests	**Reference Documents**
1. Static Pressure Test	TS EN ISO 4064-2: 2018 7.3 OIML R-49:2013: 7.3
2. Error (of indication) Test	TS EN ISO 4064-2: 2018 7.3 OIML R-49:2013: 7.3
3. Water Temperature Test	TS EN ISO 4064-2: 2018 7.5 OIML R-49:2013: 7.5
4. Overload Water Temperature Test	TS EN ISO 4064-2: 2018 7.6 OIML R-49:2013: 7.6
4 Water Pressure Test	TS EN ISO 4064-2: 2018 7.7 OIML R-49:2013: 7.7
5. Endurance Tests	TS EN ISO 4064-2: 2018 7.11 OIML R-49:2013: 7.11
5.1 Discontinuous flow endurance test	
5.2 Continuous flow endurance test	

3.4.4.1. Static Pressure Test

Object of the test is to verify that the water meter can withstand the specified hydraulic test pressure for the specified time without leakage or damage.

Pressure is increased to 1.6 times the maximum admissible pressure (MAP) (25,6 Bar) of the meter, and holding it for 15 minutes. Water meters are examined for physical damage, for external leaks and for leaks into the indicated device.

Pressure is increasing to twice the MAP (32 Bar) and holding this pressure level for 1 minute. Water meters are examined for physical damage, for external leaks and for leaks into the indicating device.

Additional requirements:

1) Increase and decrease the pressure gradually without pressure surges.
2) Apply only the reference temperatures for this test.
3) The flow rate shall be zero during the test.

Acceptance criteria is there shall be no leakage from the meter or leakage into the indicating device, or physical damage, resulting from any of the pressure tests described in 3.3.3.2.1 Static Pressure Test.

3.4.4.2. Determination of Intrinsic Errors (of indication)

Object of the test is to determine the intrinsic errors (of indication) of a water meter and the effects of the meter orientation on the error (of indication).Shortly, determining the water meter measurement error.

The test rig consists of:

a) A water supply (pumps)
b) Pipework
c) A calibrated reference device
d) Means for measuring the time of the test
e) Devices for automating the tests
f) Means for measuring water temperature
g) Means for measuring water pressure

- Supply Pressure

The supply pressure shall be maintained at a constant value throughout the test at the chosen flowrate. For all tests, the pressure upstream of the meter shall not vary by more than 10 %. The maximum uncertainty in the measurement of pressure shall be 5% of the measured value. Pressure at the entrance to the meter shall not exceed the

maximum admissible pressure for the meter.

- Flowrate

The flowrate shall be maintained constant throughout the test at the chosen value. The relative variation in the flowrate during each test (not including starting and stopping) shall not exceed:

± 2.5 % from Q_1 to Q_2 (not inclusive);

± 5.0 % from Q_2 (inclusive) to Q_4.

The flowrate value is the actual volume passed during the test divided by the time. This flowrate variation condition is acceptable if the relative pressure variation (in flow to free air) or the relative variation of pressure loss (in closed circuits) does not exceed:

± 5 % from Q_1 to Q_2 (not inclusive);

±10 % from Q_2 (inclusive) to Q_4.

- Temperature

During the test, the temperature of the water shall not change by more than 5°C, and maximum uncertainty in the measurement of temperature shall not exceed 1°C.

- Orientation of water meter(s)

1) If the meters are marked ‘H’ on the water meter marking, mount the connecting pipework with the flow axis in the horizontal plane during the test.

2) If the meters are marked ‘V’ on the water meter marking, mount the connecting pipework with the flow axis in the vertical plane during the test.

3) If the meters are not marked on the water meter marking either ‘H’ or ‘V’,

• At least one meter from the samples shall be mounted with the flow axis vertical, with flow direction from bottom to top;

• At least one meter from the samples shall be mounted with the flow axis vertical and flow direction from top to bottom;

• At least one meter from the samples shall be mounted with the flow axis at an intermediate angle to the vertical and horizontal (chosen at the discretion of the approving authority);

• The remaining meters from the sample shall be mounted with the flow axis horizontal.

4) Where the meters have an indicating device which is integral with the body of the meter, at least one of the horizontally mounted meters shall be oriented with the

indicating device positioned at the side and the remaining meters shall be oriented with the indicating device positioned at the top.

5) The tolerance on the position of the flow axis for all meters, whether horizontal, vertical or at an intermediate angle, shall be ± 5°.

- Test Procedure

- Determine the intrinsic errors (of indication) of a water meter (in the measurement of the actual volume), for at least the following flow rates, the error at each flow rate being measured three times for a), b) and e) and twice for the other flow rate ranges:

a) Between Q_1 and 1.1 Q_1

b) Between Q_2 and 1.1 Q_2

c) Between 0.33 (Q_2 + Q_3) and 0.37 (Q_2 + Q_3)

d) Between 0.67 (Q_2 + Q_3) and 0.74 (Q_2 + Q_3)

e) Between 0.9 Q_3 and Q_3

f) Between 0.95 Q_4 and Q_4

During the test all other influence factors shall be maintained at reference conditions.

Measure the errors (of indication) at other flow rates if the shape of the error curve indicates that the MPE may be exceeded.

Calculate the relative error (of indication) for each flowrate in accordance with the formula.

- Formula:

$E_{m(i)\ (i = 1, 2,\ldots n)} = 100 \times (V_i - V_a) / V_a$ (%)

Where:

$E_{m(i)\ (i =1, 2,\ldots n)}$	is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)
V_a	is the actual (or simulated) volume passed, during the test period D_t, (m3)
V_i	is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

- Acceptance criteria

1) The relative errors (of indication) observed for each of the six flowrates shall

not exceed the maximum permissible errors given in 3.2.1 and 3.2.2 of R 49-1. If the error observed on one or more meters is greater than the maximum permissible error at one flowrate only, the test at that flowrate shall be repeated. The test shall be declared satisfactory if two out of the three results lie within the maximum permissible error and the arithmetic mean of the results for the three tests at that flowrate is less than or equal to the maximum permissible error.

2) If all the relative errors (of indication) of the water meter have the same sign, at least one of these errors shall not exceed one half of the maximum permissible error. In all cases this requirement shall be applied equitably with respect to the water supplier and the consumer.

3) The standard deviation for 7.4.4 a) 1), 2) and 5) shall not exceed one-third of the maximum permissible errors.

3.4.4.3. Water Temperature Test

Object of the test is to measure the effects of water temperature on the errors (of indication) of the meter. The installation and operational requirements must be as same as described in error (of indication) test and reference condition sections.

Measure the error (of indication) of the meter at the flowrate Q_2 with the inlet water temperature at 10 °C, maintained within a tolerance of ± 5 °C and all other influence factors maintained at reference conditions.

Measure the error (of indication) of the meter at the flowrate Q_2 with the inlet water temperature at the maximum admissible temperature (MAT) of the meter, maintained within a tolerance of + 0 / – 5 °C and all other influence factors maintained at reference conditions.

Calculate the relative error (of indication) for each inlet water temperature in accordance with the formula.

Formula:

$E_{m(i)\ (i = 1, 2,\ldots n)} = 100 \times (V_i - V_a) / V_a\ (\%)$

Where:

$E_{m(i)\ (i =1, 2,\ldots n)}$	is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)
V_a	is the actual (or simulated) volume passed, during the test period D_t, (m3)

V_i is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

Acceptance criteria is the relative error (of indication) of the meter shall not exceed the applicable maximum permissible error.

3.4.4.4. Overload Water Temperature Test

Object of the test is to verify that a meter's performance is not affected after exposure to an elevated, overload, water temperature.

The installation and operational requirements must be as same as described in error (of indication) test and reference condition sections.

Test procedure

- Expose the meter to a flow of water at the reference flow rate at a temperature of MAT +10 °C ±2,5 °C for a period of 1 h after the meter has reached temperature stability.
- After recovery, measure the error (of indication) of the meter at flow rate Q2 at the reference temperature.
- Calculate the relative error (of indication) in accordance with the formula.

Formula:

$E_{m(i)\ (i = 1, 2,\ldots n)} = 100 \times (V_i - V_a) / V_a\ (\%)$

Where:

$E_{m(i)\ (i =1, 2,\ldots n)}$ is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)

V_a is the actual (or simulated) volume passed, during the test period D_t, (m3)

V_i is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

- During the test, the reference conditions for all other influence quantities shall be maintained.

Acceptance criteria

a) The meter functionality with regard to volume totalization shall remain unaffected.

b) Additional functionality, as indicated by the manufacturer, shall remain unaffected.

c) The error (of indication) of the meter shall not exceed the applicable MPE.

3.4.4.5. Water Pressure Test

Object of the test is to measure the effects of internal water pressure on the errors (of indication) of the meter. The installation and operational requirements must be as same as described in error (of indication) test and reference condition sections. Measure the error (of indication) of at least one meter at a flowrate of Q_2 with the inlet water pressure maintained firstly at 0.03 MPa (0.3 bar) ± 5 % and then at the maximum admissible pressure (+ 0, – 10 %).

During each test, all other influence factors shall be maintained at the reference conditions.

Calculate the relative error (of indication) for each inlet water temperature in accordance with formula.

Formula:

$E_{m(i)\ (i = 1, 2,\ldots n)} = 100 \times (V_i - V_a) / V_a\ (\%)$

Where:

$E_{m(i)\ (i =1, 2,\ldots n)}$	is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)
V_a	is the actual (or simulated) volume passed, during the test period D_t, (m3)
V_i	is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

Acceptance criteria is the relative error (of indication) of the meter shall not exceed the applicable maximum permissible error.

3.4.4.6. Endurance Tests

During endurance tests, the rated operating conditions of the meter shall be met.

3.4.4.6.1 Discontinuous Flow Test

Object of the test is to verify that the water meter is durable when subjected to cyclic flow conditions. The test consists of subjecting the meter to the specified number of starting and stopping flowrate cycles of short duration, the constant test flowrate phase of each cycle being kept at the specified flowrate (Q_3) throughout the duration of the test.

Flowrate cycle

A complete cycle comprises the following four phases:

a) A period from zero to the test flowrate Q_3;

b) A period at constant test flowrate Q_3;

c) A period from the test flowrate Q_3 to zero;

d) A period at zero flowrate.

- Test procedure

1) Before commencing the discontinuous endurance test, measure the errors (of indication) of the meters as described in 3.3.3.2.2. Error (of indication) Test and at the same flowrates.

2) Mount the meters either singly or in groups in the test rig in the same orientations as those used in the determination of the intrinsic errors (of indication).

3) During the tests, maintain the meters within their rated operating conditions and with the pressure downstream of the meters high enough to prevent cavitation in the meters.

4) Adjust the flowrate to within the specified tolerances.

5) Run the meters at the conditions shown in Table 2.

6) Following the discontinuous endurance test, measure the final errors (of indication) of the meters as described in 3.3.3.2.2. Error (of indication) Test and at the same flowrates.

7) Calculate the final relative error (of indication) for each flowrate in accordance with the formula.

Formula:

$E_{m(i)\ (i = 1, 2,\ldots n)} = 100 \times (V_i - V_a) / V_a\ (\%)$

Where:

$E_{m(i)\ (i =1, 2,\ldots n)}$	is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)
V_a	is the actual (or simulated) volume passed, during the test period D_t, (m3)
V_i	is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

8) For each flowrate, subtract the value of the intrinsic error (of indication) obtained before the test (step 1) from the error (of indication) obtained after the test (step 7).

- Tolerance on flowrate

The relative variation of the flow values shall not exceed ± 10 % outside the opening, closing and stoppage periods. The meter(s) on test may be used to check the flowrate.

- Tolerance on test timing

The tolerance on the specified duration of each phase of the flow cycle shall not exceed ± 10 %. The tolerance on the total test duration shall not exceed ± 5 %.

- Cyclic test

Table 5. Discontinuous Endurance Test

Permanent Flowrate (Q_3)	Test Flowrate	Type of Test	Number of interruptions	Duration of pauses	Period of operation at test flowrate	Duration of start-up and run-down
Q_3 ≤16 m3/h	Q_3	Discontinuous	100 000	15 s	15 s	0.15 (Q_3)'s with a minimum of 1 s

- Tolerance on the number of cycles

The number of cycles shall not be less than that stipulated, but shall not exceed this number by more than 1 %.

- Tolerance on discharged volume

The volume discharged throughout the test shall be equal to half the product of the specified nominal test flow and the total theoretical duration time of the test (operating periods plus transient and stoppage periods with a tolerance of ± 5 %). This precision can be obtained by sufficiently frequent corrections of the instantaneous flows and operating periods.

- Test readings

During the test the following readings shall be recorded at least once every 24 hour period, or once for every shorter period if the test is so divided:

a) Line pressure upstream of the meter(s) under test;

b) Line pressure downstream of the meter(s) under test;

c) Line temperature upstream of the meter(s) under test;

d) Flowrate through the meter(s) under test;

e) Duration of the four phases of the cycle of the discontinuous flow test;

f) Number of cycles;

g) Indicated volumes of the meter(s) under test;

h) Actual volume passed by the meter(s) under test.

- Acceptance criteria

After the discontinuous endurance test:

1) The variation in the error curve shall not exceed 3 % for flowrates in the lower zone ($Q_1 \leq Q < Q_2$), or 1.5 % for flowrates in the upper zone ($Q_2 \leq Q \leq Q_4$). For the purpose of determining these requirements, the mean values of the errors (of indication) at each flowrate shall apply.

2) The curves shall not exceed a maximum error limit of ± 6 % for flowrates in the lower zone ($Q_1 \leq Q < Q_2$) and ± 2.5 % for flowrates in the upper zone ($Q_2 \leq Q \leq Q_4$).

3.3.4.6.2 Continuous Flow Test

Object of the test is to verify the durability of the water meter when subjected to continuous, permanent and overload flow conditions. The test consists of subjecting the meter(s) to a constant flowrate of Q_3 or Q_4 for a specified duration.

- Test procedure

1) Before commencing the discontinuous endurance test, measure the errors (of indication) of the meters as described in 3.3.3.2.2. Error (of indication) Test and at the same flowrates.

2) Mount the meters either singly or in groups in the test rig in the same orientations as those used in the determination of the intrinsic errors (of indication).

3) Run the meters at a flowrate of Q_4 for a period of 100 hours.

4) Throughout the endurance tests the meter(s) shall be maintained within their rated operating conditions and the pressure at the outlet of each meter shall be high enough to prevent cavitation.

5) After each continuous endurance test, measure the errors (of indication) of the meter(s) as described in 3.3.3.2.2. Error (of indication) Test and at the same flowrates.

6) Calculate the relative errors (of indication) for each flowrate in accordance with the formula.

Formula:

$E_{m(i)\,(i = 1, 2, \ldots n)} = 100 \times (V_i - V_a) / V_a\ (\%)$

Where:

$E_{m(i)\ (i=1, 2,\ldots n)}$	is the relative error (of indication) of a complete water meter at a flowrate i (= 1, 2, n), (%)
V_a	is the actual (or simulated) volume passed, during the test period D_t, (m3)
V_i	is the volume added to (or subtracted from) the indicating device, during the test period D_t, (m^3)

7) For each flowrate, subtract the error (of indication) obtained before the test (step 1) from the error (of indication) obtained after the test (step 6).

- Tolerance on flowrate

The flowrate shall be kept constant throughout the test at a predetermined level. The relative variation of the flowrate values during each test shall not exceed ± 10 % (except when starting and stopping).

- Tolerance on test timing

The specified duration of the test is a minimum value.

- Tolerance on discharged volume

The volume indicated at the end of the test shall not be less than that determined from the product of the specified nominal flowrate of the test and the specified nominal duration of the test. To satisfy this condition, sufficiently frequent corrections to the flowrate shall be made. The water meter(s) on test may be used to check the flowrate.

- Test readings

During the test the following information shall be recorded at least once every 24 hours period, or once for every shorter period if the test is so divided:

a) Water pressure upstream of the meter(s) under test;

b) Water pressure downstream of the meter(s) under test;

c) Water temperature upstream of the meter(s) under test;

d) Flowrate through the meter(s) under test;

e) Indicated volumes of the meter(s) under test;

f) Actual volume passed by the meter(s) under test.

- Acceptance criteria

After the continuous endurance test:

1) The variation in the error curve shall not exceed 3 % for flowrates in the lower zone ($Q_1 \leq Q < Q_2$) and 1.5 % for flowrates in the upper zone ($Q_2 \leq Q \leq Q_4$). For the

purpose of determining these requirements the mean values of the errors (of indication) at each flowrate, shall apply.

2) The curves shall not exceed a maximum error limit of ± 6 % for flowrates in the lower zone ($Q_1 \leq Q < Q_2$) and ± 2.5 % for flowrates in the upper zone ($Q_2 \leq Q \leq Q_4$).

3.3.5 Applied Tests To The 100% Recycled Brass Material

In this section, 100% recycled brass materials and 0% recycled plastic materials were used. The purpose of this application is to determine the recyclability of brass material. 100% Recycled Brass Material chemical analysis tables are below.

Table 6. Chemical Analysis of 100% Recycled CC754S Material

Analyzed By: Tankut Kaan Demirkurt						Material: CC754S			
Water Meter Part: Lower Body and Adjustment Bolt									
Chemical Analysis									
# of test	Zn %	Pb %	Sn %	P %	Mn %	Fe %	Ni %	Si %	Mg %
1	37,08	2,06	0,51	0,010	0,018	0,66	0,428	0,032	0,0016
2	37,10	2,03	0,5	0,0098	0,019	0,67	0,429	0,032	0,0016
# of test	Cr %	As %	Sb %	Bi %	Co %	Al %	S %	Cu %	B %
1	0,0052	0,0018	0,0027	0,0067	0,0015	0,61	0,0038	58,5	0,0005
2	0,0049	0,0017	0,0026	0,0068	0,0015	0,61	0,0038	58,5	0,0005

Table 7. Chemical Analysis of 100% Recycled CW617N Material

Analyzed By: Tankut Kaan Demirkurt						Material: CW617N			
Water Meter Part: Upper Body									
Chemical Analysis									
# of test	Zn %	Pb %	Sn %	P %	Mn %	Fe %	Ni %	Si %	Mg %
1	40,35	1,85	0,256	0,0042	0,0018	0,291	0,118	0,0077	0,0015
2	39,72	1,86	0,276	0,0048	0,0018	0,290	0,120	0,0071	0,0015

Table 7. (Continued)

# of test	Cr %	As %	Sb %	Bi %	Co %	Al %	S %	Cu %	B %
1	0,0011	0,0042	0,0080	0,0062	0,0015	0,0065	0,0031	57,1	0,0005
2	0,0011	0,0050	0,013	0,0062	0,0015	0,0039	0,0033	57,7	0,0005

Chemical analyses are in the tolerance range according to Chemical analysis is in the tolerance range according to "*TS EN 1982 and TS EN 12164* standards.

3.3.5.1 Static Pressure Test "OIML R49-2 7.3| EN ISO 4064-2 7.3"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model	TK-25	Ambient relative humidity:	49%	49%	%
Date:	18.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	08:00	08:17	

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25001	25,6	08:00	26	08:15	26	PASSED
TK-25002	25,6	08:00	26	08:15	26	PASSED
TK-25003	25,6	08:00	26	08:15	26	PASSED
TK-25004	25,6	08:00	26	08:15	26	PASSED
TK-25005	25,6	08:00	26	08:15	26	PASSED

Meter Serial No.	MAP x 1,6	Start time	Initial pressure	End time	Final pressure	Remarks

	MPa (bar)		MPa (bar)		MPa (bar)	
TK-25001	32	08:16	32	08:17	32	PASSED
TK-25002	32	08:16	32	08:17	32	PASSED
TK-25003	32	08:16	32	08:17	32	PASSED
TK-25004	32	08:16	32	08:17	32	PASSED
TK-25005	32	08:16	32	08:17	32	PASSED

3.3.5.2 Error (of indication) Test "OIML R49-2 7.4 | EN ISO 4064-2 7.4"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	49%	49%	%
Date:	19.09.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:30	14:00	

Meter serial No.:	TK-25001	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
3,125	6	22	0,35454	0,45564	0,10110	0,10158	-0,47	2
3,125	6	22	0,45564	0,55689	0,10125	0,10165	-0,39	2
2,5	6	22	0,55689	0,63694	0,08005	0,08014	-0,11	2
2,5	6	22	0,63694	0,71784	0,08090	0,08099	-0,11	2
2,5	6	22	0,71784	0,79814	0,08030	0,08047	-0,21	2
1,778	6	22	0,79814	0,85841	0,06027	0,06018	0,15	2
1,778	6	22	0,85841	0,91898	0,06057	0,06049	0,13	2
0,889	6	22	0,91898	0,95948	0,04050	0,04014	0,90	2
0,889	6	22	0,95948	1,00042	0,04094	0,04045	1,21	2
0,04	6	22	1,00042	1,01050	0,01007	0,01006	0,17	2
0,04	6	22	1,010495	1,02055	0,01005	0,01005	0,08	2
0,04	6	22	1,020548	1,03058	0,01003	0,01002	0,09	2
0,025	6	22	1,030581	1,03760	0,00701	0,00712	-1,41	5

0,025	6	22	1,037596	1,04465	0,00706	0,00714	-1,12	5
0,025	6	22	1,044651	1,05175	0,00710	0,00721	-1,57	5

Meter serial No.: TK-25002 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,31594	0,41657	0,10063	0,10158	-0,94	2
3,125	6	23	0,41657	0,51721	0,10064	0,10165	-0,99	2
2,5	6	23	0,51721	0,59678	0,07957	0,08014	-0,71	2
2,5	6	23	0,59678	0,67694	0,08016	0,08099	-1,02	2
2,5	6	23	0,67694	0,75665	0,07971	0,08047	-0,94	2
1,778	6	23	0,75665	0,81655	0,05990	0,06018	-0,47	2
1,778	6	23	0,81655	0,87691	0,06036	0,06049	-0,21	2

0,889	6	23	0,87691	0,91713	0,04022	0,04014	0,20	2
0,889	6	23	0,91713	0,95784	0,04071	0,04045	0,64	2

0,04	6	23	0,95784	0,96805	0,01021	0,01006	1,51	2
0,04	6	23	0,96805	0,97821	0,01016	0,01005	1,14	2
0,04	6	23	0,97821	0,98835	0,01014	0,01002	1,16	2

0,025	6	23	0,98835	0,99539	0,00704	0,00712	-1,05	5
0,025	6	23	0,99539	1,00244	0,00705	0,00714	-1,19	5
0,025	6	23	1,00244	1,00954	0,00710	0,00721	-1,53	5

Meter serial No.: TK-25003 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actualflowrate Q( ) m³/h	Initial supplypressure MPa (bar)	Watertemp. Tw °C	Initialreading Vi(i) m³	Finalreading Vi(f) m³	Indicatedvolume Vi m³	Actualvolume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,39105	0,49154	0,10049	0,10158	-1,07	2
3,125	6	23	0,49154	0,59211	0,10057	0,10165	-1,06	2

2,5	6	23	0,59211	0,67185	0,07974	0,08014	-0,50	2
2,5	6	23	0,67185	0,75224	0,08039	0,08099	-0,74	2
2,5	6	23	0,75224	0,83228	0,08004	0,08047	-0,53	2
1,778	6	23	0,83228	0,89235	0,06007	0,06018	-0,18	2
1,778	6	23	0,89235	0,95294	0,06059	0,06049	0,17	2
0,889	6	23	0,95294	0,99344	0,04050	0,04014	0,90	2
0,889	6	23	0,99344	1,03414	0,04070	0,04045	0,62	2
0,04	6	23	1,03414	1,04431	0,01017	0,01006	1,11	2
0,04	6	23	1,04431	1,05446	0,01015	0,01005	1,05	2
0,04	6	23	1,05446	1,06459	0,01013	0,01002	1,06	2
0,025	6	23	1,06459	1,07157	0,00698	0,00712	-1,90	5
0,025	6	23	1,07157	1,07859	0,00702	0,00714	-1,61	5
0,025	6	23	1,07859	1,08568	0,00709	0,00721	-1,66	5

Meter serial No.: TK-25004 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,3035	0,40359	0,10009	0,10158	-1,47	2
3,125	6	23	0,40359	0,50365	0,10006	0,10165	-1,56	2
2,5	6	23	0,50365	0,58321	0,07956	0,08014	-0,72	2
2,5	6	23	0,58321	0,66345	0,08024	0,08099	-0,93	2
2,5	6	23	0,66345	0,74349	0,08004	0,08047	-0,53	2
1,778	6	23	0,74349	0,80384	0,06035	0,06018	0,28	2
1,778	6	23	0,80384	0,86451	0,06067	0,06049	0,30	2
0,889	6	23	0,86451	0,90494	0,04043	0,04014	0,72	2
0,889	6	23	0,90494	0,94585	0,04091	0,04045	1,14	2
0,04	6	23	0,94585	0,95601	0,01016	0,01006	1,01	2

0,04	6	23	0,95601	0,96612	0,01011	0,01005	0,65	2
0,04	6	23	0,96612	0,97622	0,01010	0,01002	0,76	2

0,025	6	23	0,97622	0,98320	0,00698	0,00712	-1,90	5
0,025	6	23	0,9832	0,99021	0,00701	0,00714	-1,75	5
0,025	6	23	0,99021	0,99728	0,00707	0,00721	-1,94	5

Meter serial No.: TK-25005 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,31487	0,41503	0,10016	0,10158	-1,40	2
3,125	6	23	0,41503	0,51515	0,10012	0,10165	-1,51	2

2,5	6	23	0,51515	0,59458	0,07943	0,08014	-0,89	2
2,5	6	23	0,59458	0,67469	0,08011	0,08099	-1,09	2
2,5	6	23	0,67469	0,75435	0,07966	0,08047	-1,01	2

1,778	6	23	0,75435	0,81431	0,05996	0,06018	-0,37	2
1,778	6	23	0,81431	0,87438	0,06007	0,06049	-0,69	2

0,889	6	23	0,87438	0,91460	0,04022	0,04014	0,20	2
0,889	6	23	0,9146	0,95521	0,04061	0,04045	0,40	2

0,04	6	23	0,95521	0,96532	0,01011	0,01006	0,52	2
0,04	6	23	0,96532	0,97544	0,01012	0,01005	0,75	2
0,04	6	23	0,97544	0,98552	0,01008	0,01002	0,56	2

0,025	6	23	0,98552	0,99254	0,00702	0,00712	-1,34	5
0,025	6	23	0,99254	0,99958	0,00704	0,00714	-1,33	5
0,025	6	23	0,99958	1,00667	0,00709	0,00721	-1,66	5

3.3.5.3 Water Temperature and Overload Water Temperature Tests"OIML R49-2 7.5 and 7.6 | EN ISO 4064-2 7.5 and 7.6"

Application No:

Model: TK-25

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative	49%	49%	%

		humidity:		
Date:	19.09.2021	Ambient atmospheric pressure:	101,325	101,325 KPa
Observer:	K.DEMİRKURT	Time:	14:30	17:30

Meter serial No.: TK-25001 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,10584	1,11647	0,01063	0,01051	1,14	2
MAT	0,04	0,042	3,5	49,8	1,16417	1,17454	0,01037	0,01042	-0,48	2
Reference	0,04	0,042	3,5	20,9	3,11541	3,12540	0,00999	0,01009	-0,99	2

Meter serial No.: TK-25002 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,06254	1,07318	0,01064	0,01051	1,24	2
MAT	0,04	0,042	3,5	49,8	1,12154	1,13197	0,01043	0,01042	0,10	2
Reference	0,04	0,042	3,5	20,9	3,07548	3,08563	0,01015	0,01009	0,59	2

Meter serial No.: TK-25003 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%

10 °C	0,04	0,042	3,5	10,2	1,13918	1,14984	0,01066	0,01051	1,43	2
MAT	0,04	0,042	3,5	49,8	1,20517	1,21551	0,01034	0,01042	-0,77	2
Reference	0,04	0,042	3,5	20,9	3,15843	3,16858	0,01015	0,01009	0,59	2

Meter serial No.: TK-25004 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,04385	1,05449	0,01064	0,01051	1,24	2
MAT	0,04	0,042	3,5	49,8	1,10549	1,11581	0,01032	0,01042	-0,96	2
Reference	0,04	0,042	3,5	20,9	3,05917	3,06927	0,0101	0,01009	0,10	2

Meter serial No.: TK-25005 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,05805	1,06867	0,01062	0,01051	1,05	2
MAT	0,04	0,042	3,5	49,8	1,11142	1,1218	0,01038	0,01042	-0,38	2
Reference	0,04	0,042	3,5	20,9	3,06545	3,07556	0,01011	0,01009	0,20	2

3.3.5.4 Water Pressure Test"OIML R49-2 7.7 \| EN ISO 4064-2 7.7"

Application No:

Model: TK-25

Date: 20.09.2021

Observer: K.DEMİRKURT

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative humidity:	45%	45%	%
Ambient atmospheric pressure:	101,325	101,325	KPa
Time:	08:00	09:30	

Meter serial No.: TK-25001

Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,17684	3,18681	0,00997	0,01009	-1,19	2
MAP	0,04	0,042	15,8	22,1	3,23574	3,24588	0,01014	0,01012	0,20	2

Meter serial No.: TK-25002 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%

0,3 bar	0,04	0,042	0,3	22,1	3,13808	3,14811	0,01003	0,01009	-0,59	2
MAP	0,04	0,042	15,8	22,1	3,19905	3,20922	0,01017	0,01012	0,49	2

Meter serial No.: TK-25003 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,22894	3,23898	0,01004	0,01009	-0,50	2
MAP	0,04	0,042	15,8	22,1	3,29001	3,30027	0,01026	0,01012	1,38	2

Meter serial No.: TK-25004 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply	Initial inlet	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

	Q( )	*Q( )*	pressure	water temp						
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,10938	3,11937	0,00999	0,01009	-0,99	2
MAP	0,04	0,042	15,8	22,1	3,17014	3,18035	0,01021	0,01012	0,89	2

Meter serial No.: TK-25005 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,12618	3,13621	0,01003	0,01009	-0,59	2
MAP	0,04	0,042	15,8	22,1	3,13621	3,14642	0,01021	0,01012	0,89	2

3.3.5.5 Endurance Tests "OIML R-49:2013: 7.11 | EN ISO 4064-2: 2018 7.11"

3.3.5.5.1 Discontinuous Flow Tests "OIML R-49:2013: 7.11.2 | EN ISO 4064-2: 2018 7.11.2"

Meter Serial No.: TK-25001 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	8,0	7,5	22,8	2,5	4,533	15	1	15	1	0	0
22.09.21	8	0	K.D	8,0	7,5	22,8	2,5	32,654	15	1	15	1	28,12	2541
23.09.21	8	0	K.D	8,0	7,5	22,7	2,5	60,776	15	1	15	1	28,12	2541
24.09.21	8	0	K.D	8,0	7,5	22,7	2,5	88,898	15	1	15	1	28,12	2541
25.09.21	8	0	K.D	8,0	7,5	22,8	2,5	117,019	15	1	15	1	28,12	2541
26.09.21	8	0	K.D	8,0	7,5	22,6	2,5	145,141	15	1	15	1	28,12	2541
27.09.21	8	0	K.D	8,0	7,5	22,5	2,5	173,263	15	1	15	1	28,12	2541
28.09.21	8	0	K.D	8,0	7,5	22,3	2,5	201,384	15	1	15	1	28,12	2541
29.09.21	8	0	K.D	8,0	7,5	22,5	2,5	229,506	15	1	15	1	28,12	2541
30.09.21	8	0	K.D	8,0	7,5	22,3	2,5	257,627	15	1	15	1	28,12	2541
01.10.21	8	0	K.D	8,0	7,5	22,6	2,5	285,749	15	1	15	1	28,12	2541

02.10.21	8	0	K.D	8,0	7,5	22,6	2,5	313,871	15	1	15	1	28,12	2541
03.10.21	8	0	K.D	8,0	7,5	22,5	2,5	341,992	15	1	15	1	28,12	2541
04.10.21	8	0	K.D	8,0	7,5	22,8	2,5	370,114	15	1	15	1	28,12	2541
05.10.21	8	0	K.D	8,0	7,5	22,2	2,5	398,236	15	1	15	1	28,12	2541
06.10.21	8	0	K.D	8,0	7,5	22,8	2,5	426,357	15	1	15	1	28,12	2541
07.10.21	8	0	K.D	8,0	7,5	22,7	2,5	454,479	15	1	15	1	28,12	2541
08.10.21	8	0	K.D	8,0	7,5	22,2	2,5	482,601	15	1	15	1	28,12	2541
09.10.21	8	0	K.D	8,0	7,5	22,6	2,5	510,722	15	1	15	1	28,12	2541
10.10.21	8	0	K.D	8,0	7,5	22,7	2,5	538,844	15	1	15	1	28,12	2541
11.10.21	8	0	K.D	8,0	7,5	22,3	2,5	566,966	15	1	15	1	28,12	2541
12.10.21	8	0	K.D	8,0	7,5	22,7	2,5	595,087	15	1	15	1	28,12	2541
13.10.21	8	0	K.D	8,0	7,5	22,4	2,5	623,209	15	1	15	1	28,12	2541
14.10.21	8	0	K.D	8,0	7,5	22,3	2,5	651,331	15	1	15	1	28,12	2541
15.10.21	8	0	K.D	8,0	7,5	22,6	2,5	679,452	15	1	15	1	28,12	2541
16.10.21	8	0	K.D	8,0	7,5	22,4	2,5	707,574	15	1	15	1	28,12	2541
17.10.21	8	0	K.D	8,0	7,5	22,7	2,5	735,696	15	1	15	1	28,12	2541
18.10.21	8	0	K.D	8,0	7,5	22,5	2,5	763,817	15	1	15	1	28,12	2541
19.10.21	8	0	K.D	8,0	7,5	22,3	2,5	791,939	15	1	15	1	28,12	2541
20.10.21	8	0	K.D	8,0	7,5	22,5	2,5	820,060	15	1	15	1	28,12	2541

21.10.21	8	0	K.D	8,0	7,5	22,1	2,5	848,182	15	1	15	1	28,12	2541
22.10.21	8	0	K.D	8,0	7,5	23,0	2,5	876,304	15	1	15	1	28,12	2541
23.10.21	8	0	K.D	8,0	7,5	22,1	2,5	904,425	15	1	15	1	28,12	2541
24.10.21	8	0	K.D	8,0	7,5	22,3	2,5	932,547	15	1	15	1	28,12	2541
25.10.21	8	0	K.D	8,0	7,5	22,8	2,5	960,669	15	1	15	1	28,12	2541
26.10.21	8	0	K.D	8,0	7,5	22,9	2,5	988,790	15	1	15	1	28,12	2541
27.10.21	8	0	K.D	8,0	7,5	22,5	2,5	1016,912	15	1	15	1	28,12	2541
28.10.21	8	0	K.D	8,0	7,5	22,8	2,5	1045,034	15	1	15	1	28,12	2541
29.10.21	8	0	K.D	8,0	7,5	22,6	2,5	1073,155	15	1	15	1	28,12	2541
30.10.21	8	0	K.D	8,0	7,5	22,7	2,5	1101,277	15	1	15	1	28,12	2541
30.10.21	17	0	K.D	8,0	7,5	22,6	2,5	1111,872	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1107,34	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25002 - TK-25 DN20 190mm

Discontinuous Test Readings

	T*ime*	*Observer*			*Upstream*	*Actual*	Meter	*Flow Cycle Times*	Total	Total

Date				*Upstream Pressure* bar	*Downstream Pressure* bar	*temp.* °C	*Flowrate* m³/h	Reading m³	rise	on	fall	off	Volume Discharged m³	no. of flow cycles
21.09.21	8	0	K.D	7,5	7,0	22,8	2,5	4,523	15	1	15	1	0	0
22.09.21	8	0	K.D	7,5	7,0	22,8	2,5	32,648	15	1	15	1	28,13	2541
23.09.21	8	0	K.D	7,5	7,0	22,7	2,5	60,774	15	1	15	1	28,13	2541
24.09.21	8	0	K.D	7,5	7,0	22,7	2,5	88,899	15	1	15	1	28,13	2541
25.09.21	8	0	K.D	7,5	7,0	22,8	2,5	117,024	15	1	15	1	28,13	2541
26.09.21	8	0	K.D	7,5	7,0	22,6	2,5	145,150	15	1	15	1	28,13	2541
27.09.21	8	0	K.D	7,5	7,0	22,5	2,5	173,275	15	1	15	1	28,13	2541
28.09.21	8	0	K.D	7,5	7,0	22,3	2,5	201,401	15	1	15	1	28,13	2541
29.09.21	8	0	K.D	7,5	7,0	22,5	2,5	229,526	15	1	15	1	28,13	2541
30.09.21	8	0	K.D	7,5	7,0	22,3	2,5	257,652	15	1	15	1	28,13	2541
01.10.21	8	0	K.D	7,5	7,0	22,6	2,5	285,777	15	1	15	1	28,13	2541
02.10.21	8	0	K.D	7,5	7,0	22,6	2,5	313,903	15	1	15	1	28,13	2541
03.10.21	8	0	K.D	7,5	7,0	22,5	2,5	342,028	15	1	15	1	28,13	2541
04.10.21	8	0	K.D	7,5	7,0	22,8	2,5	370,154	15	1	15	1	28,13	2541
05.10.21	8	0	K.D	7,5	7,0	22,2	2,5	398,279	15	1	15	1	28,13	2541
06.10.21	8	0	K.D	7,5	7,0	22,8	2,5	426,405	15	1	15	1	28,13	2541

07.10.21	8	0	K.D	7,5	7,0	22,7	2,5	454,530	15	1	15	1	28,13	2541
08.10.21	8	0	K.D	7,5	7,0	22,2	2,5	482,655	15	1	15	1	28,13	2541
09.10.21	8	0	K.D	7,5	7,0	22,6	2,5	510,781	15	1	15	1	28,13	2541
10.10.21	8	0	K.D	7,5	7,0	22,7	2,5	538,906	15	1	15	1	28,13	2541
11.10.21	8	0	K.D	7,5	7,0	22,3	2,5	567,032	15	1	15	1	28,13	2541
12.10.21	8	0	K.D	7,5	7,0	22,7	2,5	595,157	15	1	15	1	28,13	2541
13.10.21	8	0	K.D	7,5	7,0	22,4	2,5	623,283	15	1	15	1	28,13	2541
14.10.21	8	0	K.D	7,5	7,0	22,3	2,5	651,408	15	1	15	1	28,13	2541
15.10.21	8	0	K.D	7,5	7,0	22,6	2,5	679,534	15	1	15	1	28,13	2541
16.10.21	8	0	K.D	7,5	7,0	22,4	2,5	707,659	15	1	15	1	28,13	2541
17.10.21	8	0	K.D	7,5	7,0	22,7	2,5	735,785	15	1	15	1	28,13	2541
18.10.21	8	0	K.D	7,5	7,0	22,5	2,5	763,910	15	1	15	1	28,13	2541
19.10.21	8	0	K.D	7,5	7,0	22,3	2,5	792,036	15	1	15	1	28,13	2541
20.10.21	8	0	K.D	7,5	7,0	22,5	2,5	820,161	15	1	15	1	28,13	2541
21.10.21	8	0	K.D	7,5	7,0	22,1	2,5	848,286	15	1	15	1	28,13	2541
22.10.21	8	0	K.D	7,5	7,0	23,0	2,5	876,412	15	1	15	1	28,13	2541
23.10.21	8	0	K.D	7,5	7,0	22,1	2,5	904,537	15	1	15	1	28,13	2541
24.10.21	8	0	K.D	7,5	7,0	22,3	2,5	932,663	15	1	15	1	28,13	2541
25.10.21	8	0	K.D	7,5	7,0	22,8	2,5	960,788	15	1	15	1	28,13	2541

26.10.21	8	0	K.D	7,5	7,0	22,9	2,5	988,914	15	1	15	1	28,13	2541
27.10.21	8	0	K.D	7,5	7,0	22,5	2,5	1017,039	15	1	15	1	28,13	2541
28.10.21	8	0	K.D	7,5	7,0	22,8	2,5	1045,165	15	1	15	1	28,13	2541
29.10.21	8	0	K.D	7,5	7,0	22,6	2,5	1073,290	15	1	15	1	28,13	2541
30.10.21	8	0	K.D	7,5	7,0	22,7	2,5	1101,416	15	1	15	1	28,13	2541
30.10.21	17	0	K.D	7,5	7,0	22,6	2,5	1112,007	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1107,48	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25003 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	7,0	6,5	22,8	2,5	4,520	15	1	15	1	0	0
22.09.21	8	0	K.D	7,0	6,5	22,8	2,5	32,644	15	1	15	1	28,12	2541

23.09.21	8	0	K.D	7,0	6,5	22,7	2,5	60,768	15	1	15	1	28,12	2541
24.09.21	8	0	K.D	7,0	6,5	22,7	2,5	88,893	15	1	15	1	28,12	2541
25.09.21	8	0	K.D	7,0	6,5	22,8	2,5	117,017	15	1	15	1	28,12	2541
26.09.21	8	0	K.D	7,0	6,5	22,6	2,5	145,141	15	1	15	1	28,12	2541
27.09.21	8	0	K.D	7,0	6,5	22,5	2,5	173,265	15	1	15	1	28,12	2541
28.09.21	8	0	K.D	7,0	6,5	22,3	2,5	201,389	15	1	15	1	28,12	2541
29.09.21	8	0	K.D	7,0	6,5	22,5	2,5	229,514	15	1	15	1	28,12	2541
30.09.21	8	0	K.D	7,0	6,5	22,3	2,5	257,638	15	1	15	1	28,12	2541
01.10.21	8	0	K.D	7,0	6,5	22,6	2,5	285,762	15	1	15	1	28,12	2541
02.10.21	8	0	K.D	7,0	6,5	22,6	2,5	313,886	15	1	15	1	28,12	2541
03.10.21	8	0	K.D	7,0	6,5	22,5	2,5	342,010	15	1	15	1	28,12	2541
04.10.21	8	0	K.D	7,0	6,5	22,8	2,5	370,134	15	1	15	1	28,12	2541
05.10.21	8	0	K.D	7,0	6,5	22,2	2,5	398,259	15	1	15	1	28,12	2541
06.10.21	8	0	K.D	7,0	6,5	22,8	2,5	426,383	15	1	15	1	28,12	2541
07.10.21	8	0	K.D	7,0	6,5	22,7	2,5	454,507	15	1	15	1	28,12	2541
08.10.21	8	0	K.D	7,0	6,5	22,2	2,5	482,631	15	1	15	1	28,12	2541
09.10.21	8	0	K.D	7,0	6,5	22,6	2,5	510,755	15	1	15	1	28,12	2541
10.10.21	8	0	K.D	7,0	6,5	22,7	2,5	538,880	15	1	15	1	28,12	2541
11.10.21	8	0	K.D	7,0	6,5	22,3	2,5	567,004	15	1	15	1	28,12	2541

12.10.21	8	0	K.D	7,0	6,5	22,7	2,5	595,128	15	1	15	1	28,12	2541
13.10.21	8	0	K.D	7,0	6,5	22,4	2,5	623,252	15	1	15	1	28,12	2541
14.10.21	8	0	K.D	7,0	6,5	22,3	2,5	651,376	15	1	15	1	28,12	2541
15.10.21	8	0	K.D	7,0	6,5	22,6	2,5	679,501	15	1	15	1	28,12	2541
16.10.21	8	0	K.D	7,0	6,5	22,4	2,5	707,625	15	1	15	1	28,12	2541
17.10.21	8	0	K.D	7,0	6,5	22,7	2,5	735,749	15	1	15	1	28,12	2541
18.10.21	8	0	K.D	7,0	6,5	22,5	2,5	763,873	15	1	15	1	28,12	2541
19.10.21	8	0	K.D	7,0	6,5	22,3	2,5	791,997	15	1	15	1	28,12	2541
20.10.21	8	0	K.D	7,0	6,5	22,5	2,5	820,122	15	1	15	1	28,12	2541
21.10.21	8	0	K.D	7,0	6,5	22,1	2,5	848,246	15	1	15	1	28,12	2541
22.10.21	8	0	K.D	7,0	6,5	23,0	2,5	876,370	15	1	15	1	28,12	2541
23.10.21	8	0	K.D	7,0	6,5	22,1	2,5	904,494	15	1	15	1	28,12	2541
24.10.21	8	0	K.D	7,0	6,5	22,3	2,5	932,618	15	1	15	1	28,12	2541
25.10.21	8	0	K.D	7,0	6,5	22,8	2,5	960,742	15	1	15	1	28,12	2541
26.10.21	8	0	K.D	7,0	6,5	22,9	2,5	988,867	15	1	15	1	28,12	2541
27.10.21	8	0	K.D	7,0	6,5	22,5	2,5	1016,991	15	1	15	1	28,12	2541
28.10.21	8	0	K.D	7,0	6,5	22,8	2,5	1045,115	15	1	15	1	28,12	2541
29.10.21	8	0	K.D	7,0	6,5	22,6	2,5	1073,239	15	1	15	1	28,12	2541
30.10.21	8	0	K.D	7,0	6,5	22,7	2,5	1101,363	15	1	15	1	28,12	2541

30.10.21	17	0	K.D	7,0	6,5	22,6	2,5	1111,958	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1107,44	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25004 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	6,5	6,0	22,8	2,5	4,520	15	1	15	1	0	0
22.09.21	8	0	K.D	6,5	6,0	22,8	2,5	32,643	15	1	15	1	28,12	2541
23.09.21	8	0	K.D	6,5	6,0	22,7	2,5	60,767	15	1	15	1	28,12	2541
24.09.21	8	0	K.D	6,5	6,0	22,7	2,5	88,890	15	1	15	1	28,12	2541
25.09.21	8	0	K.D	6,5	6,0	22,8	2,5	117,014	15	1	15	1	28,12	2541
26.09.21	8	0	K.D	6,5	6,0	22,6	2,5	145,137	15	1	15	1	28,12	2541
27.09.21	8	0	K.D	6,5	6,0	22,5	2,5	173,261	15	1	15	1	28,12	2541

28.09.21	8	0	K.D	6,5	6,0	22,3	2,5	201,384	15	1	15	1	28,12	2541
29.09.21	8	0	K.D	6,5	6,0	22,5	2,5	229,508	15	1	15	1	28,12	2541
30.09.21	8	0	K.D	6,5	6,0	22,3	2,5	257,631	15	1	15	1	28,12	2541
01.10.21	8	0	K.D	6,5	6,0	22,6	2,5	285,755	15	1	15	1	28,12	2541
02.10.21	8	0	K.D	6,5	6,0	22,6	2,5	313,878	15	1	15	1	28,12	2541
03.10.21	8	0	K.D	6,5	6,0	22,5	2,5	342,002	15	1	15	1	28,12	2541
04.10.21	8	0	K.D	6,5	6,0	22,8	2,5	370,125	15	1	15	1	28,12	2541
05.10.21	8	0	K.D	6,5	6,0	22,2	2,5	398,248	15	1	15	1	28,12	2541
06.10.21	8	0	K.D	6,5	6,0	22,8	2,5	426,372	15	1	15	1	28,12	2541
07.10.21	8	0	K.D	6,5	6,0	22,7	2,5	454,495	15	1	15	1	28,12	2541
08.10.21	8	0	K.D	6,5	6,0	22,2	2,5	482,619	15	1	15	1	28,12	2541
09.10.21	8	0	K.D	6,5	6,0	22,6	2,5	510,742	15	1	15	1	28,12	2541
10.10.21	8	0	K.D	6,5	6,0	22,7	2,5	538,866	15	1	15	1	28,12	2541
11.10.21	8	0	K.D	6,5	6,0	22,3	2,5	566,989	15	1	15	1	28,12	2541
12.10.21	8	0	K.D	6,5	6,0	22,7	2,5	595,113	15	1	15	1	28,12	2541
13.10.21	8	0	K.D	6,5	6,0	22,4	2,5	623,236	15	1	15	1	28,12	2541
14.10.21	8	0	K.D	6,5	6,0	22,3	2,5	651,360	15	1	15	1	28,12	2541
15.10.21	8	0	K.D	6,5	6,0	22,6	2,5	679,483	15	1	15	1	28,12	2541
16.10.21	8	0	K.D	6,5	6,0	22,4	2,5	707,607	15	1	15	1	28,12	2541

17.10.21	8	0	K.D	6,5	6,0	22,7	2,5	735,730	15	1	15	1	28,12	2541
18.10.21	8	0	K.D	6,5	6,0	22,5	2,5	763,853	15	1	15	1	28,12	2541
19.10.21	8	0	K.D	6,5	6,0	22,3	2,5	791,977	15	1	15	1	28,12	2541
20.10.21	8	0	K.D	6,5	6,0	22,5	2,5	820,100	15	1	15	1	28,12	2541
21.10.21	8	0	K.D	6,5	6,0	22,1	2,5	848,224	15	1	15	1	28,12	2541
22.10.21	8	0	K.D	6,5	6,0	23,0	2,5	876,347	15	1	15	1	28,12	2541
23.10.21	8	0	K.D	6,5	6,0	22,1	2,5	904,471	15	1	15	1	28,12	2541
24.10.21	8	0	K.D	6,5	6,0	22,3	2,5	932,594	15	1	15	1	28,12	2541
25.10.21	8	0	K.D	6,5	6,0	22,8	2,5	960,718	15	1	15	1	28,12	2541
26.10.21	8	0	K.D	6,5	6,0	22,9	2,5	988,841	15	1	15	1	28,12	2541
27.10.21	8	0	K.D	6,5	6,0	22,5	2,5	1016,965	15	1	15	1	28,12	2541
28.10.21	8	0	K.D	6,5	6,0	22,8	2,5	1045,088	15	1	15	1	28,12	2541
29.10.21	8	0	K.D	6,5	6,0	22,6	2,5	1073,211	15	1	15	1	28,12	2541
30.10.21	8	0	K.D	6,5	6,0	22,7	2,5	1101,335	15	1	15	1	28,12	2541
30.10.21	17	0	K.D	6,5	6,0	22,6	2,5	1111,878	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1107,36	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25005 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	6,0	5,5	22,8	2,5	4,520	15	1	15	1	0	0
22.09.21	8	0	K.D	6,0	5,5	22,8	2,5	32,645	15	1	15	1	28,12	2541
23.09.21	8	0	K.D	6,0	5,5	22,7	2,5	60,770	15	1	15	1	28,12	2541
24.09.21	8	0	K.D	6,0	5,5	22,7	2,5	88,895	15	1	15	1	28,12	2541
25.09.21	8	0	K.D	6,0	5,5	22,8	2,5	117,020	15	1	15	1	28,12	2541
26.09.21	8	0	K.D	6,0	5,5	22,6	2,5	145,144	15	1	15	1	28,12	2541
27.09.21	8	0	K.D	6,0	5,5	22,5	2,5	173,269	15	1	15	1	28,12	2541
28.09.21	8	0	K.D	6,0	5,5	22,3	2,5	201,394	15	1	15	1	28,12	2541
29.09.21	8	0	K.D	6,0	5,5	22,5	2,5	229,519	15	1	15	1	28,12	2541
30.09.21	8	0	K.D	6,0	5,5	22,3	2,5	257,644	15	1	15	1	28,12	2541
01.10.21	8	0	K.D	6,0	5,5	22,6	2,5	285,769	15	1	15	1	28,12	2541
02.10.21	8	0	K.D	6,0	5,5	22,6	2,5	313,894	15	1	15	1	28,12	2541

03.10.21	8	0	K.D	6,0	5,5	22,5	2,5	342,019	15	1	15	1	28,12	2541
04.10.21	8	0	K.D	6,0	5,5	22,8	2,5	370,144	15	1	15	1	28,12	2541
05.10.21	8	0	K.D	6,0	5,5	22,2	2,5	398,268	15	1	15	1	28,12	2541
06.10.21	8	0	K.D	6,0	5,5	22,8	2,5	426,393	15	1	15	1	28,12	2541
07.10.21	8	0	K.D	6,0	5,5	22,7	2,5	454,518	15	1	15	1	28,12	2541
08.10.21	8	0	K.D	6,0	5,5	22,2	2,5	482,643	15	1	15	1	28,12	2541
09.10.21	8	0	K.D	6,0	5,5	22,6	2,5	510,768	15	1	15	1	28,12	2541
10.10.21	8	0	K.D	6,0	5,5	22,7	2,5	538,893	15	1	15	1	28,12	2541
11.10.21	8	0	K.D	6,0	5,5	22,3	2,5	567,018	15	1	15	1	28,12	2541
12.10.21	8	0	K.D	6,0	5,5	22,7	2,5	595,143	15	1	15	1	28,12	2541
13.10.21	8	0	K.D	6,0	5,5	22,4	2,5	623,268	15	1	15	1	28,12	2541
14.10.21	8	0	K.D	6,0	5,5	22,3	2,5	651,392	15	1	15	1	28,12	2541
15.10.21	8	0	K.D	6,0	5,5	22,6	2,5	679,517	15	1	15	1	28,12	2541
16.10.21	8	0	K.D	6,0	5,5	22,4	2,5	707,642	15	1	15	1	28,12	2541
17.10.21	8	0	K.D	6,0	5,5	22,7	2,5	735,767	15	1	15	1	28,12	2541
18.10.21	8	0	K.D	6,0	5,5	22,5	2,5	763,892	15	1	15	1	28,12	2541
19.10.21	8	0	K.D	6,0	5,5	22,3	2,5	792,017	15	1	15	1	28,12	2541
20.10.21	8	0	K.D	6,0	5,5	22,5	2,5	820,142	15	1	15	1	28,12	2541
21.10.21	8	0	K.D	6,0	5,5	22,1	2,5	848,267	15	1	15	1	28,12	2541

22.10.21	8	0	K.D	6,0	5,5	23,0	2,5	876,392	15	1	15	1	28,12	2541
23.10.21	8	0	K.D	6,0	5,5	22,1	2,5	904,516	15	1	15	1	28,12	2541
24.10.21	8	0	K.D	6,0	5,5	22,3	2,5	932,641	15	1	15	1	28,12	2541
25.10.21	8	0	K.D	6,0	5,5	22,8	2,5	960,766	15	1	15	1	28,12	2541
26.10.21	8	0	K.D	6,0	5,5	22,9	2,5	988,891	15	1	15	1	28,12	2541
27.10.21	8	0	K.D	6,0	5,5	22,5	2,5	1017,016	15	1	15	1	28,12	2541
28.10.21	8	0	K.D	6,0	5,5	22,8	2,5	1045,141	15	1	15	1	28,12	2541
29.10.21	8	0	K.D	6,0	5,5	22,6	2,5	1073,266	15	1	15	1	28,12	2541
30.10.21	8	0	K.D	6,0	5,5	22,7	2,5	1101,391	15	1	15	1	28,12	2541
30.10.21	17	0	K.D	6,0	5,5	22,6	2,5	1111,933	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1107,41	100024
Teoratical total	1111,11	100000

Application No:

Model: TK-25

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative humidity:	48%	48%	%

Date:	01.11.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:00	13:00	

Meter serial No.:	TK-25001	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1113,26265	1113,36220	0,09955	0,10040	-0,84	2,5	-0,41	1,5
3,125	6	22,5	1113,36220	1113,46299	0,10079	0,10156	-0,76	2,5	-0,33	1,5
2,5	6	22,5	1113,46299	1113,56315	0,10017	0,10052	-0,35	2,5	-0,21	1,5
2,5	6	22,5	1113,56315	1113,66363	0,10047	0,10093	-0,45	2,5	-0,31	1,5

2,5	6	22,5	1113,66363	1113,76436	0,10074	0,10110	-0,36	2,5	-0,22	1,5
1,778	6	22,5	1113,76436	1113,84439	0,08002	0,08019	-0,21	2,5	-0,35	1,5
1,778	6	22,5	1113,84439	1113,92438	0,08000	0,08020	-0,25	2,5	-0,39	1,5
0,889	6	22,5	1113,92438	1113,98515	0,06076	0,06037	0,65	2,5	-0,40	1,5
0,889	6	22,5	1113,98515	1114,04599	0,06084	0,06049	0,58	2,5	-0,47	1,5
0,04	6	22,5	1114,04599	1114,05645	0,01046	0,01048	-0,17	2,5	-0,28	1,5
0,04	6	22,5	1114,05645	1114,06692	0,01047	0,01049	-0,25	2,5	-0,36	1,5
0,04	6	22,5	1114,06692	1114,07762	0,01070	0,01071	-0,15	2,5	-0,26	1,5
0,025	6	22,5	1114,07762	1114,08466	0,00704	0,00720	-2,14	6	-0,78	3
0,025	6	22,5	1114,08466	1114,09185	0,00719	0,00736	-2,32	6	-0,96	3
0,025	6	22,5	1114,09185	1114,09884	0,00699	0,00715	-2,17	6	-0,81	3

Meter serial No.: TK-25002 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1113,68185	1113,78090	0,09905	0,10040	-1,34	2,5	-0,38	1,5
3,125	6	22,5	1113,78090	1113,88103	0,10013	0,10156	-1,41	2,5	-0,45	1,5
2,5	6	22,5	1113,88103	1113,98043	0,09940	0,10052	-1,11	2,5	-0,22	1,5
2,5	6	22,5	1113,98043	1114,08030	0,09987	0,10093	-1,05	2,5	-0,16	1,5
2,5	6	22,5	1114,08030	1114,18016	0,09987	0,10110	-1,22	2,5	-0,33	1,5
1,778	6	22,5	1114,18016	1114,25975	0,07959	0,08019	-0,75	2,5	-0,41	1,5
1,778	6	22,5	1114,25975	1114,33942	0,07967	0,08020	-0,66	2,5	-0,32	1,5
0,889	6	22,5	1114,33942	1114,39972	0,06030	0,06037	-0,11	2,5	-0,53	1,5
0,889	6	22,5	1114,39972	1114,46019	0,06046	0,06049	-0,05	2,5	-0,47	1,5

0,04	6	22,5	1114,46019	1114,47076	0,01057	0,01048	0,84	2,5	-0,43	1,5
0,04	6	22,5	1114,47076	1114,48133	0,01058	0,01049	0,79	2,5	-0,48	1,5
0,04	6	22,5	1114,48133	1114,49214	0,01080	0,01071	0,86	2,5	-0,41	1,5

0,025	6	22,5	1114,49214	1114,49918	0,00705	0,00720	-2,08	6	-0,82	3
0,025	6	22,5	1114,49918	1114,50637	0,00719	0,00736	-2,36	6	-1,10	3
0,025	6	22,5	1114,50637	1114,51336	0,00699	0,00715	-2,14	6	-0,88	3

Meter serial No.: TK-25003 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1113,35463	1113,45353	0,09890	0,10040	-1,49	2,5	-0,42	1,5

3,125	6	22,5	1113,45353	1113,55355	0,10002	0,10156	-1,51	2,5	-0,44	1,5
2,5	6	22,5	1113,55355	1113,65308	0,09952	0,10052	-0,99	2,5	-0,40	1,5
2,5	6	22,5	1113,65308	1113,75307	0,09999	0,10093	-0,93	2,5	-0,34	1,5
2,5	6	22,5	1113,75307	1113,85312	0,10005	0,10110	-1,04	2,5	-0,45	1,5
1,778	6	22,5	1113,85312	1113,93290	0,07978	0,08019	-0,51	2,5	-0,50	1,5
1,778	6	22,5	1113,93290	1114,01275	0,07985	0,08020	-0,43	2,5	-0,42	1,5
0,889	6	22,5	1114,01275	1114,07325	0,06050	0,06037	0,21	2,5	-0,55	1,5
0,889	6	22,5	1114,07325	1114,13395	0,06070	0,06049	0,35	2,5	-0,41	1,5
0,04	6	22,5	1114,13395	1114,14450	0,01055	0,01048	0,63	2,5	-0,44	1,5
0,04	6	22,5	1114,14450	1114,15505	0,01055	0,01049	0,57	2,5	-0,50	1,5
0,04	6	22,5	1114,15505	1114,16583	0,01078	0,01071	0,59	2,5	-0,48	1,5
0,025	6	22,5	1114,16583	1114,17285	0,00703	0,00720	-2,36	6	-0,64	3
0,025	6	22,5	1114,17285	1114,18003	0,00718	0,00736	-2,46	6	-0,74	3
0,025	6	22,5	1114,18003	1114,18699	0,00696	0,00715	-2,65	6	-0,93	3

Meter serial No.: TK-25004 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1113,22840	1113,32696	0,09856	0,10040	-1,83	2,5	-0,31	1,5
3,125	6	22,5	1113,32696	1113,42670	0,09974	0,10156	-1,79	2,5	-0,27	1,5
2,5	6	22,5	1113,42670	1113,52607	0,09937	0,10052	-1,14	2,5	-0,41	1,5
2,5	6	22,5	1113,52607	1113,62578	0,09971	0,10093	-1,21	2,5	-0,48	1,5
2,5	6	22,5	1113,62578	1113,72577	0,09999	0,10110	-1,10	2,5	-0,37	1,5
1,778	6	22,5	1113,72577	1113,80585	0,08008	0,08019	-0,14	2,5	-0,43	1,5
1,778	6	22,5	1113,80585	1113,88583	0,07999	0,08020	-0,26	2,5	-0,55	1,5

0,889	6	22,5	1113,88583	1113,94647	0,06064	0,06037	0,45	2,5	-0,48	1,5
0,889	6	22,5	1113,94647	1114,00728	0,06080	0,06049	0,51	2,5	-0,42	1,5

0,04	6	22,5	1114,00728	1114,01780	0,01053	0,01048	0,43	2,5	-0,38	1,5
0,04	6	22,5	1114,01780	1114,02834	0,01054	0,01049	0,45	2,5	-0,36	1,5
0,04	6	22,5	1114,02834	1114,03912	0,01078	0,01071	0,62	2,5	-0,19	1,5

0,025	6	22,5	1114,03912	1114,04615	0,00703	0,00720	-2,36	6	-0,50	3
0,025	6	22,5	1114,04615	1114,05332	0,00717	0,00736	-2,63	6	-0,77	3
0,025	6	22,5	1114,05332	1114,06028	0,00696	0,00715	-2,52	6	-0,66	3

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Meter serial No.: TK-25005 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1113,36946	1113,46799	0,09853	0,10040	-1,86	2,5	-0,41	1,5
3,125	6	22,5	1113,46799	1113,56788	0,09989	0,10156	-1,64	2,5	-0,19	1,5
2,5	6	22,5	1113,56788	1113,66706	0,09918	0,10052	-1,33	2,5	-0,34	1,5
2,5	6	22,5	1113,66706	1113,76647	0,09940	0,10093	-1,51	2,5	-0,52	1,5
2,5	6	22,5	1113,76647	1113,86606	0,09959	0,10110	-1,49	2,5	-0,50	1,5
1,778	6	22,5	1113,86606	1113,94634	0,08028	0,08019	0,11	2,5	0,64	1,5
1,778	6	22,5	1113,94634	1114,02658	0,08024	0,08020	0,05	2,5	0,58	1,5
0,889	6	22,5	1114,02658	1114,08682	0,06024	0,06037	-0,21	2,5	-0,51	1,5
0,889	6	22,5	1114,08682	1114,14723	0,06041	0,06049	-0,14	2,5	-0,44	1,5
0,04	6	22,5	1114,14723	1114,15773	0,01051	0,01048	0,23	2,5	-0,38	1,5
0,04	6	22,5	1114,15773	1114,16824	0,01051	0,01049	0,14	2,5	-0,47	1,5
0,04	6	22,5	1114,16824	1114,17896	0,01072	0,01071	0,08	2,5	-0,53	1,5

0,025	6	22,5	1114,17896	1114,18600	0,00704	0,00720	-2,14	6	-0,70	3
0,025	6	22,5	1114,18600	1114,19322	0,00722	0,00736	-1,99	6	-0,55	3
0,025	6	22,5	1114,19322	1114,20023	0,00701	0,00715	-1,92	6	-0,48	3

3.3.5.5.2 Continuous Flow Tests "OIML R-49:2013: 7.11.3 \| EN ISO 4064-2: 2018 7.11.3"

Meter Serial No: TK-25001

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
02.11.2021	08:00	K.D	5	4,4	22,8	3,125	1114,099	0	0
03.11.2021	08:00	K.D	5	4,4	22,9	3,125	1188,537	74,438	24
04.11.2021	08:00	K.D	5	4,4	22,7	3,125	1262,949	148,850	48
05.11.2021	08:00	K.D	5	4,4	22,8	3,125	1337,316	223,217	72
06.11.2021	12:00	K.D	5	4,4	22,9	3,125	1423,956	309,857	100
				Total at end of test				309,857	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25002

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
02.11.2021	08:00	K.D	4,4	3,8	22,8	3,125	1114,513	0	0
03.11.2021	08:00	K.D	4,4	3,8	22,9	3,125	1188,525	74,011	24
04.11.2021	08:00	K.D	4,4	3,8	22,7	3,125	1262,759	148,246	48
05.11.2021	08:00	K.D	4,4	3,8	22,8	3,125	1336,797	222,283	72
06.11.2021	12:00	K.D	4,4	3,8	22,9	3,125	1423,378	308,865	100
				Total at end of test				308,865	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25003

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run

			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
02.11.2021	08:00	K.D	3,8	3,2	22,8	3,125	1114,187	0,000	0
03.11.2021	08:00	K.D	3,8	3,2	22,9	3,125	1188,457	74,270	24
04.11.2021	08:00	K.D	3,8	3,2	22,7	3,125	1262,531	148,344	48
05.11.2021	08:00	K.D	3,8	3,2	22,8	3,125	1336,204	222,017	72
06.11.2021	12:00	K.D	3,8	3,2	22,9	3,125	1422,942	308,755	100
				Total at end of test				308,755	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25004

Date	Time	Observer	Up stream Pressure	Downstream Pressure	Upstream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
02.11.2021	08:00	K.D	3,2	2,6	22,8	3,125	1114,060	0,000	0
03.11.2021	08:00	K.D	3,2	2,6	22,9	3,125	1188,323	74,263	24
04.11.2021	08:00	K.D	3,2	2,6	22,7	3,125	1262,599	148,538	48

05.11.2021	08:00	K.D	3,2	2,6	22,8	3,125	1336,821	222,761	72
06.11.2021	12:00	K.D	3,2	2,6	22,9	3,125	1423,372	309,312	100
				Total at end of test				309,312	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25005

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m^3/h	m^3	m^3	h
02.11.2021	08:00	K.D	2,6	2,0	22,8	3,125	1114,060	0,000	0
03.11.2021	08:00	K.D	2,6	2,0	22,9	3,125	1188,537	74,477	24
04.11.2021	08:00	K.D	2,6	2,0	22,7	3,125	1262,903	148,843	48
05.11.2021	08:00	K.D	2,6	2,0	22,8	3,125	1336,977	222,917	72
06.11.2021	12:00	K.D	2,6	2,0	22,9	3,125	1423,309	309,249	100
				Total at end of test				309,249	100
				Minimum volume discharged				312,5	

Comments: Water meter is connected on Horizontal Position

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	48%	48%	%
Date:	06.11.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	13:00	18:00	

Meter serial No.:	TK-25001	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A)	%

									%	
3,125	6	22,5	1426,23158	1426,33058	0,09900	0,10032	-1,32	2,5	-0,89	1,5
3,125	6	22,5	1426,33058	1426,42955	0,09898	0,10023	-1,25	2,5	-0,82	1,5
2,5	6	22,5	1426,42955	1426,52966	0,10011	0,10107	-0,95	2,5	-0,81	1,5
2,5	6	22,5	1426,52966	1426,62935	0,09969	0,10056	-0,87	2,5	-0,73	1,5
2,5	6	22,5	1426,62935	1426,72866	0,09931	0,10017	-0,86	2,5	-0,72	1,5
1,778	6	22,5	1426,72866	1426,80873	0,08007	0,08063	-0,69	2,5	-0,83	1,5
1,778	6	22,5	1426,80873	1426,88827	0,07954	0,08014	-0,75	2,5	-0,89	1,5
0,889	6	22,5	1426,88827	1426,94854	0,06027	0,06013	0,24	2,5	-0,81	1,5
0,889	6	22,5	1426,94854	1427,00898	0,06043	0,06035	0,14	2,5	-0,91	1,5
0,04	6	22,5	1427,00898	1427,01906	0,01008	0,01016	-0,76	2,5	-0,87	1,5
0,04	6	22,5	1427,01906	1427,02904	0,00998	0,01005	-0,72	2,5	-0,83	1,5
0,04	6	22,5	1427,02904	1427,03902	0,00998	0,01005	-0,69	2,5	-0,80	1,5
0,025	6	22,5	1427,03902	1427,04587	0,00685	0,00704	-2,74	6	-1,38	3

0,025	6	22,5	1427,04587	1427,05269	0,00682	0,00701	-2,69	6	-1,33	3
0,025	6	22,5	1427,05269	1427,05950	0,00681	0,00702	-3,02	6	-1,66	3

Meter serial No.: TK-25002 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1426,98264	1427,08119	0,09855	0,10032	-1,76	2,5	-0,80	1,5
3,125	6	22,5	1427,08119	1427,17959	0,09840	0,10023	-1,83	2,5	-0,87	1,5
2,5	6	22,5	1427,17959	1427,27912	0,09953	0,10107	-1,52	2,5	-0,63	1,5
2,5	6	22,5	1427,27912	1427,37798	0,09886	0,10056	-1,69	2,5	-0,80	1,5
2,5	6	22,5	1427,37798	1427,47668	0,09870	0,10017	-1,47	2,5	-0,58	1,5

1,778	6	22,5	1427,47668	1427,55642	0,07974	0,08063	-1,11	2,5	-0,77	1,5
1,778	6	22,5	1427,55642	1427,63572	0,07930	0,08014	-1,05	2,5	-0,71	1,5
0,889	6	22,5	1427,63572	1427,69565	0,05994	0,06013	-0,32	2,5	-0,74	1,5
0,889	6	22,5	1427,69565	1427,75576	0,06010	0,06035	-0,41	2,5	-0,83	1,5
0,04	6	22,5	1427,75576	1427,76596	0,01020	0,01016	0,41	2,5	-0,86	1,5
0,04	6	22,5	1427,76596	1427,77607	0,01011	0,01005	0,62	2,5	-0,65	1,5
0,04	6	22,5	1427,77607	1427,78618	0,01011	0,01005	0,56	2,5	-0,71	1,5
0,025	6	22,5	1427,78618	1427,79303	0,00685	0,00704	-2,65	6	-1,39	3
0,025	6	22,5	1427,79303	1427,79987	0,00684	0,00701	-2,43	6	-1,17	3
0,025	6	22,5	1427,79987	1427,80668	0,00682	0,00702	-2,91	6	-1,65	3

Meter serial No.: TK-25003 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1426,62643	1426,72515	0,09872	0,10032	-1,59	2,5	-0,52	1,5
3,125	6	22,5	1426,72515	1426,82365	0,09850	0,10023	-1,73	2,5	-0,66	1,5
2,5	6	22,5	1426,82365	1426,92349	0,09984	0,10107	-1,22	2,5	-0,63	1,5
2,5	6	22,5	1426,92349	1427,02261	0,09912	0,10056	-1,43	2,5	-0,84	1,5
2,5	6	22,5	1427,02261	1427,12143	0,09882	0,10017	-1,35	2,5	-0,76	1,5
1,778	6	22,5	1427,12143	1427,20147	0,08004	0,08063	-0,73	2,5	-0,72	1,5
1,778	6	22,5	1427,20147	1427,28094	0,07947	0,08014	-0,83	2,5	-0,82	1,5
0,889	6	22,5	1427,28094	1427,34103	0,06009	0,06013	-0,07	2,5	-0,83	1,5
0,889	6	22,5	1427,34103	1427,40133	0,06030	0,06035	-0,08	2,5	-0,84	1,5

0,04	6	22,5	1427,40133	1427,41151	0,01018	0,01016	0,21	2,5	-0,86	1,5
0,04	6	22,5	1427,41151	1427,42158	0,01007	0,01005	0,18	2,5	-0,89	1,5
0,04	6	22,5	1427,42158	1427,43167	0,01008	0,01005	0,32	2,5	-0,75	1,5

0,025	6	22,5	1427,43167	1427,43852	0,00685	0,00704	-2,69	6	-0,97	3
0,025	6	22,5	1427,43852	1427,44535	0,00683	0,00701	-2,52	6	-0,80	3
0,025	6	22,5	1427,44535	1427,45216	0,00681	0,00702	-2,94	6	-1,22	3

Meter serial No.: TK-25004 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1426,91353	1427,01160	0,09807	0,10032	-2,24	2,5	-0,72	1,5

3,125	6	22,5	1427,01160	1427,10969	0,09809	0,10023	-2,14	2,5	-0,62	1,5
2,5	6	22,5	1427,10969	1427,20911	0,09942	0,10107	-1,63	2,5	-0,90	1,5
2,5	6	22,5	1427,20911	1427,30808	0,09897	0,10056	-1,58	2,5	-0,85	1,5
2,5	6	22,5	1427,30808	1427,40670	0,09862	0,10017	-1,55	2,5	-0,82	1,5
1,778	6	22,5	1427,40670	1427,48687	0,08017	0,08063	-0,57	2,5	-0,86	1,5
1,778	6	22,5	1427,48687	1427,56658	0,07972	0,08014	-0,53	2,5	-0,82	1,5
0,889	6	22,5	1427,56658	1427,62676	0,06017	0,06013	0,07	2,5	-0,86	1,5
0,889	6	22,5	1427,62676	1427,68719	0,06043	0,06035	0,14	2,5	-0,79	1,5
0,04	6	22,5	1427,68719	1427,69736	0,01017	0,01016	0,05	2,5	-0,76	1,5
0,04	6	22,5	1427,69736	1427,70742	0,01006	0,01005	0,09	2,5	-0,72	1,5
0,04	6	22,5	1427,70742	1427,71746	0,01005	0,01005	-0,04	2,5	-0,85	1,5
0,025	6	22,5	1427,71746	1427,72427	0,00681	0,00704	-3,26	6	-1,40	3
0,025	6	22,5	1427,72427	1427,73106	0,00679	0,00701	-3,14	6	-1,28	3
0,025	6	22,5	1427,73106	1427,73787	0,00680	0,00702	-3,08	6	-1,22	3

Meter serial No.: TK-25005 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1426,85543	1426,95360	0,09817	0,10032	-2,14	2,5	-0,69	1,5
3,125	6	22,5	1426,95360	1427,05160	0,09799	0,10023	-2,23	2,5	-0,78	1,5
2,5	6	22,5	1427,05160	1427,15082	0,09922	0,10107	-1,83	2,5	-0,84	1,5
2,5	6	22,5	1427,15082	1427,24964	0,09882	0,10056	-1,73	2,5	-0,74	1,5
2,5	6	22,5	1427,24964	1427,34802	0,09838	0,10017	-1,79	2,5	-0,80	1,5
1,778	6	22,5	1427,34802	1427,42752	0,07951	0,08063	-1,39	2,5	-0,86	1,5
1,778	6	22,5	1427,42752	1427,50659	0,07907	0,08014	-1,34	2,5	-0,81	1,5

0,889	6	22,5	1427,50659	1427,56641	0,05982	0,06013	-0,52	2,5	-0,82	1,5
0,889	6	22,5	1427,56641	1427,62647	0,06007	0,06035	-0,47	2,5	-0,77	1,5

0,04	6	22,5	1427,62647	1427,63661	0,01014	0,01016	-0,21	2,5	-0,82	1,5
0,04	6	22,5	1427,63661	1427,64665	0,01004	0,01005	-0,14	2,5	-0,75	1,5
0,04	6	22,5	1427,64665	1427,65667	0,01002	0,01005	-0,33	2,5	-0,94	1,5

0,025	6	22,5	1427,65667	1427,66349	0,00683	0,00704	-3,05	6	-1,61	3
0,025	6	22,5	1427,66349	1427,67028	0,00678	0,00701	-3,22	6	-1,78	3
0,025	6	22,5	1427,67028	1427,67708	0,00680	0,00702	-3,14	6	-1,70	3

3.3.6 Applied Tests To The 100% Recycled Plastic Material

3.3.6.1 Static Pressure Test "OIML R49-2 7.3| EN ISO 4064-2 7.3"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model	TK-25	Ambient relative humidity:	49%	49%	%
Date:	18.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	09:00	09:17	

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25006	25,6	09:00	26	09:01	0	FAILED
TK-25007	25,6	09:00	26	09:01	0	FAILED
TK-25008	25,6	09:00	26	09:01	0	FAILED
TK-25009	25,6	09:00	26	09:01	0	FAILED
TK-25010	25,6	09:00	26	09:01	0	FAILED

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25006	32	-	-	-	-	-
TK-25007	32	-	-	-	-	-
TK-25008	32	-	-	-	-	-
TK-25009	32	-	-	-	-	-
TK-25010	32	-	-	-	-	-

3.3.7 Applied Tests To The 50% Recycled Plastic Material

3.3.7.1 Static Pressure Test "OIML R49-2 7.3| EN ISO 4064-2 7.3"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model	TK-25	Ambient relative humidity:	49%	49%	%
Date:	18.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	10:00	10:17	

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25011	25,6	10:00	26	10:15	26	PASSED
TK-25012	25,6	10:00	26	10:15	26	PASSED
TK-25013	25,6	10:00	26	10:15	26	PASSED
TK-25014	25,6	10:00	26	10:15	26	PASSED
TK-25015	25,6	10:00	26	10:15	26	PASSED

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25011	32	10:16	32	10:17	10	**FAILED**

TK-25012	32	10:16	32	10:17	32	PASSED
TK-25013	32	10:16	32	10:17	32	PASSED
TK-25014	32	10:16	32	10:17	10	**FAILED**
TK-25015	32	10:16	32	10:17	32	PASSED

3.3.8 Applied Tests To The 30% Recycled Plastic Material

3.3.8.1 Static Pressure Test "OIML R49-2 7.3| EN ISO 4064-2 7.3"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model	TK-25	Ambient relative humidity:	49%	49%	%
Date:	19.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	08:00	08:17	

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25016	25,6	08:00	26	08:15	26	PASSED
TK-25017	25,6	08:00	26	08:15	26	PASSED
TK-25018	25,6	08:00	26	08:15	26	PASSED

TK-25019	25,6	08:00	26	08:15	26	PASSED
TK-25020	25,6	08:00	26	08:15	26	PASSED

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25016	32	08:16	32	08:17	32	PASSED
TK-25017	32	08:16	32	08:17	32	PASSED
TK-25018	32	08:16	32	08:17	32	PASSED
TK-25019	32	08:16	32	08:17	32	PASSED
TK-25020	32	08:16	32	08:17	32	PASSED

3.3.8.2 Error (of indication) Test "OIML R49-2 7.4 | EN ISO 4064-2 7.4"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	49%	49%	%
Date:	19.09.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:30	14:00	

Meter serial No.: TK-25016 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	22	0,20735	0,30806	0,10071	0,10158	-0,86	2
3,125	6	22	0,30806	0,40896	0,10091	0,10165	-0,73	2
2,5	6	22	0,40896	0,48883	0,07987	0,08014	-0,34	2
2,5	6	22	0,48883	0,56968	0,08085	0,08099	-0,17	2
2,5	6	22	0,56968	0,64998	0,08029	0,08047	-0,22	2
1,778	6	22	0,64998	0,71025	0,06028	0,06018	0,16	2
1,778	6	22	0,71025	0,77088	0,06062	0,06049	0,22	2
0,889	6	22	0,77088	0,81127	0,04040	0,04014	0,64	2
0,889	6	22	0,81127	0,85202	0,04075	0,04045	0,73	2

0,04	6	22	0,85202	0,86220	0,01018	0,01006	1,21	2
0,04	6	22	0,86220	0,87235	0,01015	0,01005	1,05	2
0,04	6	22	0,87235	0,88249	0,01014	0,01002	1,19	2

0,025	6	22	0,88249	0,88952	0,00703	0,00712	-1,22	5
0,025	6	22	0,88952	0,89658	0,00706	0,00714	-1,02	5
0,025	6	22	0,89658	0,90372	0,00714	0,00721	-0,96	5

Meter serial No.: TK-25017 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	22	0,21064	0,31159	0,10095	0,10158	-0,62	2
3,125	6	22	0,31159	0,41244	0,10085	0,10165	-0,79	2

2,5	6	22	0,41244	0,49244	0,08000	0,08014	-0,17	2
2,5	6	22	0,49244	0,57317	0,08073	0,08099	-0,32	2

2,5	6	22	0,57317	0,65342	0,08024	0,08047	-0,28	2
1,778	6	22	0,65342	0,71379	0,06037	0,06018	0,32	2
1,778	6	22	0,71379	0,77441	0,06062	0,06049	0,21	2
0,889	6	22	0,77441	0,81481	0,04040	0,04014	0,65	2
0,889	6	22	0,81481	0,85555	0,04075	0,04045	0,73	2
0,04	6	22	0,85555	0,86572	0,01017	0,01006	1,11	2
0,04	6	22	0,86572	0,87588	0,01015	0,01005	1,08	2
0,04	6	22	0,87588	0,88599	0,01012	0,01002	0,93	2
0,025	6	22	0,88599	0,89299	0,00700	0,00712	-1,63	5
0,025	6	22	0,89299	0,90004	0,00704	0,00714	-1,28	5
0,025	6	22	0,90004	0,90715	0,00711	0,00721	-1,37	5

Meter serial No.: TK-25018 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actualflowrate Q( ) m³/h	Initial supplypressure MPa (bar)	Water temp. Tw °C	Initialreading Vi(i) m³	Finalreading Vi(f) m³	Indicatedvolume Vi m³	Actualvolume Va m³	Meter error *E*m %	MPE % %
3,125	6	22	0,20738	0,30842	0,10104	0,10158	-0,53	2
3,125	6	22	0,30842	0,40957	0,10115	0,10165	-0,49	2
2,5	6	22	0,40957	0,48963	0,08005	0,08014	-0,11	2
2,5	6	22	0,48963	0,57055	0,08093	0,08099	-0,08	2
2,5	6	22	0,57055	0,65084	0,08028	0,08047	-0,23	2
1,778	6	22	0,65084	0,71121	0,06037	0,06018	0,32	2
1,778	6	22	0,71121	0,77196	0,06075	0,06049	0,43	2
0,889	6	22	0,77196	0,81240	0,04045	0,04014	0,76	2
0,889	6	22	0,81240	0,85323	0,04083	0,04045	0,94	2
0,04	6	22	0,85323	0,86341	0,01018	0,01006	1,22	2
0,04	6	22	0,86341	0,87359	0,01018	0,01005	1,31	2
0,04	6	22	0,87359	0,88376	0,01017	0,01002	1,41	2

0,025	6	22	0,88376	0,89080	0,00705	0,00712	-0,94	5
0,025	6	22	0,89080	0,89788	0,00707	0,00714	-0,87	5
0,025	6	22	0,89788	0,90503	0,00715	0,00721	-0,83	5

Meter serial No.: TK-25019 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	22	0,21143	0,31231	0,10088	0,10158	-0,69	2
3,125	6	22	0,31231	0,41324	0,10093	0,10165	-0,71	2
2,5	6	22	0,41324	0,49321	0,07997	0,08014	-0,21	2
2,5	6	22	0,49321	0,57409	0,08088	0,08099	-0,14	2
2,5	6	22	0,57409	0,65430	0,08021	0,08047	-0,32	2
1,778	6	22	0,65430	0,71467	0,06037	0,06018	0,32	2

1,778	6	22	0,71467	0,77525	0,06057	0,06049	0,14	2
0,889	6	22	0,77525	0,81568	0,04043	0,04014	0,73	2
0,889	6	22	0,81568	0,85646	0,04078	0,04045	0,82	2
0,04	6	22	0,85646	0,86663	0,01017	0,01006	1,07	2
0,04	6	22	0,86663	0,87679	0,01017	0,01005	1,22	2
0,04	6	22	0,87679	0,88695	0,01016	0,01002	1,31	2
0,025	6	22	0,88695	0,89400	0,00706	0,00712	-0,83	5
0,025	6	22	0,89400	0,90107	0,00706	0,00714	-1,04	5
0,025	6	22	0,90107	0,90821	0,00714	0,00721	-0,96	5

Meter serial No.: TK-25020 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
Q( )		Tw	Vi(i)	Vi(f)	Vi	Va	*E*m	
m³/h	MPa (bar)	°C	m³	m³	m³	m³	%	%

3,125	6	22	0,23218	0,33312	0,10094	0,10158	-0,63	2
3,125	6	22	0,33312	0,43394	0,10082	0,10165	-0,82	2
2,5	6	22	0,43394	0,51396	0,08003	0,08014	-0,14	2
2,5	6	22	0,51396	0,59475	0,08079	0,08099	-0,25	2
2,5	6	22	0,59475	0,67497	0,08022	0,08047	-0,31	2
1,778	6	22	0,67497	0,73530	0,06032	0,06018	0,24	2
1,778	6	22	0,73530	0,79601	0,06071	0,06049	0,37	2
0,889	6	22	0,79601	0,83649	0,04048	0,04014	0,84	2
0,889	6	22	0,83649	0,87723	0,04075	0,04045	0,73	2
0,04	6	22	0,87723	0,88741	0,01018	0,01006	1,22	2
0,04	6	22	0,88741	0,89759	0,01018	0,01005	1,34	2
0,04	6	22	0,89759	0,90774	0,01014	0,01002	1,18	2
0,025	6	22	0,90774	0,91480	0,00707	0,00712	-0,69	5
0,025	6	22	0,91480	0,92186	0,00706	0,00714	-1,02	5
0,025	6	22	0,92186	0,92901	0,00715	0,00721	-0,86	5

3.3.8.3 Water Temperature and Overload Water Temperature Tests "OIML R49-2 7.5 and 7.6 | EN ISO 4064-2 7.5 and 7.6"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	49%	49%	%
Date:	19.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	14:30	17:30	

Meter serial No.: TK-25016 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%

10 °C	0,04	0,042	3,5	10,2	1,12043	1,13112	0,01069	0,01051	1,72	2
MAT	0,04	0,042	3,5	49,8	1,20326	1,21378	0,01052	0,01042	0,97	2
Reference	0,04	0,042	3,5	20,9	3,20654	3,21675	0,01021	0,01009	1,23	2

Meter serial No.: TK-25017 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,11019	1,12087	0,01068	0,01051	1,62	2
MAT	0,04	0,042	3,5	49,8	1,20135	1,21186	0,01051	0,01042	0,89	2
Reference	0,04	0,042	3,5	20,9	3,23135	3,24158	0,01023	0,01009	1,35	2

Meter serial No.: TK-25018 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,11783	1,12851	0,01068	0,01051	1,57	2
MAT	0,04	0,042	3,5	49,8	1,20564	1,21613	0,01049	0,01042	0,69	2
Reference	0,04	0,042	3,5	20,9	3,22325	3,23346	0,01021	0,01009	1,15	2

Meter serial No.: TK-25019 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,18613	1,19682	0,01069	0,01051	1,73	2

MAT	0,04	0,042	3,5	49,8	1,21355	1,22406	0,01051	0,01042	0,89	2
Reference	0,04	0,042	3,5	20,9	3,23143	3,24165	0,01022	0,01009	1,32	2

Meter serial No.: TK-25020 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,15353	1,16421	0,01068	0,01051	1,57	2
MAT	0,04	0,042	3,5	49,8	1,19356	1,20407	0,01051	0,01042	0,82	2
Reference	0,04	0,042	3,5	20,9	3,20373	3,21394	0,01021	0,01009	1,14	2

3.3.8.4 Water Pressure Test"OIML R49-2 7.7 | EN ISO 4064-2 7.7"

Application No: Ambient Temperature:

At Start	At End
23	23

°C

Model:	TK-25	Ambient relative humidity:	45%	45%	%
Date:	20.09.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	08:00	09:30	

Meter serial No.: TK-25016 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,40135	3,41145	0,01010	0,01009	0,14	2
MAP	0,04	0,042	15,8	22,1	3,42034	3,43056	0,01022	0,01012	0,96	2

Meter serial No.: TK-25017 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,39356	3,40368	0,01012	0,01009	0,32	2
MAP	0,04	0,042	15,8	22,1	3,42394	3,43418	0,01024	0,01012	1,15	2

Meter serial No.: TK-25018 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,38463	3,39474	0,01011	0,01009	0,22	2
MAP	0,04	0,042	15,8	22,1	3,43014	3,44036	0,01022	0,01012	0,97	2

Meter serial No.: TK-25019 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,39135	3,40148	0,01013	0,01009	0,39	2
MAP	0,04	0,042	15,8	22,1	3,43264	3,44287	0,01023	0,01012	1,10	2

Meter serial No.: TK-25020 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,39326	3,40337	0,01011	0,01009	0,21	2
MAP	0,04	0,042	15,8	22,1	3,42101	3,43124	0,01023	0,01012	1,08	2

3.3.8.5 Endurance Tests "OIML R-49:2013: 7.11 \| EN ISO 4064-2: 2018 7.11"

3.3.8.5.1 Discontinuous Flow Tests "OIML R-49:2013: 7.11.2 \| EN ISO 4064-2: 2018 7.11.2"

Meter Serial No.: TK-25016 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	5,5	5,0	22,8	2,5	3,431	15	1	15	1	0	0
22.09.21	8	0	K.D	5,5	5,0	22,8	2,5	31,444	15	1	15	1	28,01	2541
23.09.21	8	0	K.D	5,5	5,0	22,7	2,5	59,458	15	1	15	1	28,01	2541
24.09.21	8	0	K.D	5,5	5,0	22,7	2,5	87,471	15	1	15	1	28,01	2541
25.09.21	8	0	K.D	5,5	5,0	22,8	2,5	115,485	15	1	15	1	28,01	2541
26.09.21	8	0	K.D	5,5	5,0	22,6	2,5	143,498	15	1	15	1	28,01	2541

27.09.21	8	0	K.D	5,5	5,0	22,5	2,5	171,512	15	1	15	1	28,01	2541
28.09.21	8	0	K.D	5,5	5,0	22,3	2,5	199,526	15	1	15	1	28,01	2541
29.09.21	8	0	K.D	5,5	5,0	22,5	2,5	227,539	15	1	15	1	28,01	2541
30.09.21	8	0	K.D	5,5	5,0	22,3	2,5	255,553	15	1	15	1	28,01	2541
01.10.21	8	0	K.D	5,5	5,0	22,6	2,5	283,566	15	1	15	1	28,01	2541
02.10.21	8	0	K.D	5,5	5,0	22,6	2,5	311,580	15	1	15	1	28,01	2541
03.10.21	8	0	K.D	5,5	5,0	22,5	2,5	339,594	15	1	15	1	28,01	2541
04.10.21	8	0	K.D	5,5	5,0	22,8	2,5	367,607	15	1	15	1	28,01	2541
05.10.21	8	0	K.D	5,5	5,0	22,2	2,5	395,621	15	1	15	1	28,01	2541
06.10.21	8	0	K.D	5,5	5,0	22,8	2,5	423,634	15	1	15	1	28,01	2541
07.10.21	8	0	K.D	5,5	5,0	22,7	2,5	451,648	15	1	15	1	28,01	2541
08.10.21	8	0	K.D	5,5	5,0	22,2	2,5	479,661	15	1	15	1	28,01	2541
09.10.21	8	0	K.D	5,5	5,0	22,6	2,5	507,675	15	1	15	1	28,01	2541
10.10.21	8	0	K.D	5,5	5,0	22,7	2,5	535,689	15	1	15	1	28,01	2541
11.10.21	8	0	K.D	5,5	5,0	22,3	2,5	563,702	15	1	15	1	28,01	2541
12.10.21	8	0	K.D	5,5	5,0	22,7	2,5	591,716	15	1	15	1	28,01	2541
13.10.21	8	0	K.D	5,5	5,0	22,4	2,5	619,729	15	1	15	1	28,01	2541
14.10.21	8	0	K.D	5,5	5,0	22,3	2,5	647,743	15	1	15	1	28,01	2541
15.10.21	8	0	K.D	5,5	5,0	22,6	2,5	675,756	15	1	15	1	28,01	2541

16.10.21	8	0	K.D	5,5	5,0	22,4	2,5	703,770	15	1	15	1	28,01	2541
17.10.21	8	0	K.D	5,5	5,0	22,7	2,5	731,784	15	1	15	1	28,01	2541
18.10.21	8	0	K.D	5,5	5,0	22,5	2,5	759,797	15	1	15	1	28,01	2541
19.10.21	8	0	K.D	5,5	5,0	22,3	2,5	787,811	15	1	15	1	28,01	2541
20.10.21	8	0	K.D	5,5	5,0	22,5	2,5	815,824	15	1	15	1	28,01	2541
21.10.21	8	0	K.D	5,5	5,0	22,1	2,5	843,838	15	1	15	1	28,01	2541
22.10.21	8	0	K.D	5,5	5,0	23,0	2,5	871,852	15	1	15	1	28,01	2541
23.10.21	8	0	K.D	5,5	5,0	22,1	2,5	899,865	15	1	15	1	28,01	2541
24.10.21	8	0	K.D	5,5	5,0	22,3	2,5	927,879	15	1	15	1	28,01	2541
25.10.21	8	0	K.D	5,5	5,0	22,8	2,5	955,892	15	1	15	1	28,01	2541
26.10.21	8	0	K.D	5,5	5,0	22,9	2,5	983,906	15	1	15	1	28,01	2541
27.10.21	8	0	K.D	5,5	5,0	22,5	2,5	1011,919	15	1	15	1	28,01	2541
28.10.21	8	0	K.D	5,5	5,0	22,8	2,5	1039,933	15	1	15	1	28,01	2541
29.10.21	8	0	K.D	5,5	5,0	22,6	2,5	1067,947	15	1	15	1	28,01	2541
30.10.21	8	0	K.D	5,5	5,0	22,7	2,5	1095,960	15	1	15	1	28,01	2541
30.10.21	17	0	K.D	5,5	5,0	22,6	2,5	1106,555	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1103,12	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25017 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	5,0	4,5	22,8	2,5	3,434	15	1	15	1	0	0
22.09.21	8	0	K.D	5,0	4,5	22,8	2,5	31,457	15	1	15	1	28,02	2541
23.09.21	8	0	K.D	5,0	4,5	22,7	2,5	59,479	15	1	15	1	28,02	2541
24.09.21	8	0	K.D	5,0	4,5	22,7	2,5	87,501	15	1	15	1	28,02	2541
25.09.21	8	0	K.D	5,0	4,5	22,8	2,5	115,524	15	1	15	1	28,02	2541
26.09.21	8	0	K.D	5,0	4,5	22,6	2,5	143,546	15	1	15	1	28,02	2541
27.09.21	8	0	K.D	5,0	4,5	22,5	2,5	171,568	15	1	15	1	28,02	2541
28.09.21	8	0	K.D	5,0	4,5	22,3	2,5	199,591	15	1	15	1	28,02	2541
29.09.21	8	0	K.D	5,0	4,5	22,5	2,5	227,613	15	1	15	1	28,02	2541
30.09.21	8	0	K.D	5,0	4,5	22,3	2,5	255,635	15	1	15	1	28,02	2541
01.10.21	8	0	K.D	5,0	4,5	22,6	2,5	283,658	15	1	15	1	28,02	2541

02.10.21	8	0	K.D	5,0	4,5	22,6	2,5	311,680	15	1	15	1	28,02	2541
03.10.21	8	0	K.D	5,0	4,5	22,5	2,5	339,702	15	1	15	1	28,02	2541
04.10.21	8	0	K.D	5,0	4,5	22,8	2,5	367,725	15	1	15	1	28,02	2541
05.10.21	8	0	K.D	5,0	4,5	22,2	2,5	395,747	15	1	15	1	28,02	2541
06.10.21	8	0	K.D	5,0	4,5	22,8	2,5	423,769	15	1	15	1	28,02	2541
07.10.21	8	0	K.D	5,0	4,5	22,7	2,5	451,792	15	1	15	1	28,02	2541
08.10.21	8	0	K.D	5,0	4,5	22,2	2,5	479,814	15	1	15	1	28,02	2541
09.10.21	8	0	K.D	5,0	4,5	22,6	2,5	507,836	15	1	15	1	28,02	2541
10.10.21	8	0	K.D	5,0	4,5	22,7	2,5	535,859	15	1	15	1	28,02	2541
11.10.21	8	0	K.D	5,0	4,5	22,3	2,5	563,881	15	1	15	1	28,02	2541
12.10.21	8	0	K.D	5,0	4,5	22,7	2,5	591,903	15	1	15	1	28,02	2541
13.10.21	8	0	K.D	5,0	4,5	22,4	2,5	619,926	15	1	15	1	28,02	2541
14.10.21	8	0	K.D	5,0	4,5	22,3	2,5	647,948	15	1	15	1	28,02	2541
15.10.21	8	0	K.D	5,0	4,5	22,6	2,5	675,970	15	1	15	1	28,02	2541
16.10.21	8	0	K.D	5,0	4,5	22,4	2,5	703,993	15	1	15	1	28,02	2541
17.10.21	8	0	K.D	5,0	4,5	22,7	2,5	732,015	15	1	15	1	28,02	2541
18.10.21	8	0	K.D	5,0	4,5	22,5	2,5	760,037	15	1	15	1	28,02	2541
19.10.21	8	0	K.D	5,0	4,5	22,3	2,5	788,060	15	1	15	1	28,02	2541
20.10.21	8	0	K.D	5,0	4,5	22,5	2,5	816,082	15	1	15	1	28,02	2541

21.10.21	8	0	K.D	5,0	4,5	22,1	2,5	844,104	15	1	15	1	28,02	2541
22.10.21	8	0	K.D	5,0	4,5	23,0	2,5	872,127	15	1	15	1	28,02	2541
23.10.21	8	0	K.D	5,0	4,5	22,1	2,5	900,149	15	1	15	1	28,02	2541
24.10.21	8	0	K.D	5,0	4,5	22,3	2,5	928,171	15	1	15	1	28,02	2541
25.10.21	8	0	K.D	5,0	4,5	22,8	2,5	956,194	15	1	15	1	28,02	2541
26.10.21	8	0	K.D	5,0	4,5	22,9	2,5	984,216	15	1	15	1	28,02	2541
27.10.21	8	0	K.D	5,0	4,5	22,5	2,5	1012,238	15	1	15	1	28,02	2541
28.10.21	8	0	K.D	5,0	4,5	22,8	2,5	1040,261	15	1	15	1	28,02	2541
29.10.21	8	0	K.D	5,0	4,5	22,6	2,5	1068,283	15	1	15	1	28,02	2541
30.10.21	8	0	K.D	5,0	4,5	22,7	2,5	1096,305	15	1	15	1	28,02	2541
30.10.21	17	0	K.D	5,0	4,5	22,6	2,5	1106,897	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1103,46	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25018 - TK-25 DN20 190mm

Discontinuous Test Readings

	T*ime*	*Observer*		*Downstream*	*Upstream*	*Actual*	Meter	*Flow Cycle Times*	Total	Total no. of

Date				*Upstream Pressure* bar	*Pressure* bar	*temp.* °C	*Flowrate* m³/h	Reading m³	rise	on	fall	off	Volume Discharged m³	flow cycles
21.09.21	8	0	K.D	4,5	4,0	22,8	2,5	3,440	15	1	15	1	0	0
22.09.21	8	0	K.D	4,5	4,0	22,8	2,5	31,452	15	1	15	1	28,01	2541
23.09.21	8	0	K.D	4,5	4,0	22,7	2,5	59,463	15	1	15	1	28,01	2541
24.09.21	8	0	K.D	4,5	4,0	22,7	2,5	87,474	15	1	15	1	28,01	2541
25.09.21	8	0	K.D	4,5	4,0	22,8	2,5	115,486	15	1	15	1	28,01	2541
26.09.21	8	0	K.D	4,5	4,0	22,6	2,5	143,497	15	1	15	1	28,01	2541
27.09.21	8	0	K.D	4,5	4,0	22,5	2,5	171,508	15	1	15	1	28,01	2541
28.09.21	8	0	K.D	4,5	4,0	22,3	2,5	199,519	15	1	15	1	28,01	2541
29.09.21	8	0	K.D	4,5	4,0	22,5	2,5	227,531	15	1	15	1	28,01	2541
30.09.21	8	0	K.D	4,5	4,0	22,3	2,5	255,542	15	1	15	1	28,01	2541
01.10.21	8	0	K.D	4,5	4,0	22,6	2,5	283,553	15	1	15	1	28,01	2541
02.10.21	8	0	K.D	4,5	4,0	22,6	2,5	311,565	15	1	15	1	28,01	2541
03.10.21	8	0	K.D	4,5	4,0	22,5	2,5	339,576	15	1	15	1	28,01	2541
04.10.21	8	0	K.D	4,5	4,0	22,8	2,5	367,587	15	1	15	1	28,01	2541
05.10.21	8	0	K.D	4,5	4,0	22,2	2,5	395,599	15	1	15	1	28,01	2541
06.10.21	8	0	K.D	4,5	4,0	22,8	2,5	423,610	15	1	15	1	28,01	2541

07.10.21	8	0	K.D	4,5	4,0	22,7	2,5	451,621	15	1	15	1	28,01	2541
08.10.21	8	0	K.D	4,5	4,0	22,2	2,5	479,632	15	1	15	1	28,01	2541
09.10.21	8	0	K.D	4,5	4,0	22,6	2,5	507,644	15	1	15	1	28,01	2541
10.10.21	8	0	K.D	4,5	4,0	22,7	2,5	535,655	15	1	15	1	28,01	2541
11.10.21	8	0	K.D	4,5	4,0	22,3	2,5	563,666	15	1	15	1	28,01	2541
12.10.21	8	0	K.D	4,5	4,0	22,7	2,5	591,678	15	1	15	1	28,01	2541
13.10.21	8	0	K.D	4,5	4,0	22,4	2,5	619,689	15	1	15	1	28,01	2541
14.10.21	8	0	K.D	4,5	4,0	22,3	2,5	647,700	15	1	15	1	28,01	2541
15.10.21	8	0	K.D	4,5	4,0	22,6	2,5	675,712	15	1	15	1	28,01	2541
16.10.21	8	0	K.D	4,5	4,0	22,4	2,5	703,723	15	1	15	1	28,01	2541
17.10.21	8	0	K.D	4,5	4,0	22,7	2,5	731,734	15	1	15	1	28,01	2541
18.10.21	8	0	K.D	4,5	4,0	22,5	2,5	759,745	15	1	15	1	28,01	2541
19.10.21	8	0	K.D	4,5	4,0	22,3	2,5	787,757	15	1	15	1	28,01	2541
20.10.21	8	0	K.D	4,5	4,0	22,5	2,5	815,768	15	1	15	1	28,01	2541
21.10.21	8	0	K.D	4,5	4,0	22,1	2,5	843,779	15	1	15	1	28,01	2541
22.10.21	8	0	K.D	4,5	4,0	23,0	2,5	871,791	15	1	15	1	28,01	2541
23.10.21	8	0	K.D	4,5	4,0	22,1	2,5	899,802	15	1	15	1	28,01	2541
24.10.21	8	0	K.D	4,5	4,0	22,3	2,5	927,813	15	1	15	1	28,01	2541
25.10.21	8	0	K.D	4,5	4,0	22,8	2,5	955,825	15	1	15	1	28,01	2541

26.10.21	8	0	K.D	4,5	4,0	22,9	2,5	983,836	15	1	15	1	28,01	2541
27.10.21	8	0	K.D	4,5	4,0	22,5	2,5	1011,847	15	1	15	1	28,01	2541
28.10.21	8	0	K.D	4,5	4,0	22,8	2,5	1039,858	15	1	15	1	28,01	2541
29.10.21	8	0	K.D	4,5	4,0	22,6	2,5	1067,870	15	1	15	1	28,01	2541
30.10.21	8	0	K.D	4,5	4,0	22,7	2,5	1095,881	15	1	15	1	28,01	2541
30.10.21	17	0	K.D	4,5	4,0	22,6	2,5	1106,475	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1103,03	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25019 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	4,0	3,5	22,8	2,5	3,443	15	1	15	1	0	0
22.09.21	8	0	K.D	4,0	3,5	22,8	2,5	31,473	15	1	15	1	28,03	2541

23.09.21	8	0	K.D	4,0	3,5	22,7	2,5	59,503	15	1	15	1	28,03	2541
24.09.21	8	0	K.D	4,0	3,5	22,7	2,5	87,533	15	1	15	1	28,03	2541
25.09.21	8	0	K.D	4,0	3,5	22,8	2,5	115,563	15	1	15	1	28,03	2541
26.09.21	8	0	K.D	4,0	3,5	22,6	2,5	143,594	15	1	15	1	28,03	2541
27.09.21	8	0	K.D	4,0	3,5	22,5	2,5	171,624	15	1	15	1	28,03	2541
28.09.21	8	0	K.D	4,0	3,5	22,3	2,5	199,654	15	1	15	1	28,03	2541
29.09.21	8	0	K.D	4,0	3,5	22,5	2,5	227,684	15	1	15	1	28,03	2541
30.09.21	8	0	K.D	4,0	3,5	22,3	2,5	255,714	15	1	15	1	28,03	2541
01.10.21	8	0	K.D	4,0	3,5	22,6	2,5	283,744	15	1	15	1	28,03	2541
02.10.21	8	0	K.D	4,0	3,5	22,6	2,5	311,774	15	1	15	1	28,03	2541
03.10.21	8	0	K.D	4,0	3,5	22,5	2,5	339,805	15	1	15	1	28,03	2541
04.10.21	8	0	K.D	4,0	3,5	22,8	2,5	367,835	15	1	15	1	28,03	2541
05.10.21	8	0	K.D	4,0	3,5	22,2	2,5	395,865	15	1	15	1	28,03	2541
06.10.21	8	0	K.D	4,0	3,5	22,8	2,5	423,895	15	1	15	1	28,03	2541
07.10.21	8	0	K.D	4,0	3,5	22,7	2,5	451,925	15	1	15	1	28,03	2541
08.10.21	8	0	K.D	4,0	3,5	22,2	2,5	479,955	15	1	15	1	28,03	2541
09.10.21	8	0	K.D	4,0	3,5	22,6	2,5	507,985	15	1	15	1	28,03	2541
10.10.21	8	0	K.D	4,0	3,5	22,7	2,5	536,016	15	1	15	1	28,03	2541

11.10.21	8	0	K.D	4,0	3,5	22,3	2,5	564,046	15	1	15	1	28,03	2541
12.10.21	8	0	K.D	4,0	3,5	22,7	2,5	592,076	15	1	15	1	28,03	2541
13.10.21	8	0	K.D	4,0	3,5	22,4	2,5	620,106	15	1	15	1	28,03	2541
14.10.21	8	0	K.D	4,0	3,5	22,3	2,5	648,136	15	1	15	1	28,03	2541
15.10.21	8	0	K.D	4,0	3,5	22,6	2,5	676,166	15	1	15	1	28,03	2541
16.10.21	8	0	K.D	4,0	3,5	22,4	2,5	704,196	15	1	15	1	28,03	2541
17.10.21	8	0	K.D	4,0	3,5	22,7	2,5	732,227	15	1	15	1	28,03	2541
18.10.21	8	0	K.D	4,0	3,5	22,5	2,5	760,257	15	1	15	1	28,03	2541
19.10.21	8	0	K.D	4,0	3,5	22,3	2,5	788,287	15	1	15	1	28,03	2541
20.10.21	8	0	K.D	4,0	3,5	22,5	2,5	816,317	15	1	15	1	28,03	2541
21.10.21	8	0	K.D	4,0	3,5	22,1	2,5	844,347	15	1	15	1	28,03	2541
22.10.21	8	0	K.D	4,0	3,5	23,0	2,5	872,377	15	1	15	1	28,03	2541
23.10.21	8	0	K.D	4,0	3,5	22,1	2,5	900,407	15	1	15	1	28,03	2541
24.10.21	8	0	K.D	4,0	3,5	22,3	2,5	928,437	15	1	15	1	28,03	2541
25.10.21	8	0	K.D	4,0	3,5	22,8	2,5	956,468	15	1	15	1	28,03	2541
26.10.21	8	0	K.D	4,0	3,5	22,9	2,5	984,498	15	1	15	1	28,03	2541
27.10.21	8	0	K.D	4,0	3,5	22,5	2,5	1012,528	15	1	15	1	28,03	2541
28.10.21	8	0	K.D	4,0	3,5	22,8	2,5	1040,558	15	1	15	1	28,03	2541
29.10.21	8	0	K.D	4,0	3,5	22,6	2,5	1068,588	15	1	15	1	28,03	2541

30.10.21	8	0	K.D	4,0	3,5	22,7	2,5	1096,618	15	1	15	1	28,03	2541
30.10.21	17	0	K.D	4,0	3,5	22,6	2,5	1107,161	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1103,72	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25020 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
21.09.21	8	0	K.D	3,5	3,0	22,8	2,5	3,431	15	1	15	1	0	0
22.09.21	8	0	K.D	3,5	3,0	22,8	2,5	31,447	15	1	15	1	28,02	2541
23.09.21	8	0	K.D	3,5	3,0	22,7	2,5	59,463	15	1	15	1	28,02	2541
24.09.21	8	0	K.D	3,5	3,0	22,7	2,5	87,479	15	1	15	1	28,02	2541
25.09.21	8	0	K.D	3,5	3,0	22,8	2,5	115,495	15	1	15	1	28,02	2541
26.09.21	8	0	K.D	3,5	3,0	22,6	2,5	143,511	15	1	15	1	28,02	2541

27.09.21	8	0	K.D	3,5	3,0	22,5	2,5	171,527	15	1	15	1	28,02	2541
28.09.21	8	0	K.D	3,5	3,0	22,3	2,5	199,543	15	1	15	1	28,02	2541
29.09.21	8	0	K.D	3,5	3,0	22,5	2,5	227,558	15	1	15	1	28,02	2541
30.09.21	8	0	K.D	3,5	3,0	22,3	2,5	255,574	15	1	15	1	28,02	2541
01.10.21	8	0	K.D	3,5	3,0	22,6	2,5	283,590	15	1	15	1	28,02	2541
02.10.21	8	0	K.D	3,5	3,0	22,6	2,5	311,606	15	1	15	1	28,02	2541
03.10.21	8	0	K.D	3,5	3,0	22,5	2,5	339,622	15	1	15	1	28,02	2541
04.10.21	8	0	K.D	3,5	3,0	22,8	2,5	367,638	15	1	15	1	28,02	2541
05.10.21	8	0	K.D	3,5	3,0	22,2	2,5	395,654	15	1	15	1	28,02	2541
06.10.21	8	0	K.D	3,5	3,0	22,8	2,5	423,670	15	1	15	1	28,02	2541
07.10.21	8	0	K.D	3,5	3,0	22,7	2,5	451,686	15	1	15	1	28,02	2541
08.10.21	8	0	K.D	3,5	3,0	22,2	2,5	479,702	15	1	15	1	28,02	2541
09.10.21	8	0	K.D	3,5	3,0	22,6	2,5	507,717	15	1	15	1	28,02	2541
10.10.21	8	0	K.D	3,5	3,0	22,7	2,5	535,733	15	1	15	1	28,02	2541
11.10.21	8	0	K.D	3,5	3,0	22,3	2,5	563,749	15	1	15	1	28,02	2541
12.10.21	8	0	K.D	3,5	3,0	22,7	2,5	591,765	15	1	15	1	28,02	2541
13.10.21	8	0	K.D	3,5	3,0	22,4	2,5	619,781	15	1	15	1	28,02	2541
14.10.21	8	0	K.D	3,5	3,0	22,3	2,5	647,797	15	1	15	1	28,02	2541
15.10.21	8	0	K.D	3,5	3,0	22,6	2,5	675,813	15	1	15	1	28,02	2541

16.10.21	8	0	K.D	3,5	3,0	22,4	2,5	703,829	15	1	15	1	28,02	2541
17.10.21	8	0	K.D	3,5	3,0	22,7	2,5	731,845	15	1	15	1	28,02	2541
18.10.21	8	0	K.D	3,5	3,0	22,5	2,5	759,861	15	1	15	1	28,02	2541
19.10.21	8	0	K.D	3,5	3,0	22,3	2,5	787,876	15	1	15	1	28,02	2541
20.10.21	8	0	K.D	3,5	3,0	22,5	2,5	815,892	15	1	15	1	28,02	2541
21.10.21	8	0	K.D	3,5	3,0	22,1	2,5	843,908	15	1	15	1	28,02	2541
22.10.21	8	0	K.D	3,5	3,0	23,0	2,5	871,924	15	1	15	1	28,02	2541
23.10.21	8	0	K.D	3,5	3,0	22,1	2,5	899,940	15	1	15	1	28,02	2541
24.10.21	8	0	K.D	3,5	3,0	22,3	2,5	927,956	15	1	15	1	28,02	2541
25.10.21	8	0	K.D	3,5	3,0	22,8	2,5	955,972	15	1	15	1	28,02	2541
26.10.21	8	0	K.D	3,5	3,0	22,9	2,5	983,988	15	1	15	1	28,02	2541
27.10.21	8	0	K.D	3,5	3,0	22,5	2,5	1012,004	15	1	15	1	28,02	2541
28.10.21	8	0	K.D	3,5	3,0	22,8	2,5	1040,020	15	1	15	1	28,02	2541
29.10.21	8	0	K.D	3,5	3,0	22,6	2,5	1068,035	15	1	15	1	28,02	2541
30.10.21	8	0	K.D	3,5	3,0	22,7	2,5	1096,051	15	1	15	1	28,02	2541
30.10.21	17	0	K.D	3,5	3,0	22,6	2,5	1106,594	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1103,16	100024
Teoratical total	1111,11	100000

		At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	48%	48%	%
Date:	01.11.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:00	13:00	

Meter serial No.:	TK-25016	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1112,06595	1112,16502	0,09907	0,10040	-1,32	2,5	-0,52	1,5

3,125	6	22,5	1112,16502	1112,26499	0,09997	0,10156	-1,56	2,5	-0,76	1,5
2,5	6	22,5	1112,26499	1112,36439	0,09939	0,10052	-1,12	2,5	-0,88	1,5
2,5	6	22,5	1112,36439	1112,46434	0,09996	0,10093	-0,96	2,5	-0,72	1,5
2,5	6	22,5	1112,46434	1112,56458	0,10023	0,10110	-0,86	2,5	-0,62	1,5
1,778	6	22,5	1112,56458	1112,64418	0,07961	0,08019	-0,73	2,5	-0,92	1,5
1,778	6	22,5	1112,64418	1112,72387	0,07969	0,08020	-0,63	2,5	-0,82	1,5
0,889	6	22,5	1112,72387	1112,78438	0,06051	0,06037	0,23	2,5	-0,46	1,5
0,889	6	22,5	1112,78438	1112,84508	0,06070	0,06049	0,34	2,5	-0,35	1,5
0,04	6	22,5	1112,84508	1112,85502	0,00994	0,01048	-5,16	2,5	-6,31	1,5
0,04	6	22,5	1112,85502	1112,86501	0,00999	0,01049	-4,83	2,5	-5,98	1,5
0,04	6	22,5	1112,86501	1112,87515	0,01014	0,01071	-5,37	2,5	-6,52	1,5
0,025	6	22,5	1112,87515	1112,88146	0,00631	0,00720	-12,25	6	-11,18	3
0,025	6	22,5	1112,88146	1112,88789	0,00643	0,00736	-12,69	6	-11,62	3
0,025	6	22,5	1112,88789	1112,89409	0,00620	0,00715	-13,17	6	-12,10	3

Meter serial No.: TK-25017 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1112,13843	1112,23756	0,09913	0,10040	-1,26	2,5	-0,55	1,5
3,125	6	22,5	1112,23756	1112,33772	0,10016	0,10156	-1,38	2,5	-0,67	1,5
2,5	6	22,5	1112,33772	1112,43702	0,09930	0,10052	-1,21	2,5	-0,95	1,5
2,5	6	22,5	1112,43702	1112,53702	0,10000	0,10093	-0,92	2,5	-0,66	1,5
2,5	6	22,5	1112,53702	1112,63701	0,09999	0,10110	-1,10	2,5	-0,84	1,5
1,778	6	22,5	1112,63701	1112,71694	0,07994	0,08019	-0,32	2,5	-0,59	1,5
1,778	6	22,5	1112,71694	1112,79679	0,07985	0,08020	-0,43	2,5	-0,70	1,5

0,889	6	22,5	1112,79679	1112,85704	0,06024	0,06037	-0,21	2,5	-0,90	1,5
0,889	6	22,5	1112,85704	1112,91744	0,06041	0,06049	-0,14	2,5	-0,83	1,5

0,04	6	22,5	1112,91744	1112,92705	0,00961	0,01048	-8,34	2,5	-9,38	1,5
0,04	6	22,5	1112,92705	1112,93658	0,00953	0,01049	-9,21	2,5	-10,25	1,5
0,04	6	22,5	1112,93658	1112,94644	0,00986	0,01071	-7,96	2,5	-9,00	1,5

0,025	6	22,5	1112,94644	1112,95234	0,00590	0,00720	-18,02	6	-16,59	3
0,025	6	22,5	1112,95234	1112,95840	0,00606	0,00736	-17,69	6	-16,26	3
0,025	6	22,5	1112,95840	1112,96421	0,00581	0,00715	-18,63	6	-17,20	3

Meter serial No.: TK-25018 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A)	%

									%	
3,125	6	22,5	1112,64930	1112,74847	0,09917	0,10040	-1,22	2,5	-0,71	1,5
3,125	6	22,5	1112,74847	1112,84908	0,10061	0,10156	-0,93	2,5	-0,42	1,5
2,5	6	22,5	1112,84908	1112,94897	0,09988	0,10052	-0,63	2,5	-0,49	1,5
2,5	6	22,5	1112,94897	1113,04916	0,10019	0,10093	-0,73	2,5	-0,59	1,5
2,5	6	22,5	1113,04916	1113,14969	0,10053	0,10110	-0,56	2,5	-0,42	1,5
1,778	6	22,5	1113,14969	1113,22963	0,07994	0,08019	-0,32	2,5	-0,70	1,5
1,778	6	22,5	1113,22963	1113,30950	0,07987	0,08020	-0,41	2,5	-0,79	1,5
0,889	6	22,5	1113,30950	1113,36999	0,06050	0,06037	0,21	2,5	-0,64	1,5
0,889	6	22,5	1113,36999	1113,43055	0,06056	0,06049	0,11	2,5	-0,74	1,5
0,04	6	22,5	1113,43055	1113,44018	0,00963	0,01048	-8,15	2,5	-9,46	1,5
0,04	6	22,5	1113,44018	1113,44990	0,00972	0,01049	-7,36	2,5	-8,67	1,5
0,04	6	22,5	1113,44990	1113,45979	0,00989	0,01071	-7,66	2,5	-8,97	1,5
0,025	6	22,5	1113,45979	1113,46586	0,00607	0,00720	-15,66	6	-14,78	3

0,025	6	22,5	1113,46586	1113,47229	0,00643	0,00736	-12,63	6	-11,75	3
0,025	6	22,5	1113,47229	1113,47838	0,00609	0,00715	-14,83	6	-13,95	3

Meter serial No.: TK-25019 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( )m³/h	MPa (bar)	Tw°C	Vi(i)m³	Vi(f)m³	Vim³	Vam³	*E*m%	%	Ēm(B) - Ēm(A)%	%
3,125	6	22,5	1112,79613	1112,89489	0,09876	0,10040	-1,63	2,5	-0,93	1,5
3,125	6	22,5	1112,89489	1112,99488	0,09999	0,10156	-1,54	2,5	-0,84	1,5
2,5	6	22,5	1112,99488	1113,09477	0,09988	0,10052	-0,63	2,5	-0,41	1,5
2,5	6	22,5	1113,09477	1113,19524	0,10047	0,10093	-0,45	2,5	-0,23	1,5
2,5	6	22,5	1113,19524	1113,29551	0,10027	0,10110	-0,82	2,5	-0,60	1,5
1,778	6	22,5	1113,29551	1113,37543	0,07992	0,08019	-0,34	2,5	-0,57	1,5

1,778	6	22,5	1113,37543	1113,45543	0,08000	0,08020	-0,25	2,5	-0,48	1,5
0,889	6	22,5	1113,45543	1113,51588	0,06045	0,06037	0,14	2,5	-0,64	1,5
0,889	6	22,5	1113,51588	1113,57650	0,06062	0,06049	0,21	2,5	-0,57	1,5
0,04	6	22,5	1113,57650	1113,58682	0,01032	0,01048	-1,58	2,5	-2,78	1,5
0,04	6	22,5	1113,58682	1113,59709	0,01027	0,01049	-2,10	2,5	-3,30	1,5
0,04	6	22,5	1113,59709	1113,60759	0,01050	0,01071	-1,96	2,5	-3,16	1,5
0,025	6	22,5	1113,60759	1113,61431	0,00672	0,00720	-6,62	6	-5,68	3
0,025	6	22,5	1113,61431	1113,62118	0,00687	0,00736	-6,73	6	-5,79	3
0,025	6	22,5	1113,62118	1113,62778	0,00660	0,00715	-7,61	6	-6,67	3

Meter serial No.: TK-25020 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1112,43292	1112,53177	0,09885	0,10040	-1,54	2,5	-0,81	1,5
3,125	6	22,5	1112,53177	1112,63198	0,10021	0,10156	-1,33	2,5	-0,60	1,5
2,5	6	22,5	1112,63198	1112,73180	0,09982	0,10052	-0,69	2,5	-0,46	1,5
2,5	6	22,5	1112,73180	1112,83199	0,10019	0,10093	-0,73	2,5	-0,50	1,5
2,5	6	22,5	1112,83199	1112,93226	0,10027	0,10110	-0,82	2,5	-0,59	1,5
1,778	6	22,5	1112,93226	1113,01217	0,07990	0,08019	-0,36	2,5	-0,67	1,5
1,778	6	22,5	1113,01217	1113,09220	0,08003	0,08020	-0,21	2,5	-0,52	1,5
0,889	6	22,5	1113,09220	1113,15270	0,06051	0,06037	0,23	2,5	-0,56	1,5
0,889	6	22,5	1113,15270	1113,21330	0,06060	0,06049	0,17	2,5	-0,62	1,5
0,04	6	22,5	1113,21330	1113,22305	0,00975	0,01048	-6,96	2,5	-8,21	1,5
0,04	6	22,5	1113,22305	1113,23276	0,00971	0,01049	-7,46	2,5	-8,71	1,5
0,04	6	22,5	1113,23276	1113,24262	0,00986	0,01071	-7,96	2,5	-9,21	1,5

0,025	6	22,5	1113,24262	1113,24871	0,00609	0,00720	-15,33	6	-14,47	3
0,025	6	22,5	1113,24871	1113,25503	0,00632	0,00736	-14,18	6	-13,32	3
0,025	6	22,5	1113,25503	1113,26101	0,00598	0,00715	-16,32	6	-15,46	3

3.3.9 Applied Tests To The 20% Recycled Plastic Material

3.3.9.1 Static Pressure Test "OIML R49-2 7.3| EN ISO 4064-2 7.3"

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model	TK-25	Ambient relative humidity:	49%	49%	%
Date:	08.11.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	08:00	08:17	

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25021	25,6	08:00	26	08:15	26	PASSED
TK-25022	25,6	08:00	26	08:15	26	PASSED
TK-25023	25,6	08:00	26	08:15	26	PASSED
TK-25024	25,6	08:00	26	08:15	26	PASSED

TK-25025	25,6	08:00	26	08:15	26	PASSED

Meter Serial No.	MAP x 1,6 MPa (bar)	Start time	Initial pressure MPa (bar)	End time	Final pressure MPa (bar)	Remarks
TK-25021	32	08:16	32	08:17	32	PASSED
TK-25022	32	08:16	32	08:17	32	PASSED
TK-25023	32	08:16	32	08:17	32	PASSED
TK-25024	32	08:16	32	08:17	32	PASSED
TK-25025	32	08:16	32	08:17	32	PASSED

3.3.9.2 Error (of indication) Test "OIML R49-2 7.4 | EN ISO 4064-2 7.4"

Application No:

Model: TK-25

Date: 08.11.2021

Observer: K.DEMİRKURT

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative humidity:	49%	49%	%
Ambient atmospheric pressure:	101,325	101,325	Kpa
Time:	08:30	14:00	

Meter serial No.: TK-25021

Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	22	0,21688	0,31632	0,09944	0,10017	-0,73	2
3,125	6	22	0,31632	0,41802	0,10170	0,10238	-0,66	2
2,5	6	22	0,41802	0,49805	0,08002	0,08016	-0,17	2
2,5	6	22	0,49805	0,57804	0,07999	0,08017	-0,22	2
2,5	6	22	0,57804	0,65821	0,08017	0,08036	-0,24	2
1,778	6	22	0,65821	0,71869	0,06048	0,06032	0,27	2
1,778	6	22	0,71869	0,77932	0,06063	0,06041	0,36	2
0,889	6	22	0,77932	0,81971	0,04040	0,04004	0,89	2
0,889	6	22	0,81971	0,86042	0,04070	0,04031	0,97	2
0,04	6	22	0,86042	0,87062	0,01020	0,01014	0,63	2

0,04	6	22	0,87062	0,88071	0,01009	0,01004	0,47	2
0,04	6	22	0,88071	0,89099	0,01028	0,01022	0,58	2

0,025	6	22	0,89099	0,89792	0,00693	0,00701	-1,12	5
0,025	6	22	0,89792	0,90491	0,00699	0,00706	-0,97	5
0,025	6	22	0,90491	0,91190	0,00699	0,00705	-0,83	5

Meter serial No.: TK-25022 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,22046	0,31977	0,09931	0,10017	-0,86	2
3,125	6	23	0,31977	0,42140	0,10163	0,10238	-0,73	2

2,5	6	23	0,42140	0,50138	0,07998	0,08016	-0,22	2
2,5	6	23	0,50138	0,58142	0,08003	0,08017	-0,17	2
2,5	6	23	0,58142	0,66152	0,08010	0,08036	-0,32	2

1,778	6	23	0,66152	0,72198	0,06046	0,06032	0,23	2
1,778	6	23	0,72198	0,78264	0,06066	0,06041	0,41	2
0,889	6	23	0,78264	0,82295	0,04032	0,04004	0,69	2
0,889	6	23	0,82295	0,86362	0,04066	0,04031	0,88	2
0,04	6	23	0,86362	0,87381	0,01019	0,01014	0,47	2
0,04	6	23	0,87381	0,88390	0,01010	0,01004	0,58	2
0,04	6	23	0,88390	0,89418	0,01027	0,01022	0,52	2
0,025	6	23	0,89418	0,90109	0,00691	0,00701	-1,39	5
0,025	6	23	0,90109	0,90808	0,00699	0,00706	-0,94	5
0,025	6	23	0,90808	0,91507	0,00699	0,00705	-0,87	5

Meter serial No.: TK-25023 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actualflowrate	Initial supplypressure	Watertemp.	Initialreading	Finalreading	Indicatedvolume	Actualvolume	Meter error	MPE

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
3,125	6	23	0,21739	0,31680	0,09941	0,10017	-0,76	2
3,125	6	23	0,31680	0,41850	0,10170	0,10238	-0,66	2
2,5	6	23	0,41850	0,49857	0,08007	0,08016	-0,11	2
2,5	6	23	0,49857	0,57850	0,07992	0,08017	-0,31	2
2,5	6	23	0,57850	0,65892	0,08042	0,08036	0,08	2
1,778	6	23	0,65892	0,71941	0,06049	0,06032	0,28	2
1,778	6	23	0,71941	0,77990	0,06049	0,06041	0,14	2
0,889	6	23	0,77990	0,82022	0,04032	0,04004	0,69	2
0,889	6	23	0,82022	0,86082	0,04060	0,04031	0,73	2
0,04	6	23	0,86082	0,87101	0,01018	0,01014	0,43	2
0,04	6	23	0,87101	0,88110	0,01010	0,01004	0,55	2
0,04	6	23	0,88110	0,89139	0,01028	0,01022	0,61	2
0,025	6	23	0,89139	0,89833	0,00694	0,00701	-0,97	5

0,025	6	23	0,89833	0,90530	0,00697	0,00706	-1,26	5
0,025	6	23	0,90530	0,91226	0,00696	0,00705	-1,32	5

Meter serial No.: TK-25024 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,19396	0,29344	0,09948	0,10017	-0,69	2
3,125	6	23	0,29344	0,39509	0,10165	0,10238	-0,71	2
2,5	6	23	0,39509	0,47504	0,07995	0,08016	-0,26	2
2,5	6	23	0,47504	0,55496	0,07992	0,08017	-0,31	2
2,5	6	23	0,55496	0,63519	0,08022	0,08036	-0,17	2
1,778	6	23	0,63519	0,69562	0,06043	0,06032	0,19	2
1,778	6	23	0,69562	0,75623	0,06060	0,06041	0,32	2

0,889	6	23	0,75623	0,79658	0,04036	0,04004	0,79	2
0,889	6	23	0,79658	0,83722	0,04064	0,04031	0,82	2

0,04	6	23	0,83722	0,84743	0,01020	0,01014	0,63	2
0,04	6	23	0,84743	0,85751	0,01009	0,01004	0,47	2
0,04	6	23	0,85751	0,86780	0,01029	0,01022	0,65	2

0,025	6	23	0,86780	0,87476	0,00695	0,00701	-0,79	5
0,025	6	23	0,87476	0,88175	0,00699	0,00706	-0,93	5
0,025	6	23	0,88175	0,88872	0,00697	0,00705	-1,12	5

Meter serial No.: TK-25025 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate Q( ) m³/h	Initial supply pressure MPa (bar)	Water temp. Tw °C	Initial reading Vi(i) m³	Final reading Vi(f) m³	Indicated volume Vi m³	Actual volume Va m³	Meter error *E*m %	MPE %
3,125	6	23	0,20097	0,30035	0,09938	0,10017	-0,79	2
3,125	6	23	0,30035	0,40206	0,10171	0,10238	-0,65	2

2,5	6	23	0,40206	0,48197	0,07990	0,08016	-0,32	2
2,5	6	23	0,48197	0,56202	0,08006	0,08017	-0,14	2
2,5	6	23	0,56202	0,64216	0,08013	0,08036	-0,28	2
1,778	6	23	0,64216	0,70267	0,06051	0,06032	0,31	2
1,778	6	23	0,70267	0,76316	0,06049	0,06041	0,14	2
0,889	6	23	0,76316	0,80345	0,04029	0,04004	0,63	2
0,889	6	23	0,80345	0,84407	0,04062	0,04031	0,76	2
0,04	6	23	0,84407	0,85426	0,01019	0,01014	0,53	2
0,04	6	23	0,85426	0,86435	0,01009	0,01004	0,47	2
0,04	6	23	0,86435	0,87461	0,01026	0,01022	0,43	2
0,025	6	23	0,87461	0,88156	0,00694	0,00701	-0,97	5
0,025	6	23	0,88156	0,88852	0,00697	0,00706	-1,31	5
0,025	6	23	0,88852	0,89549	0,00696	0,00705	-1,25	5

3.3.9.3 Water Temperature and Overload Water Temperature Tests“OIML R49-2 7.5 and 7.6 | EN ISO 4064-2 7.5 and 7.6”

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	49%	49%	%
Date:	08.11.2021	Ambient atmospheric pressure:	101,325	101,325	KPa
Observer:	K.DEMİRKURT	Time:	14:30	17:30	

Meter serial No.:	TK-25021	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,01954	1,02976	0,01022	0,01012	0,97	2
MAT	0,04	0,042	3,5	49,8	1,20168	1,21177	0,01009	0,01008	0,14	2

Reference	0,04	0,042	3,5	20,9	3,12943	3,13967	0,01024	0,01017	0,65	2

Meter serial No.: TK-25022 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m^3/h	m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,03946	1,04966	0,01020	0,01012	0,76	2
MAT	0,04	0,042	3,5	49,8	1,21046	1,22054	0,01008	0,01008	0,04	2
Reference	0,04	0,042	3,5	20,9	3,13395	3,14416	0,01021	0,01017	0,39	2

Meter serial No.: TK-25023 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply	Initial inlet	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

			pressure	water temp.						
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,02594	1,03614	0,01020	0,01012	0,82	2
MAT	0,04	0,042	3,5	49,8	1,20349	1,21358	0,01009	0,01008	0,14	2
Reference	0,04	0,042	3,5	20,9	3,11641	3,12662	0,01021	0,01017	0,41	2

Meter serial No.: TK-25024 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,03646	1,04667	0,01021	0,01012	0,93	2
MAT	0,04	0,042	3,5	49,8	1,21341	1,22351	0,01010	0,01008	0,22	2

Reference	0,04	0,042	3,5	20,9	3,12394	3,13417	0,01023	0,01017	0,61	2

Meter serial No.: TK-25025 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply pressure	Initial inlet water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
10 °C	0,04	0,042	3,5	10,2	1,04036	1,05056	0,01020	0,01012	0,82	2
MAT	0,04	0,042	3,5	49,8	1,22393	1,23403	0,01010	0,01008	0,17	2
Reference	0,04	0,042	3,5	20,9	3,12843	3,13863	0,01020	0,01017	0,34	2

3.3.9.4 Water Pressure Test"OIML R49-2 7.7 | EN ISO 4064-2 7.7"

Application No:

Model: TK-25

Date: 09.11.2021

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative humidity:	45%	45%	%
Ambient atmospheric pressure:	101,325	101,325	KPa

Observer: K.DEMİRKURT Time: 08:00 09:30

Meter serial No.: TK-25021 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,35762	3,36769	0,01007	0,01005	0,17	2
MAP	0,04	0,042	15,8	22,1	3,40644	3,41673	0,01029	0,01021	0,81	2

Meter serial No.: TK-25022 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate	Actual flowrate	Initial supply	Initial inlet	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

	Q( )	*Q( )*	pressure	water temp						
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,36194	3,37202	0,01008	0,01005	0,31	2
MAP	0,04	0,042	15,8	22,1	3,40295	3,41326	0,01031	0,01021	0,99	2

Meter serial No.: TK-25023 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,32921	3,33928	0,01007	0,01005	0,24	2
MAP	0,04	0,042	15,8	22,1	3,42192	3,43221	0,01029	0,01021	0,79	2

Meter serial No.: TK-25024 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE
	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,35494	3,36501	0,01007	0,01005	0,22	2
MAP	0,04	0,042	15,8	22,1	3,40184	3,41214	0,01030	0,01021	0,93	2

Meter serial No.: TK-25025 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Application conditions	Nominal flowrate *Q( )*	Actual flowrate *Q( )*	Initial supply pressure	Initial inlet water temp	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE

	m³/h	m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%
0,3 bar	0,04	0,042	0,3	22,1	3,33741	3,34749	0,01008	0,01005	0,34	2
MAP	0,04	0,042	15,8	22,1	3,39173	3,40205	0,01032	0,01021	1,08	2

3.3.9.5 Endurance Tests "OIML R-49:2013: 7.11 \| EN ISO 4064-2: 2018 7.11"

3.3.9.5.1 Discontinuous Flow Tests "OIML R-49:2013: 7.11.2 \| EN ISO 4064-2: 2018 7.11.2"

Meter Serial No.: TK-25021 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
10.11.21	8	0	K.D	8,0	7,5	22,8	2,5	3,432	15	1	15	1	0	0
11.11.21	8	0	K.D	8,0	7,5	22,8	2,5	31,540	15	1	15	1	28,11	2541
12.11.21	8	0	K.D	8,0	7,5	22,7	2,5	59,649	15	1	15	1	28,11	2541
13.11.21	8	0	K.D	8,0	7,5	22,7	2,5	87,757	15	1	15	1	28,11	2541
14.11.21	8	0	K.D	8,0	7,5	22,8	2,5	115,866	15	1	15	1	28,11	2541
15.11.21	8	0	K.D	8,0	7,5	22,6	2,5	143,974	15	1	15	1	28,11	2541

16.11.21	8	0	K.D	8,0	7,5	22,5	2,5	172,082	15	1	15	1	28,11	2541
17.11.21	8	0	K.D	8,0	7,5	22,3	2,5	200,191	15	1	15	1	28,11	2541
18.11.21	8	0	K.D	8,0	7,5	22,5	2,5	228,299	15	1	15	1	28,11	2541
19.11.21	8	0	K.D	8,0	7,5	22,3	2,5	256,408	15	1	15	1	28,11	2541
20.11.21	8	0	K.D	8,0	7,5	22,6	2,5	284,516	15	1	15	1	28,11	2541
21.11.21	8	0	K.D	8,0	7,5	22,6	2,5	312,625	15	1	15	1	28,11	2541
22.11.21	8	0	K.D	8,0	7,5	22,5	2,5	340,733	15	1	15	1	28,11	2541
23.11.21	8	0	K.D	8,0	7,5	22,8	2,5	368,842	15	1	15	1	28,11	2541
24.11.21	8	0	K.D	8,0	7,5	22,2	2,5	396,950	15	1	15	1	28,11	2541
25.11.21	8	0	K.D	8,0	7,5	22,8	2,5	425,059	15	1	15	1	28,11	2541
26.11.21	8	0	K.D	8,0	7,5	22,7	2,5	453,167	15	1	15	1	28,11	2541
27.11.21	8	0	K.D	8,0	7,5	22,2	2,5	481,276	15	1	15	1	28,11	2541
28.11.21	8	0	K.D	8,0	7,5	22,6	2,5	509,384	15	1	15	1	28,11	2541
29.11.21	8	0	K.D	8,0	7,5	22,7	2,5	537,492	15	1	15	1	28,11	2541
30.11.21	8	0	K.D	8,0	7,5	22,3	2,5	565,601	15	1	15	1	28,11	2541
01.12.21	8	0	K.D	8,0	7,5	22,7	2,5	593,709	15	1	15	1	28,11	2541
02.12.21	8	0	K.D	8,0	7,5	22,4	2,5	621,818	15	1	15	1	28,11	2541
03.12.21	8	0	K.D	8,0	7,5	22,3	2,5	649,926	15	1	15	1	28,11	2541
04.12.21	8	0	K.D	8,0	7,5	22,6	2,5	678,035	15	1	15	1	28,11	2541

05.12.21	8	0	K.D	8,0	7,5	22,4	2,5	706,143	15	1	15	1	28,11	2541
06.12.21	8	0	K.D	8,0	7,5	22,7	2,5	734,252	15	1	15	1	28,11	2541
07.12.21	8	0	K.D	8,0	7,5	22,5	2,5	762,360	15	1	15	1	28,11	2541
08.12.21	8	0	K.D	8,0	7,5	22,3	2,5	790,469	15	1	15	1	28,11	2541
09.12.21	8	0	K.D	8,0	7,5	22,5	2,5	818,577	15	1	15	1	28,11	2541
10.12.21	8	0	K.D	8,0	7,5	22,1	2,5	846,686	15	1	15	1	28,11	2541
11.12.21	8	0	K.D	8,0	7,5	23,0	2,5	874,794	15	1	15	1	28,11	2541
12.12.21	8	0	K.D	8,0	7,5	22,1	2,5	902,902	15	1	15	1	28,11	2541
13.12.21	8	0	K.D	8,0	7,5	22,3	2,5	931,011	15	1	15	1	28,11	2541
14.12.21	8	0	K.D	8,0	7,5	22,8	2,5	959,119	15	1	15	1	28,11	2541
15.12.21	8	0	K.D	8,0	7,5	22,9	2,5	987,228	15	1	15	1	28,11	2541
16.12.21	8	0	K.D	8,0	7,5	22,5	2,5	1015,336	15	1	15	1	28,11	2541
17.12.21	8	0	K.D	8,0	7,5	22,8	2,5	1043,445	15	1	15	1	28,11	2541
18.12.21	8	0	K.D	8,0	7,5	22,6	2,5	1071,553	15	1	15	1	28,11	2541
19.12.21	8	0	K.D	8,0	7,5	22,7	2,5	1099,662	15	1	15	1	28,11	2541
19.12.21	17	0	K.D	8,0	7,5	22,6	2,5	1110,256	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1106,82	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25022 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
10.11.21	8	0	K.D	7,5	7,0	22,8	2,5	3,428	15	1	15	1	0	0
11.11.21	8	0	K.D	7,5	7,0	22,8	2,5	31,531	15	1	15	1	28,10	2541
12.11.21	8	0	K.D	7,5	7,0	22,7	2,5	59,635	15	1	15	1	28,10	2541
13.11.21	8	0	K.D	7,5	7,0	22,7	2,5	87,738	15	1	15	1	28,10	2541
14.11.21	8	0	K.D	7,5	7,0	22,8	2,5	115,841	15	1	15	1	28,10	2541
15.11.21	8	0	K.D	7,5	7,0	22,6	2,5	143,944	15	1	15	1	28,10	2541
16.11.21	8	0	K.D	7,5	7,0	22,5	2,5	172,048	15	1	15	1	28,10	2541
17.11.21	8	0	K.D	7,5	7,0	22,3	2,5	200,151	15	1	15	1	28,10	2541
18.11.21	8	0	K.D	7,5	7,0	22,5	2,5	228,254	15	1	15	1	28,10	2541
19.11.21	8	0	K.D	7,5	7,0	22,3	2,5	256,357	15	1	15	1	28,10	2541
20.11.21	8	0	K.D	7,5	7,0	22,6	2,5	284,461	15	1	15	1	28,10	2541

21.11.21	8	0	K.D	7,5	7,0	22,6	2,5	312,564	15	1	15	1	28,10	2541
22.11.21	8	0	K.D	7,5	7,0	22,5	2,5	340,667	15	1	15	1	28,10	2541
23.11.21	8	0	K.D	7,5	7,0	22,8	2,5	368,770	15	1	15	1	28,10	2541
24.11.21	8	0	K.D	7,5	7,0	22,2	2,5	396,873	15	1	15	1	28,10	2541
25.11.21	8	0	K.D	7,5	7,0	22,8	2,5	424,977	15	1	15	1	28,10	2541
26.11.21	8	0	K.D	7,5	7,0	22,7	2,5	453,080	15	1	15	1	28,10	2541
27.11.21	8	0	K.D	7,5	7,0	22,2	2,5	481,183	15	1	15	1	28,10	2541
28.11.21	8	0	K.D	7,5	7,0	22,6	2,5	509,286	15	1	15	1	28,10	2541
29.11.21	8	0	K.D	7,5	7,0	22,7	2,5	537,390	15	1	15	1	28,10	2541
30.11.21	8	0	K.D	7,5	7,0	22,3	2,5	565,493	15	1	15	1	28,10	2541
01.12.21	8	0	K.D	7,5	7,0	22,7	2,5	593,596	15	1	15	1	28,10	2541
02.12.21	8	0	K.D	7,5	7,0	22,4	2,5	621,699	15	1	15	1	28,10	2541
03.12.21	8	0	K.D	7,5	7,0	22,3	2,5	649,803	15	1	15	1	28,10	2541
04.12.21	8	0	K.D	7,5	7,0	22,6	2,5	677,906	15	1	15	1	28,10	2541
05.12.21	8	0	K.D	7,5	7,0	22,4	2,5	706,009	15	1	15	1	28,10	2541
06.12.21	8	0	K.D	7,5	7,0	22,7	2,5	734,112	15	1	15	1	28,10	2541
07.12.21	8	0	K.D	7,5	7,0	22,5	2,5	762,215	15	1	15	1	28,10	2541
08.12.21	8	0	K.D	7,5	7,0	22,3	2,5	790,319	15	1	15	1	28,10	2541
09.12.21	8	0	K.D	7,5	7,0	22,5	2,5	818,422	15	1	15	1	28,10	2541

10.12.21	8	0	K.D	7,5	7,0	22,1	2,5	846,525	15	1	15	1	28,10	2541
11.12.21	8	0	K.D	7,5	7,0	23,0	2,5	874,628	15	1	15	1	28,10	2541
12.12.21	8	0	K.D	7,5	7,0	22,1	2,5	902,732	15	1	15	1	28,10	2541
13.12.21	8	0	K.D	7,5	7,0	22,3	2,5	930,835	15	1	15	1	28,10	2541
14.12.21	8	0	K.D	7,5	7,0	22,8	2,5	958,938	15	1	15	1	28,10	2541
15.12.21	8	0	K.D	7,5	7,0	22,9	2,5	987,041	15	1	15	1	28,10	2541
16.12.21	8	0	K.D	7,5	7,0	22,5	2,5	1015,145	15	1	15	1	28,10	2541
17.12.21	8	0	K.D	7,5	7,0	22,8	2,5	1043,248	15	1	15	1	28,10	2541
18.12.21	8	0	K.D	7,5	7,0	22,6	2,5	1071,351	15	1	15	1	28,10	2541
19.12.21	8	0	K.D	7,5	7,0	22,7	2,5	1099,454	15	1	15	1	28,10	2541
19.12.21	17	0	K.D	7,5	7,0	22,6	2,5	1110,046	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1106,62	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25023 - TK-25 DN20 190mm

Discontinuous Test Readings

	T*ime*	*Observer*		*Downstream*	*Upstream*	*Actual*	Meter	*Flow Cycle Times*	Total	Total no. of

Date				*Upstream Pressure* bar	*Pressure* bar	*temp.* °C	*Flowrate* m³/h	Reading m³	rise	on	fall	off	Volume Discharged m³	flow cycles
10.11.21	8	0	K.D	7,0	6,5	22,8	2,5	3,447	15	1	15	1	0	0
11.11.21	8	0	K.D	7,0	6,5	22,8	2,5	31,541	15	1	15	1	28,09	2541
12.11.21	8	0	K.D	7,0	6,5	22,7	2,5	59,636	15	1	15	1	28,09	2541
13.11.21	8	0	K.D	7,0	6,5	22,7	2,5	87,730	15	1	15	1	28,09	2541
14.11.21	8	0	K.D	7,0	6,5	22,8	2,5	115,824	15	1	15	1	28,09	2541
15.11.21	8	0	K.D	7,0	6,5	22,6	2,5	143,919	15	1	15	1	28,09	2541
16.11.21	8	0	K.D	7,0	6,5	22,5	2,5	172,013	15	1	15	1	28,09	2541
17.11.21	8	0	K.D	7,0	6,5	22,3	2,5	200,107	15	1	15	1	28,09	2541
18.11.21	8	0	K.D	7,0	6,5	22,5	2,5	228,202	15	1	15	1	28,09	2541
19.11.21	8	0	K.D	7,0	6,5	22,3	2,5	256,296	15	1	15	1	28,09	2541
20.11.21	8	0	K.D	7,0	6,5	22,6	2,5	284,390	15	1	15	1	28,09	2541
21.11.21	8	0	K.D	7,0	6,5	22,6	2,5	312,484	15	1	15	1	28,09	2541
22.11.21	8	0	K.D	7,0	6,5	22,5	2,5	340,579	15	1	15	1	28,09	2541
23.11.21	8	0	K.D	7,0	6,5	22,8	2,5	368,673	15	1	15	1	28,09	2541
24.11.21	8	0	K.D	7,0	6,5	22,2	2,5	396,767	15	1	15	1	28,09	2541
25.11.21	8	0	K.D	7,0	6,5	22,8	2,5	424,862	15	1	15	1	28,09	2541

26.11.21	8	0	K.D	7,0	6,5	22,7	2,5	452,956	15	1	15	1	28,09	2541
27.11.21	8	0	K.D	7,0	6,5	22,2	2,5	481,050	15	1	15	1	28,09	2541
28.11.21	8	0	K.D	7,0	6,5	22,6	2,5	509,145	15	1	15	1	28,09	2541
29.11.21	8	0	K.D	7,0	6,5	22,7	2,5	537,239	15	1	15	1	28,09	2541
30.11.21	8	0	K.D	7,0	6,5	22,3	2,5	565,333	15	1	15	1	28,09	2541
01.12.21	8	0	K.D	7,0	6,5	22,7	2,5	593,427	15	1	15	1	28,09	2541
02.12.21	8	0	K.D	7,0	6,5	22,4	2,5	621,522	15	1	15	1	28,09	2541
03.12.21	8	0	K.D	7,0	6,5	22,3	2,5	649,616	15	1	15	1	28,09	2541
04.12.21	8	0	K.D	7,0	6,5	22,6	2,5	677,710	15	1	15	1	28,09	2541
05.12.21	8	0	K.D	7,0	6,5	22,4	2,5	705,805	15	1	15	1	28,09	2541
06.12.21	8	0	K.D	7,0	6,5	22,7	2,5	733,899	15	1	15	1	28,09	2541
07.12.21	8	0	K.D	7,0	6,5	22,5	2,5	761,993	15	1	15	1	28,09	2541
08.12.21	8	0	K.D	7,0	6,5	22,3	2,5	790,088	15	1	15	1	28,09	2541
09.12.21	8	0	K.D	7,0	6,5	22,5	2,5	818,182	15	1	15	1	28,09	2541
10.12.21	8	0	K.D	7,0	6,5	22,1	2,5	846,276	15	1	15	1	28,09	2541
11.12.21	8	0	K.D	7,0	6,5	23,0	2,5	874,370	15	1	15	1	28,09	2541
12.12.21	8	0	K.D	7,0	6,5	22,1	2,5	902,465	15	1	15	1	28,09	2541
13.12.21	8	0	K.D	7,0	6,5	22,3	2,5	930,559	15	1	15	1	28,09	2541
14.12.21	8	0	K.D	7,0	6,5	22,8	2,5	958,653	15	1	15	1	28,09	2541

15.12.21	8	0	K.D	7,0	6,5	22,9	2,5	986,748	15	1	15	1	28,09	2541
16.12.21	8	0	K.D	7,0	6,5	22,5	2,5	1014,842	15	1	15	1	28,09	2541
17.12.21	8	0	K.D	7,0	6,5	22,8	2,5	1042,936	15	1	15	1	28,09	2541
18.12.21	8	0	K.D	7,0	6,5	22,6	2,5	1071,031	15	1	15	1	28,09	2541
19.12.21	8	0	K.D	7,0	6,5	22,7	2,5	1099,125	15	1	15	1	28,09	2541
19.12.21	17	0	K.D	7,0	6,5	22,6	2,5	1109,719	15	1	15	1	10,59	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1106,27	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25024 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
10.11.21	8	0	K.D	6,5	6,0	22,8	2,5	3,427	15	1	15	1	0	0
11.11.21	8	0	K.D	6,5	6,0	22,8	2,5	31,521	15	1	15	1	28,09	2541

12.11.21	8	0	K.D	6,5	6,0	22,7	2,5	59,616	15	1	15	1	28,09	2541
13.11.21	8	0	K.D	6,5	6,0	22,7	2,5	87,710	15	1	15	1	28,09	2541
14.11.21	8	0	K.D	6,5	6,0	22,8	2,5	115,805	15	1	15	1	28,09	2541
15.11.21	8	0	K.D	6,5	6,0	22,6	2,5	143,899	15	1	15	1	28,09	2541
16.11.21	8	0	K.D	6,5	6,0	22,5	2,5	171,993	15	1	15	1	28,09	2541
17.11.21	8	0	K.D	6,5	6,0	22,3	2,5	200,088	15	1	15	1	28,09	2541
18.11.21	8	0	K.D	6,5	6,0	22,5	2,5	228,182	15	1	15	1	28,09	2541
19.11.21	8	0	K.D	6,5	6,0	22,3	2,5	256,276	15	1	15	1	28,09	2541
20.11.21	8	0	K.D	6,5	6,0	22,6	2,5	284,371	15	1	15	1	28,09	2541
21.11.21	8	0	K.D	6,5	6,0	22,6	2,5	312,465	15	1	15	1	28,09	2541
22.11.21	8	0	K.D	6,5	6,0	22,5	2,5	340,559	15	1	15	1	28,09	2541
23.11.21	8	0	K.D	6,5	6,0	22,8	2,5	368,654	15	1	15	1	28,09	2541
24.11.21	8	0	K.D	6,5	6,0	22,2	2,5	396,748	15	1	15	1	28,09	2541
25.11.21	8	0	K.D	6,5	6,0	22,8	2,5	424,842	15	1	15	1	28,09	2541
26.11.21	8	0	K.D	6,5	6,0	22,7	2,5	452,937	15	1	15	1	28,09	2541
27.11.21	8	0	K.D	6,5	6,0	22,2	2,5	481,031	15	1	15	1	28,09	2541
28.11.21	8	0	K.D	6,5	6,0	22,6	2,5	509,125	15	1	15	1	28,09	2541
29.11.21	8	0	K.D	6,5	6,0	22,7	2,5	537,220	15	1	15	1	28,09	2541
30.11.21	8	0	K.D	6,5	6,0	22,3	2,5	565,314	15	1	15	1	28,09	2541

01.12.21	8	0	K.D	6,5	6,0	22,7	2,5	593,408	15	1	15	1	28,09	2541
02.12.21	8	0	K.D	6,5	6,0	22,4	2,5	621,503	15	1	15	1	28,09	2541
03.12.21	8	0	K.D	6,5	6,0	22,3	2,5	649,597	15	1	15	1	28,09	2541
04.12.21	8	0	K.D	6,5	6,0	22,6	2,5	677,692	15	1	15	1	28,09	2541
05.12.21	8	0	K.D	6,5	6,0	22,4	2,5	705,786	15	1	15	1	28,09	2541
06.12.21	8	0	K.D	6,5	6,0	22,7	2,5	733,880	15	1	15	1	28,09	2541
07.12.21	8	0	K.D	6,5	6,0	22,5	2,5	761,975	15	1	15	1	28,09	2541
08.12.21	8	0	K.D	6,5	6,0	22,3	2,5	790,069	15	1	15	1	28,09	2541
09.12.21	8	0	K.D	6,5	6,0	22,5	2,5	818,163	15	1	15	1	28,09	2541
10.12.21	8	0	K.D	6,5	6,0	22,1	2,5	846,258	15	1	15	1	28,09	2541
11.12.21	8	0	K.D	6,5	6,0	23,0	2,5	874,352	15	1	15	1	28,09	2541
12.12.21	8	0	K.D	6,5	6,0	22,1	2,5	902,446	15	1	15	1	28,09	2541
13.12.21	8	0	K.D	6,5	6,0	22,3	2,5	930,541	15	1	15	1	28,09	2541
14.12.21	8	0	K.D	6,5	6,0	22,8	2,5	958,635	15	1	15	1	28,09	2541
15.12.21	8	0	K.D	6,5	6,0	22,9	2,5	986,729	15	1	15	1	28,09	2541
16.12.21	8	0	K.D	6,5	6,0	22,5	2,5	1014,824	15	1	15	1	28,09	2541
17.12.21	8	0	K.D	6,5	6,0	22,8	2,5	1042,918	15	1	15	1	28,09	2541
18.12.21	8	0	K.D	6,5	6,0	22,6	2,5	1071,012	15	1	15	1	28,09	2541
19.12.21	8	0	K.D	6,5	6,0	22,7	2,5	1099,107	15	1	15	1	28,09	2541

19.12.21	17	0	K.D	6,5	6,0	22,6	2,5	1109,649	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1106,22	100024
Teoratical total	1111,11	100000

Meter Serial No.: TK-25025 - TK-25 DN20 190mm

Discontinuous Test Readings

Date	T*ime*		*Observer*	*Upstream Pressure* bar	*Downstream Pressure* bar	*Upstream temp.* °C	*Actual Flowrate* m³/h	Meter Reading m³	*Flow Cycle Times*				Total Volume Discharged m³	Total no. of flow cycles
									rise	on	fall	off		
10.11.21	8	0	K.D	6,0	5,5	22,8	2,5	3,417	15	1	15	1	0	0
11.11.21	8	0	K.D	6,0	5,5	22,8	2,5	31,518	15	1	15	1	28,10	2541
12.11.21	8	0	K.D	6,0	5,5	22,7	2,5	59,619	15	1	15	1	28,10	2541
13.11.21	8	0	K.D	6,0	5,5	22,7	2,5	87,720	15	1	15	1	28,10	2541
14.11.21	8	0	K.D	6,0	5,5	22,8	2,5	115,820	15	1	15	1	28,10	2541
15.11.21	8	0	K.D	6,0	5,5	22,6	2,5	143,921	15	1	15	1	28,10	2541
16.11.21	8	0	K.D	6,0	5,5	22,5	2,5	172,022	15	1	15	1	28,10	2541

17.11.21	8	0	K.D	6,0	5,5	22,3	2,5	200,123	15	1	15	1	28,10	2541
18.11.21	8	0	K.D	6,0	5,5	22,5	2,5	228,224	15	1	15	1	28,10	2541
19.11.21	8	0	K.D	6,0	5,5	22,3	2,5	256,324	15	1	15	1	28,10	2541
20.11.21	8	0	K.D	6,0	5,5	22,6	2,5	284,425	15	1	15	1	28,10	2541
21.11.21	8	0	K.D	6,0	5,5	22,6	2,5	312,526	15	1	15	1	28,10	2541
22.11.21	8	0	K.D	6,0	5,5	22,5	2,5	340,627	15	1	15	1	28,10	2541
23.11.21	8	0	K.D	6,0	5,5	22,8	2,5	368,728	15	1	15	1	28,10	2541
24.11.21	8	0	K.D	6,0	5,5	22,2	2,5	396,829	15	1	15	1	28,10	2541
25.11.21	8	0	K.D	6,0	5,5	22,8	2,5	424,929	15	1	15	1	28,10	2541
26.11.21	8	0	K.D	6,0	5,5	22,7	2,5	453,030	15	1	15	1	28,10	2541
27.11.21	8	0	K.D	6,0	5,5	22,2	2,5	481,131	15	1	15	1	28,10	2541
28.11.21	8	0	K.D	6,0	5,5	22,6	2,5	509,232	15	1	15	1	28,10	2541
29.11.21	8	0	K.D	6,0	5,5	22,7	2,5	537,333	15	1	15	1	28,10	2541
30.11.21	8	0	K.D	6,0	5,5	22,3	2,5	565,433	15	1	15	1	28,10	2541
01.12.21	8	0	K.D	6,0	5,5	22,7	2,5	593,534	15	1	15	1	28,10	2541
02.12.21	8	0	K.D	6,0	5,5	22,4	2,5	621,635	15	1	15	1	28,10	2541
03.12.21	8	0	K.D	6,0	5,5	22,3	2,5	649,736	15	1	15	1	28,10	2541
04.12.21	8	0	K.D	6,0	5,5	22,6	2,5	677,837	15	1	15	1	28,10	2541
05.12.21	8	0	K.D	6,0	5,5	22,4	2,5	705,938	15	1	15	1	28,10	2541

06.12.21	8	0	K.D	6,0	5,5	22,7	2,5	734,038	15	1	15	1	28,10	2541
07.12.21	8	0	K.D	6,0	5,5	22,5	2,5	762,139	15	1	15	1	28,10	2541
08.12.21	8	0	K.D	6,0	5,5	22,3	2,5	790,240	15	1	15	1	28,10	2541
09.12.21	8	0	K.D	6,0	5,5	22,5	2,5	818,341	15	1	15	1	28,10	2541
10.12.21	8	0	K.D	6,0	5,5	22,1	2,5	846,442	15	1	15	1	28,10	2541
11.12.21	8	0	K.D	6,0	5,5	23,0	2,5	874,542	15	1	15	1	28,10	2541
12.12.21	8	0	K.D	6,0	5,5	22,1	2,5	902,643	15	1	15	1	28,10	2541
13.12.21	8	0	K.D	6,0	5,5	22,3	2,5	930,744	15	1	15	1	28,10	2541
14.12.21	8	0	K.D	6,0	5,5	22,8	2,5	958,845	15	1	15	1	28,10	2541
15.12.21	8	0	K.D	6,0	5,5	22,9	2,5	986,946	15	1	15	1	28,10	2541
16.12.21	8	0	K.D	6,0	5,5	22,5	2,5	1015,047	15	1	15	1	28,10	2541
17.12.21	8	0	K.D	6,0	5,5	22,8	2,5	1043,147	15	1	15	1	28,10	2541
18.12.21	8	0	K.D	6,0	5,5	22,6	2,5	1071,248	15	1	15	1	28,10	2541
19.12.21	8	0	K.D	6,0	5,5	22,7	2,5	1099,349	15	1	15	1	28,10	2541
19.12.21	17	0	K.D	6,0	5,5	22,6	2,5	1109,892	15	1	15	1	10,54	925

Comment: Water meter is connected on Horizontal Position

Totals at end of test	1106,47	100024
Teoratical total	1111,11	100000

			At Start	At End	
Application No:		Ambient Temperature:	23	23	°C
Model:	TK-25	Ambient relative humidity:	48%	48%	%
Date:	20.12.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:00	13:00	

Meter serial No.:	TK-25021	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1110,61352	1110,71290	0,09938	0,10035	-0,97	2,5	-0,27	1,5
3,125	6	22,5	1110,71290	1110,81416	0,10127	0,10231	-1,02	2,5	-0,32	1,5

2,5	6	22,5	1110,81416	1110,91411	0,09995	0,10058	-0,63	2,5	-0,42	1,5
2,5	6	22,5	1110,91411	1111,01517	0,10106	0,10164	-0,57	2,5	-0,36	1,5
2,5	6	22,5	1111,01517	1111,11531	0,10014	0,10073	-0,59	2,5	-0,38	1,5
1,778	6	22,5	1111,11531	1111,19540	0,08010	0,08013	-0,04	2,5	-0,36	1,5
1,778	6	22,5	1111,19540	1111,27563	0,08023	0,08033	-0,13	2,5	-0,45	1,5
0,889	6	22,5	1111,27563	1111,33606	0,06043	0,06014	0,49	2,5	-0,44	1,5
0,889	6	22,5	1111,33606	1111,39670	0,06064	0,06032	0,53	2,5	-0,40	1,5
0,04	6	22,5	1111,39670	1111,40703	0,01032	0,01032	0,04	2,5	-0,52	1,5
0,04	6	22,5	1111,40703	1111,41718	0,01016	0,01017	-0,14	2,5	-0,70	1,5
0,04	6	22,5	1111,41718	1111,42740	0,01021	0,01022	-0,08	2,5	-0,64	1,5
0,025	6	22,5	1111,42740	1111,43426	0,00687	0,00702	-2,17	6	-1,20	3
0,025	6	22,5	1111,43426	1111,44119	0,00693	0,00712	-2,69	6	-1,72	3
0,025	6	22,5	1111,44119	1111,44806	0,00687	0,00703	-2,25	6	-1,28	3

Meter serial No.: TK-25022 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1110,46836	1110,56741	0,09905	0,10035	-1,30	2,5	-0,50	1,5
3,125	6	22,5	1110,56741	1110,66841	0,10100	0,10231	-1,28	2,5	-0,48	1,5
2,5	6	22,5	1110,66841	1110,76819	0,09979	0,10058	-0,79	2,5	-0,55	1,5
2,5	6	22,5	1110,76819	1110,86889	0,10069	0,10164	-0,93	2,5	-0,69	1,5
2,5	6	22,5	1110,86889	1110,96873	0,09984	0,10073	-0,88	2,5	-0,64	1,5
1,778	6	22,5	1110,96873	1111,04849	0,07976	0,08013	-0,46	2,5	-0,78	1,5
1,778	6	22,5	1111,04849	1111,12853	0,08004	0,08033	-0,36	2,5	-0,68	1,5
0,889	6	22,5	1111,12853	1111,18883	0,06030	0,06014	0,27	2,5	-0,52	1,5
0,889	6	22,5	1111,18883	1111,24926	0,06043	0,06032	0,18	2,5	-0,61	1,5

0,04	6	22,5	1111,24926	1111,25957	0,01031	0,01032	-0,08	2,5	-0,60	1,5
0,04	6	22,5	1111,25957	1111,26973	0,01015	0,01017	-0,17	2,5	-0,69	1,5
0,04	6	22,5	1111,26973	1111,27994	0,01021	0,01022	-0,06	2,5	-0,58	1,5

0,025	6	22,5	1111,27994	1111,28679	0,00685	0,00702	-2,46	6	-1,39	3
0,025	6	22,5	1111,28679	1111,29371	0,00692	0,00712	-2,74	6	-1,67	3
0,025	6	22,5	1111,29371	1111,30058	0,00687	0,00703	-2,27	6	-1,20	3

Meter serial No.: TK-25023 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1110,39743	1110,49657	0,09914	0,10035	-1,21	2,5	-0,50	1,5
3,125	6	22,5	1110,49657	1110,59741	0,10085	0,10231	-1,43	2,5	-0,72	1,5

2,5	6	22,5	1110,59741	1110,69736	0,09995	0,10058	-0,63	2,5	-0,52	1,5
2,5	6	22,5	1110,69736	1110,79824	0,10088	0,10164	-0,75	2,5	-0,64	1,5
2,5	6	22,5	1110,79824	1110,89814	0,09990	0,10073	-0,82	2,5	-0,71	1,5
1,778	6	22,5	1110,89814	1110,97793	0,07979	0,08013	-0,42	2,5	-0,63	1,5
1,778	6	22,5	1110,97793	1111,05785	0,07991	0,08033	-0,52	2,5	-0,73	1,5
0,889	6	22,5	1111,05785	1111,11809	0,06024	0,06014	0,17	2,5	-0,54	1,5
0,889	6	22,5	1111,11809	1111,17854	0,06045	0,06032	0,22	2,5	-0,49	1,5
0,04	6	22,5	1111,17854	1111,18883	0,01029	0,01032	-0,32	2,5	-0,85	1,5
0,04	6	22,5	1111,18883	1111,19898	0,01016	0,01017	-0,14	2,5	-0,67	1,5
0,04	6	22,5	1111,19898	1111,20918	0,01020	0,01022	-0,22	2,5	-0,75	1,5
0,025	6	22,5	1111,20918	1111,21602	0,00684	0,00702	-2,57	6	-1,39	3
0,025	6	22,5	1111,21602	1111,22295	0,00693	0,00712	-2,69	6	-1,51	3
0,025	6	22,5	1111,22295	1111,22979	0,00684	0,00703	-2,74	6	-1,56	3

Meter serial No.: TK-25024 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1110,77364	1110,87255	0,09891	0,10035	-1,43	2,5	-0,73	1,5
3,125	6	22,5	1110,87255	1110,97361	0,10105	0,10231	-1,23	2,5	-0,53	1,5
2,5	6	22,5	1110,97361	1111,07342	0,09982	0,10058	-0,76	2,5	-0,51	1,5
2,5	6	22,5	1111,07342	1111,17443	0,10101	0,10164	-0,62	2,5	-0,37	1,5
2,5	6	22,5	1111,17443	1111,27432	0,09988	0,10073	-0,84	2,5	-0,59	1,5
1,778	6	22,5	1111,27432	1111,35417	0,07985	0,08013	-0,35	2,5	-0,61	1,5
1,778	6	22,5	1111,35417	1111,43406	0,07990	0,08033	-0,54	2,5	-0,80	1,5
0,889	6	22,5	1111,43406	1111,49433	0,06027	0,06014	0,21	2,5	-0,60	1,5
0,889	6	22,5	1111,49433	1111,55475	0,06042	0,06032	0,17	2,5	-0,64	1,5

0,04	6	22,5	1111,55475	1111,56504	0,01029	0,01032	-0,32	2,5	-0,90	1,5
0,04	6	22,5	1111,56504	1111,57519	0,01016	0,01017	-0,14	2,5	-0,72	1,5
0,04	6	22,5	1111,57519	1111,58539	0,01020	0,01022	-0,21	2,5	-0,79	1,5

0,025	6	22,5	1111,58539	1111,59221	0,00681	0,00702	-2,93	6	-1,98	3
0,025	6	22,5	1111,59221	1111,59917	0,00697	0,00712	-2,17	6	-1,22	3
0,025	6	22,5	1111,59917	1111,60604	0,00687	0,00703	-2,33	6	-1,38	3

Meter serial No.: TK-25025 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1110,59432	1110,69335	0,09903	0,10035	-1,32	2,5	-0,60	1,5
3,125	6	22,5	1110,69335	1110,79449	0,10114	0,10231	-1,14	2,5	-0,42	1,5

2,5	6	22,5	1110,79449	1110,89410	0,09961	0,10058	-0,96	2,5	-0,71	1,5
2,5	6	22,5	1110,89410	1110,99500	0,10090	0,10164	-0,73	2,5	-0,48	1,5
2,5	6	22,5	1110,99500	1111,09491	0,09990	0,10073	-0,82	2,5	-0,57	1,5
1,778	6	22,5	1111,09491	1111,17469	0,07979	0,08013	-0,43	2,5	-0,66	1,5
1,778	6	22,5	1111,17469	1111,25471	0,08002	0,08033	-0,39	2,5	-0,62	1,5
0,889	6	22,5	1111,25471	1111,31489	0,06018	0,06014	0,07	2,5	-0,63	1,5
0,889	6	22,5	1111,31489	1111,37531	0,06042	0,06032	0,16	2,5	-0,54	1,5
0,04	6	22,5	1111,37531	1111,38559	0,01029	0,01032	-0,32	2,5	-0,80	1,5
0,04	6	22,5	1111,38559	1111,39574	0,01015	0,01017	-0,24	2,5	-0,72	1,5
0,04	6	22,5	1111,39574	1111,40594	0,01020	0,01022	-0,17	2,5	-0,65	1,5
0,025	6	22,5	1111,40594	1111,41278	0,00684	0,00702	-2,63	6	-1,45	3
0,025	6	22,5	1111,41278	1111,41974	0,00697	0,00712	-2,17	6	-0,99	3
0,025	6	22,5	1111,41974	1111,42661	0,00687	0,00703	-2,32	6	-1,14	3

3.3.9.5.2 Continuous Flow Tests "OIML R-49:2013: 7.11.3 | EN ISO 4064-2: 2018 7.11.3"

Meter Serial No: TK-25021

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
21.12.2021	08:00	K.D	5	4,4	22,8	3,125	1111,448	0	0
22.12.2021	08:00	K.D	5	4,4	22,9	3,125	1185,183	73,735	24
23.12.2021	08:00	K.D	5	4,4	22,7	3,125	1258,918	147,470	48
24.12.2021	08:00	K.D	5	4,4	22,8	3,125	1332,654	221,206	72
25.12.2021	12:00	K.D	5	4,4	22,9	3,125	1418,678	307,230	100
				Total at end of test				307,230	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25022

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa	Mpa	°C	m³/h	m³	m³	h

			(bar)	(bar)					
21.12.2021	08:00	K.D	4,4	3,8	22,8	3,125	1111,301	0	0
22.12.2021	08:00	K.D	4,4	3,8	22,9	3,125	1184,936	73,635	24
23.12.2021	08:00	K.D	4,4	3,8	22,7	3,125	1258,571	147,270	48
24.12.2021	08:00	K.D	4,4	3,8	22,8	3,125	1332,206	220,905	72
25.12.2021	12:00	K.D	4,4	3,8	22,9	3,125	1418,114	306,813	100
				Total at end of test				306,813	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25023

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m^3/h	m^3	m^3	h
21.12.2021	08:00	K.D	3,8	3,2	22,8	3,125	1111,230	0,000	0
22.12.2021	08:00	K.D	3,8	3,2	22,9	3,125	1184,926	73,696	24
23.12.2021	08:00	K.D	3,8	3,2	22,7	3,125	1258,622	147,393	48

24.12.2021	08:00	K.D	3,8	3,2	22,8	3,125	1332,319	221,089	72
25.12.2021	12:00	K.D	3,8	3,2	22,9	3,125	1418,298	307,068	100
				Total at end of test				307,068	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25024

Date	Time	Observer	Up stream Pressure	Downstream Pressure	Upstream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m^3/h	m^3	m^3	h
21.12.2021	08:00	K.D	3,2	2,6	22,8	3,125	1111,606	0,000	0
22.12.2021	08:00	K.D	3,2	2,6	22,9	3,125	1185,412	73,806	24
23.12.2021	08:00	K.D	3,2	2,6	22,7	3,125	1259,218	147,612	48
24.12.2021	08:00	K.D	3,2	2,6	22,8	3,125	1333,023	221,417	72
25.12.2021	12:00	K.D	3,2	2,6	22,9	3,125	1419,130	307,524	100
				Total at end of test				307,524	100
				Minimum volume discharged				312,5	
Comments: Water meter is connected on Horizontal Position									

Meter Serial No: TK-25025

Date	Time	Observer	Up stream Pressure	Down stream Pressure	Up stream temp.	Actual Flowrate	Meter Reading	Total Volume Discharged	Hours run
			Mpa (bar)	Mpa (bar)	°C	m³/h	m³	m³	h
21.12.2021	08:00	K.D	2,6	2,0	22,8	3,125	1111,427	0,000	0
22.12.2021	08:00	K.D	2,6	2,0	22,9	3,125	1185,094	73,667	24
23.12.2021	08:00	K.D	2,6	2,0	22,7	3,125	1258,761	147,335	48
24.12.2021	08:00	K.D	2,6	2,0	22,8	3,125	1332,428	221,002	72
25.12.2021	12:00	K.D	2,6	2,0	22,9	3,125	1418,374	306,947	100
				Total at end of test				306,947	100
				Minimum volume discharged				312,5	

Comments: Water meter is connected on Horizontal Position

Application No:

Model: TK-25

	At Start	At End	
Ambient Temperature:	23	23	°C
Ambient relative humidity:	48%	48%	%

Date:	26.12.2021	Ambient atmospheric pressure:	101,325	101,325	Kpa
Observer:	K.DEMİRKURT	Time:	08:00	13:00	

Meter serial No.:	TK-25021	Orientation (V, H, other):	H
Flow direction:	Normal	Location of indicating device:	Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1419,35465	1419,45321	0,09856	0,10024	-1,68	2,5	-0,98	1,5
3,125	6	22,5	1419,45321	1419,55224	0,09903	0,10091	-1,86	2,5	-1,16	1,5
2,5	6	22,5	1419,55224	1419,65113	0,09889	0,10013	-1,24	2,5	-1,03	1,5
2,5	6	22,5	1419,65113	1419,75056	0,09943	0,10058	-1,14	2,5	-0,93	1,5
2,5	6	22,5	1419,75056	1419,84976	0,09919	0,10043	-1,23	2,5	-1,02	1,5
1,778	6	22,5	1419,84976	1419,92949	0,07973	0,08032	-0,73	2,5	-1,05	1,5

1,778	6	22,5	1419,92949	1420,00926	0,07977	0,08044	-0,83	2,5	-1,15	1,5
0,889	6	22,5	1420,00926	1420,06961	0,06035	0,06032	0,05	2,5	-0,88	1,5
0,889	6	22,5	1420,06961	1420,12994	0,06033	0,06025	0,13	2,5	-0,80	1,5
0,04	6	22,5	1420,12994	1420,14012	0,01018	0,01021	-0,33	2,5	-0,89	1,5
0,04	6	22,5	1420,14012	1420,15021	0,01010	0,01014	-0,43	2,5	-0,99	1,5
0,04	6	22,5	1420,15021	1420,16044	0,01023	0,01028	-0,51	2,5	-1,07	1,5
0,025	6	22,5	1420,16044	1420,16726	0,00682	0,00703	-3,04	6	-2,07	3
0,025	6	22,5	1420,16726	1420,17403	0,00677	0,00701	-3,39	6	-2,42	3
0,025	6	22,5	1420,17403	1420,18089	0,00686	0,00709	-3,25	6	-2,28	3

Meter serial No.: TK-25022 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1418,76535	1418,86382	0,09847	0,10024	-1,77	2,5	-0,97	1,5
3,125	6	22,5	1418,86382	1418,96324	0,09943	0,10091	-1,47	2,5	-0,67	1,5
2,5	6	22,5	1418,96324	1419,06232	0,09908	0,10013	-1,05	2,5	-0,81	1,5
2,5	6	22,5	1419,06232	1419,16191	0,09958	0,10058	-0,99	2,5	-0,75	1,5
2,5	6	22,5	1419,16191	1419,26139	0,09949	0,10043	-0,94	2,5	-0,70	1,5
1,778	6	22,5	1419,26139	1419,34120	0,07981	0,08032	-0,64	2,5	-0,96	1,5
1,778	6	22,5	1419,34120	1419,42125	0,08005	0,08044	-0,48	2,5	-0,80	1,5
0,889	6	22,5	1419,42125	1419,48144	0,06019	0,06032	-0,21	2,5	-1,00	1,5
0,889	6	22,5	1419,48144	1419,54159	0,06015	0,06025	-0,17	2,5	-0,96	1,5
0,04	6	22,5	1419,54159	1419,55177	0,01018	0,01021	-0,34	2,5	-0,86	1,5
0,04	6	22,5	1419,55177	1419,56187	0,01010	0,01014	-0,41	2,5	-0,93	1,5
0,04	6	22,5	1419,56187	1419,57209	0,01023	0,01028	-0,52	2,5	-1,04	1,5

0,025	6	22,5	1419,57209	1419,57893	0,00684	0,00703	-2,73	6	-1,66	3
0,025	6	22,5	1419,57893	1419,58573	0,00680	0,00701	-2,93	6	-1,86	3
0,025	6	22,5	1419,58573	1419,59260	0,00687	0,00709	-3,11	6	-2,04	3

Meter serial No.: TK-25023 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1418,93653	1419,03499	0,09846	0,10024	-1,78	2,5	-1,07	1,5
3,125	6	22,5	1419,03499	1419,13425	0,09927	0,10091	-1,63	2,5	-0,92	1,5
2,5	6	22,5	1419,13425	1419,23312	0,09887	0,10013	-1,26	2,5	-1,15	1,5
2,5	6	22,5	1419,23312	1419,33261	0,09949	0,10058	-1,08	2,5	-0,97	1,5
2,5	6	22,5	1419,33261	1419,43192	0,09931	0,10043	-1,12	2,5	-1,01	1,5

1,778	6	22,5	1419,43192	1419,51173	0,07981	0,08032	-0,63	2,5	-0,84	1,5
1,778	6	22,5	1419,51173	1419,59159	0,07986	0,08044	-0,72	2,5	-0,93	1,5
0,889	6	22,5	1419,59159	1419,65172	0,06013	0,06032	-0,32	2,5	-1,03	1,5
0,889	6	22,5	1419,65172	1419,71187	0,06015	0,06025	-0,17	2,5	-0,88	1,5
0,04	6	22,5	1419,71187	1419,72203	0,01017	0,01021	-0,43	2,5	-0,96	1,5
0,04	6	22,5	1419,72203	1419,73214	0,01011	0,01014	-0,33	2,5	-0,86	1,5
0,04	6	22,5	1419,73214	1419,74239	0,01025	0,01028	-0,28	2,5	-0,81	1,5
0,025	6	22,5	1419,74239	1419,74919	0,00680	0,00703	-3,24	6	-2,06	3
0,025	6	22,5	1419,74919	1419,75597	0,00678	0,00701	-3,27	6	-2,09	3
0,025	6	22,5	1419,75597	1419,76282	0,00684	0,00709	-3,46	6	-2,28	3

Meter serial No.: TK-25024 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)

Q( ) m³/h	MPa (bar)	Tw °C	Vi(i) m³	Vi(f) m³	Vi m³	Va m³	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1419,97382	1420,07237	0,09855	0,10024	-1,69	2,5	-0,99	1,5
3,125	6	22,5	1420,07237	1420,17153	0,09916	0,10091	-1,73	2,5	-1,03	1,5
2,5	6	22,5	1420,17153	1420,27097	0,09944	0,10013	-0,69	2,5	-0,44	1,5
2,5	6	22,5	1420,27097	1420,37049	0,09952	0,10058	-1,05	2,5	-0,80	1,5
2,5	6	22,5	1420,37049	1420,46990	0,09941	0,10043	-1,02	2,5	-0,77	1,5
1,778	6	22,5	1420,46990	1420,54955	0,07965	0,08032	-0,83	2,5	-1,09	1,5
1,778	6	22,5	1420,54955	1420,62938	0,07983	0,08044	-0,76	2,5	-1,02	1,5
0,889	6	22,5	1420,62938	1420,68956	0,06018	0,06032	-0,23	2,5	-1,04	1,5
0,889	6	22,5	1420,68956	1420,74961	0,06005	0,06025	-0,34	2,5	-1,15	1,5
0,04	6	22,5	1420,74961	1420,75978	0,01017	0,01021	-0,37	2,5	-0,95	1,5
0,04	6	22,5	1420,75978	1420,76988	0,01010	0,01014	-0,43	2,5	-1,01	1,5
0,04	6	22,5	1420,76988	1420,78010	0,01023	0,01028	-0,52	2,5	-1,10	1,5

0,025	6	22,5	1420,78010	1420,78690	0,00680	0,00703	-3,32	6	-2,37	3
0,025	6	22,5	1420,78690	1420,79369	0,00679	0,00701	-3,18	6	-2,23	3
0,025	6	22,5	1420,79369	1420,80055	0,00686	0,00709	-3,25	6	-2,30	3

Meter serial No.: TK-25025 Orientation (V, H, other): H

Flow direction: Normal Location of indicating device: Top

Actual flowrate	Initial supply pressure	Water temp.	Initial reading	Final reading	Indicated volume	Actual volume	Meter error	MPE	Curve variation error	MPE (of curve variation error)
Q( ) m^3/h	MPa (bar)	Tw °C	Vi(i) m^3	Vi(f) m^3	Vi m^3	Va m^3	*E*m %	%	Ēm(B) - Ēm(A) %	%
3,125	6	22,5	1419,32177	1419,42066	0,09889	0,10024	-1,35	2,5	-0,63	1,5
3,125	6	22,5	1419,42066	1419,52007	0,09942	0,10091	-1,48	2,5	-0,76	1,5
2,5	6	22,5	1419,52007	1419,61919	0,09912	0,10013	-1,01	2,5	-0,76	1,5
2,5	6	22,5	1419,61919	1419,71855	0,09936	0,10058	-1,21	2,5	-0,96	1,5
2,5	6	22,5	1419,71855	1419,81779	0,09923	0,10043	-1,19	2,5	-0,94	1,5

1,778	6	22,5	1419,81779	1419,89752	0,07973	0,08032	-0,73	2,5	-0,96	1,5
1,778	6	22,5	1419,89752	1419,97746	0,07993	0,08044	-0,63	2,5	-0,86	1,5

0,889	6	22,5	1419,97746	1420,03757	0,06011	0,06032	-0,35	2,5	-1,05	1,5
0,889	6	22,5	1420,03757	1420,09765	0,06008	0,06025	-0,28	2,5	-0,98	1,5

0,04	6	22,5	1420,09765	1420,10781	0,01016	0,01021	-0,46	2,5	-0,94	1,5
0,04	6	22,5	1420,10781	1420,11789	0,01008	0,01014	-0,56	2,5	-1,04	1,5
0,04	6	22,5	1420,11789	1420,12811	0,01022	0,01028	-0,62	2,5	-1,10	1,5

0,025	6	22,5	1420,12811	1420,13491	0,00680	0,00703	-3,24	6	-2,06	3
0,025	6	22,5	1420,13491	1420,14170	0,00679	0,00701	-3,17	6	-1,99	3
0,025	6	22,5	1420,14170	1420,14854	0,00684	0,00709	-3,54	6	-2,36	3

CHAPTER 4: RESULTS

4.1 Summary of the Test Results

4.1.1 Summary of the Applied Tests with 100% Recycled Brass Material

Table 8. Summary of the Applied Tests with 100% Recycled Brass Material

Test Name	Water Meter Serial Number				
	TK-25001	TK-25002	TK-25003	TK-25004	TK-25005
Static Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Determination of intrinsic errors	PASSED	PASSED	PASSED	PASSED	PASSED
Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED
Overload Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED
Water Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Endurance Tests	PASSED	PASSED	PASSED	PASSED	PASSED

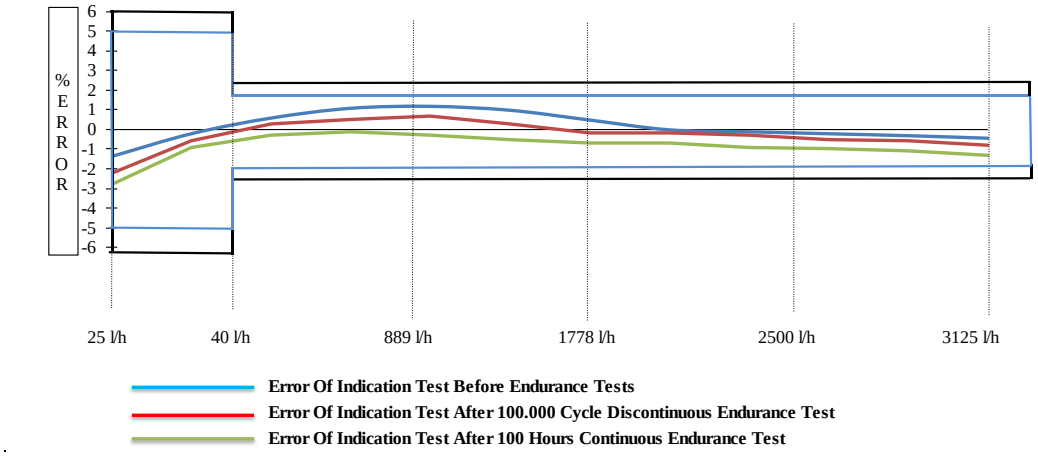

Figure 3. Error of Indication Test Results (Before and After Endurance Tests) of 100% Recycled Brass Material - Meter 1

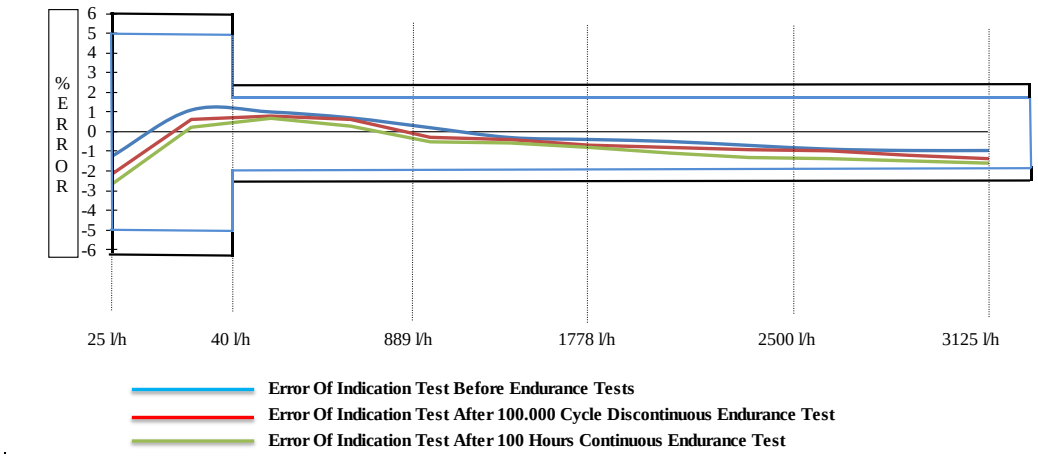

Figure 4. Error of Indication Test Results (Before and After Endurance Tests) of 100% Recycled Brass Material - Meter 2

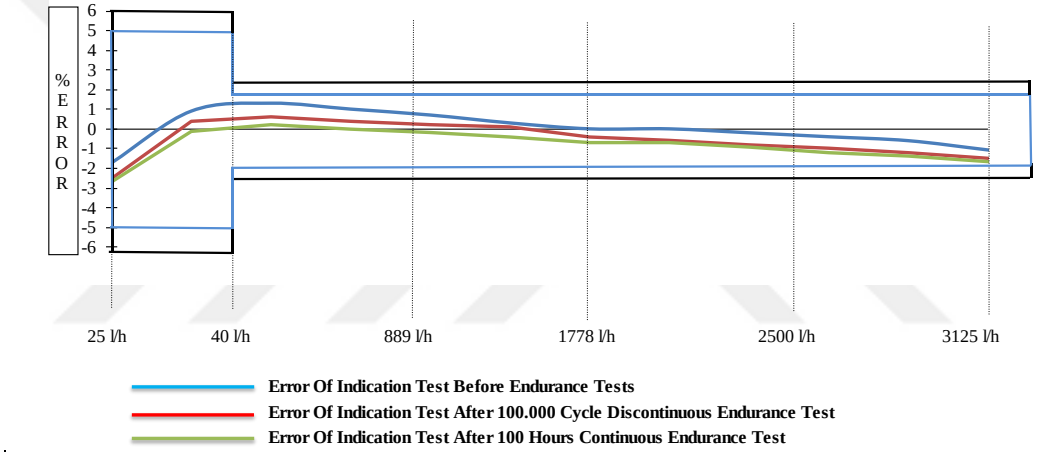

Figure 5. Error of Indication Test Results (Before and After Endurance Tests) of 100% Recycled Brass Material - Meter 3

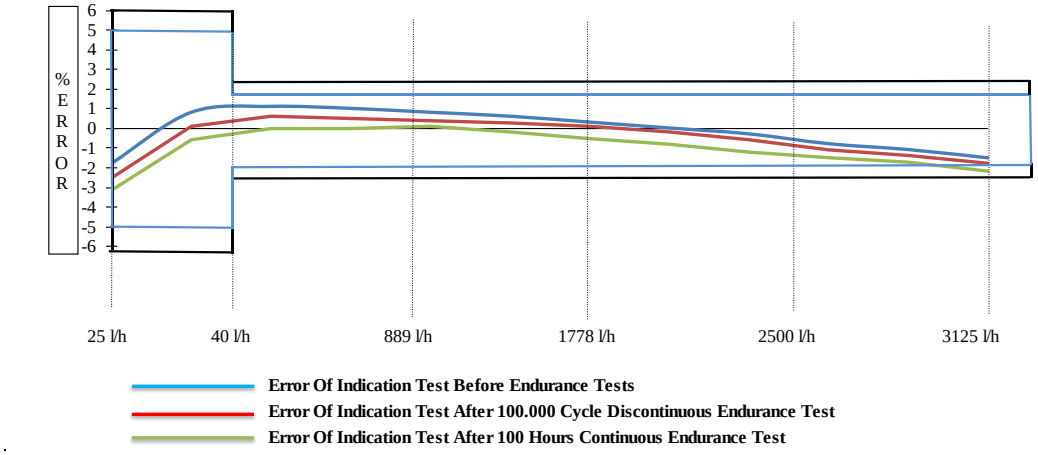

Figure 6. Error of Indication Test Results (Before and After Endurance Tests) of 100% Recycled Brass Material - Meter 4

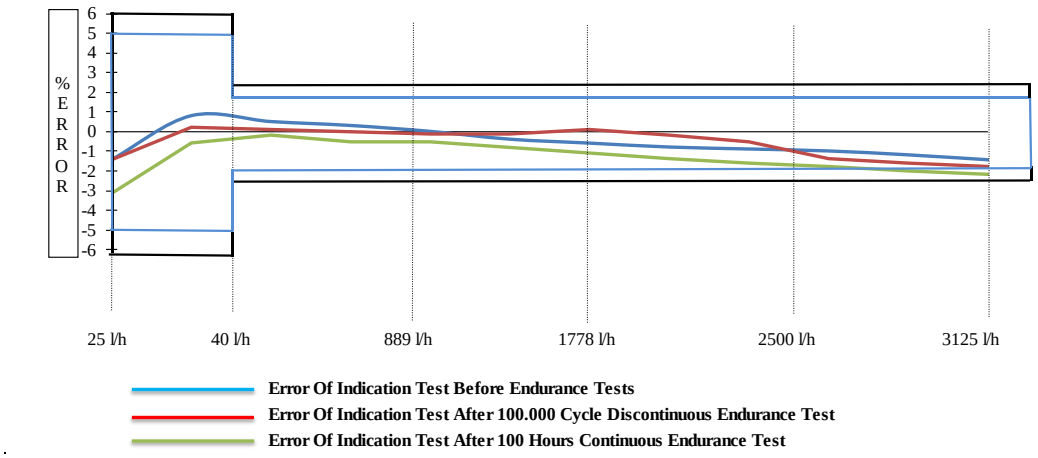

Figure 7. Error of Indication Test Results (Before and After Endurance Tests) of 100% Recycled Brass Material - Meter 5

4.1.2 Summary of the Applied Tests with 100% Recycled Plastic Material

Table 9. Summary of the Applied Tests with 100% Recycled Plastic Material

Test Name	**Water Meter Serial Number**				
	TK-25006	**TK-25007**	**TK-25008**	**TK-25009**	**TK-25010**
Static Pressure Test	FAILED	FAILED	FAILED	FAILED	FAILED
Determination of intrinsic errors	N/A	N/A	N/A	N/A	N/A
Water Temperature Test	N/A	N/A	N/A	N/A	N/A
Overload Water Temperature Test	N/A	N/A	N/A	N/A	N/A
Water Pressure Test	N/A	N/A	N/A	N/A	N/A
Endurance Tests	N/A	N/A	N/A	N/A	N/A

4.1.3 Summary of the Applied Tests with 50% Recycled Plastic Material

Table 10. Summary of the Applied Tests with 50% Recycled Plastic Material

Test Name	**Water Meter Serial Number**				
	TK-25011	**TK-25012**	**TK-25013**	**TK-25014**	**TK-25015**
Static Pressure Test	FAILED	PASSED	FAILED	PASSED	PASSED
Determination of intrinsic errors	N/A	N/A	N/A	N/A	N/A
Water Temperature Test	N/A	N/A	N/A	N/A	N/A
Overload Water Temperature Test	N/A	N/A	N/A	N/A	N/A
Water Pressure Test	N/A	N/A	N/A	N/A	N/A
Endurance Tests	N/A	N/A	N/A	N/A	N/A

4.1.4 Summary of the Applied Tests with 30% Recycled Plastic Material

Table 11. Summary of the Applied Tests with 30% Recycled Plastic Material

Test Name	**Water Meter Serial Number**				
	TK-25016	**TK-25017**	**TK-25018**	**TK-25019**	**TK-25020**
Static Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Determination of intrinsic errors	PASSED	PASSED	PASSED	PASSED	PASSED
Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED

Table 11. (Continued)

Overload Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED
Water Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Endurance Tests	FAILED	FAILED	FAILED	FAILED	FAILED

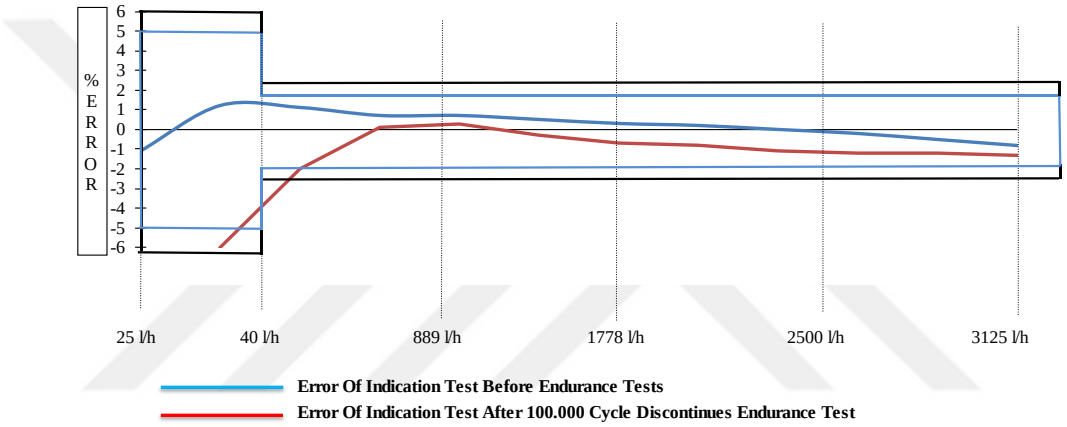

Figure 8. Error of Indication Test Results (Before and After Discontinues Endurance Test) of 30% Recycled Plastic Material - Meter 1

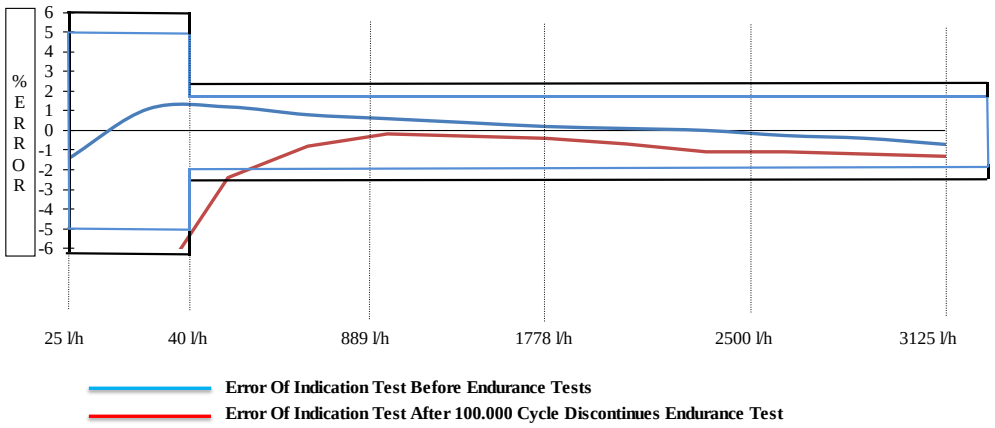

Figure 9. Error of Indication Test Results (Before and After Discontinues Endurance Test) of 30% Recycled Plastic Material - Meter 2

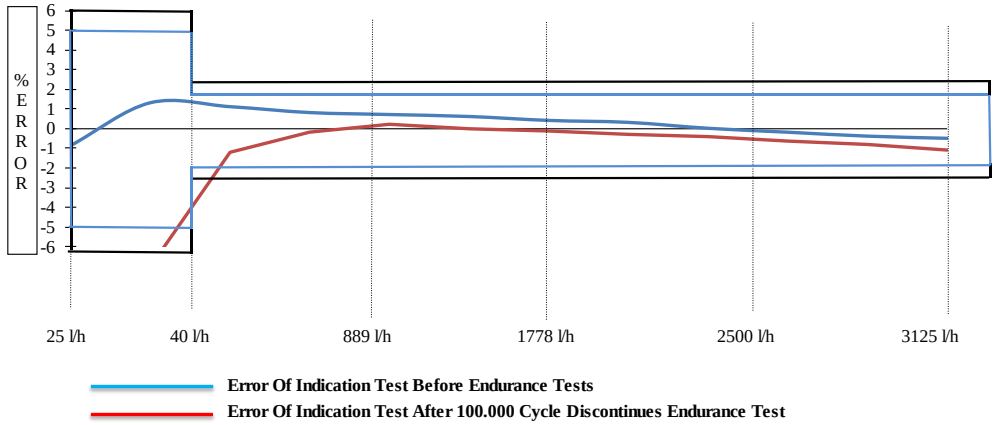

Figure 10. Error of Indication Test Results (Before and After Discontinues Endurance Test) of 30% Recycled Plastic Material - Meter 3

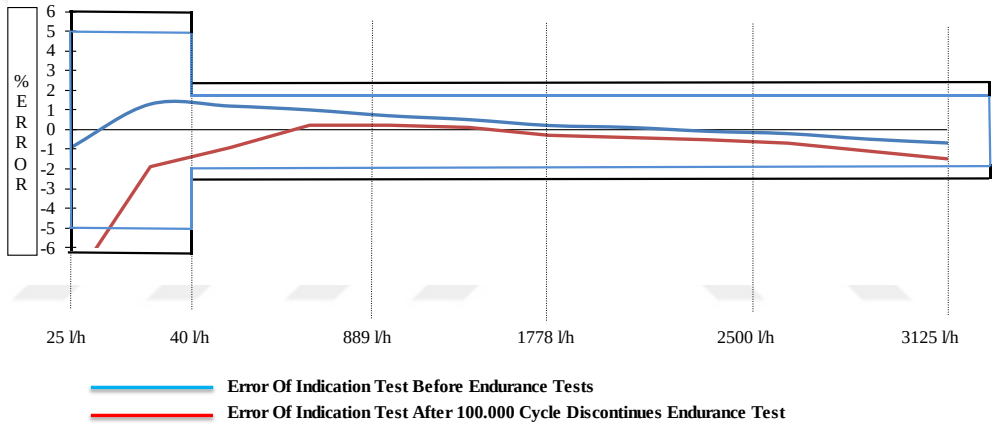

Figure 11. Error of Indication Test Results (Before and After Discontinues Endurance Test) of 30% Recycled Plastic Material - Meter 4

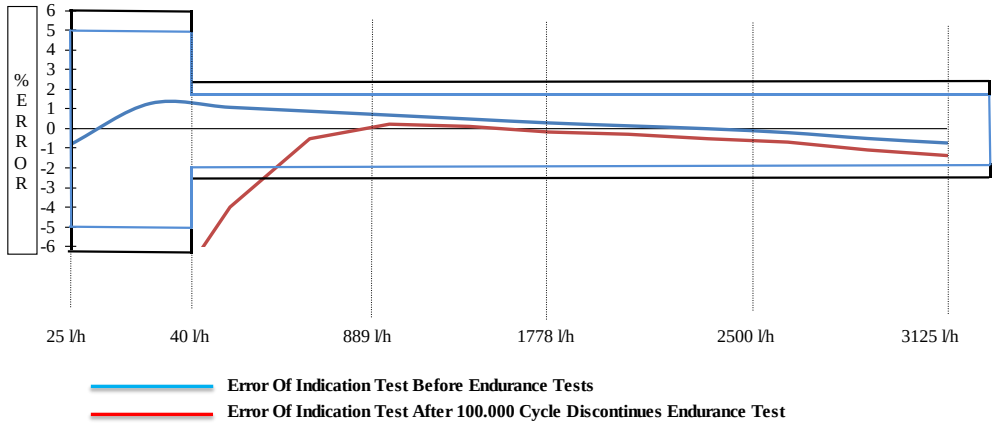

Figure 12. Error of Indication Test Results (Before and After Discontinues Endurance Test) of 30% Recycled Plastic Material - Meter 5

4.1.4 Summary of the Applied Tests with 20% Recycled Plastic Material

Table 12. Summary of the Applied Tests with 20% Recycled Plastic Material

Test Name	Water Meter Serial Number				
	TK-25021	TK-25022	TK-25023	TK-25024	TK-25025
Static Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Determination of intrinsic errors	PASSED	PASSED	PASSED	PASSED	PASSED
Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED
Overload Water Temperature Test	PASSED	PASSED	PASSED	PASSED	PASSED
Water Pressure Test	PASSED	PASSED	PASSED	PASSED	PASSED
Endurance Tests	PASSED	PASSED	PASSED	PASSED	PASSED

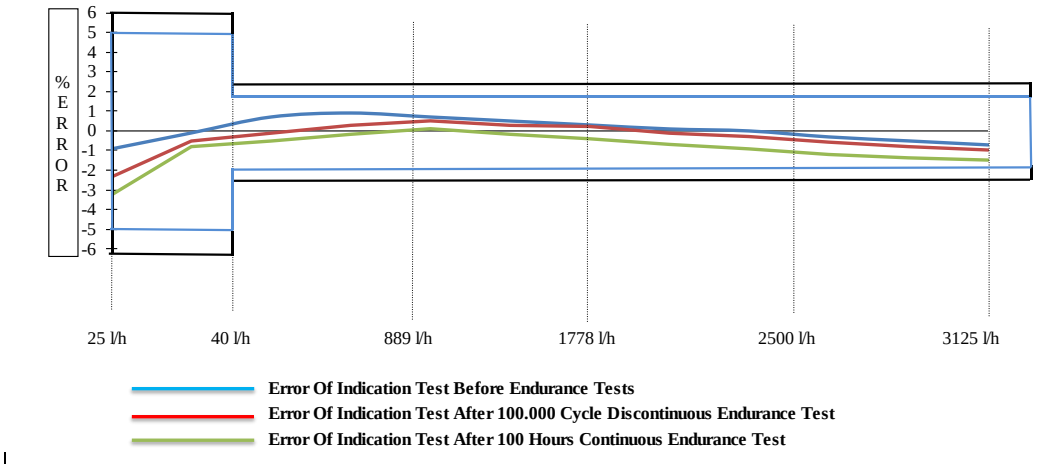

Figure 13. Error of Indication Test Results (Before and After Endurance Tests) of 20% Recycled Plastic Material - Meter 1

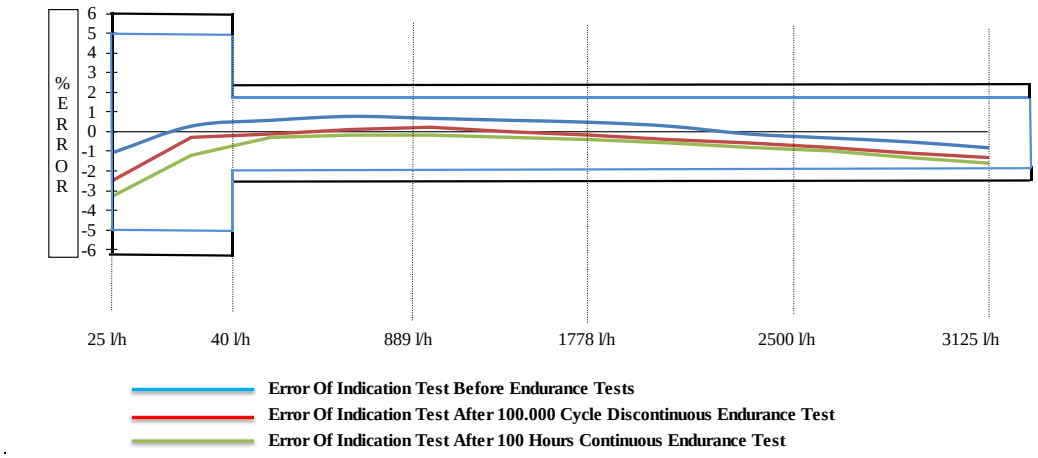

Figure 14. Error of Indication Test Results (Before and After Endurance Tests) of 20% Recycled Plastic Material - Meter 2

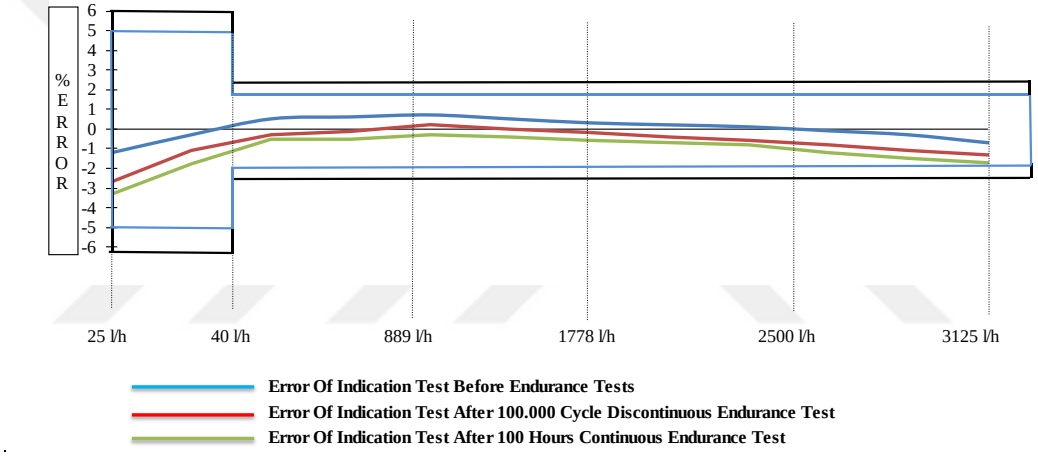

Figure 15. Error of Indication Test Results (Before and After Endurance Tests) of 20% Recycled Plastic Material - Meter 3

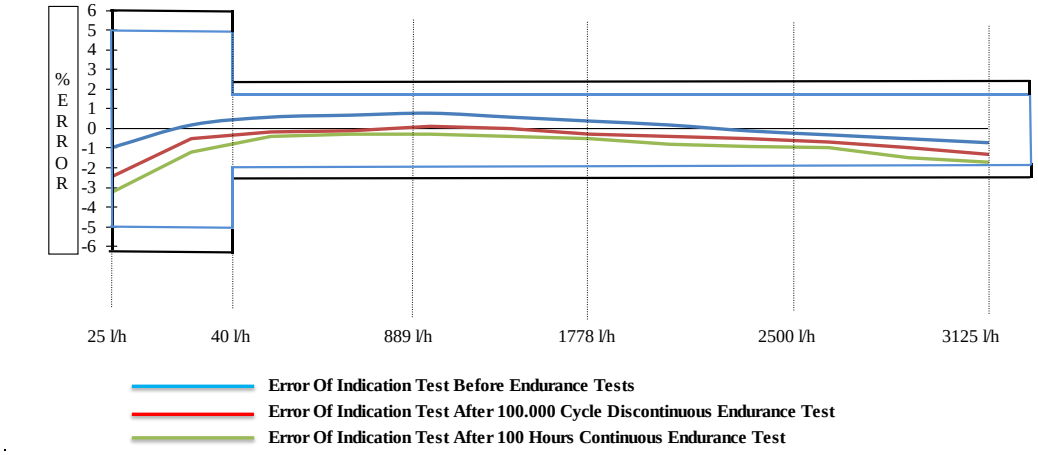

Figure 16. Error of Indication Test Results (Before and After Endurance Tests) of 20% Recycled Plastic Material - Meter 4

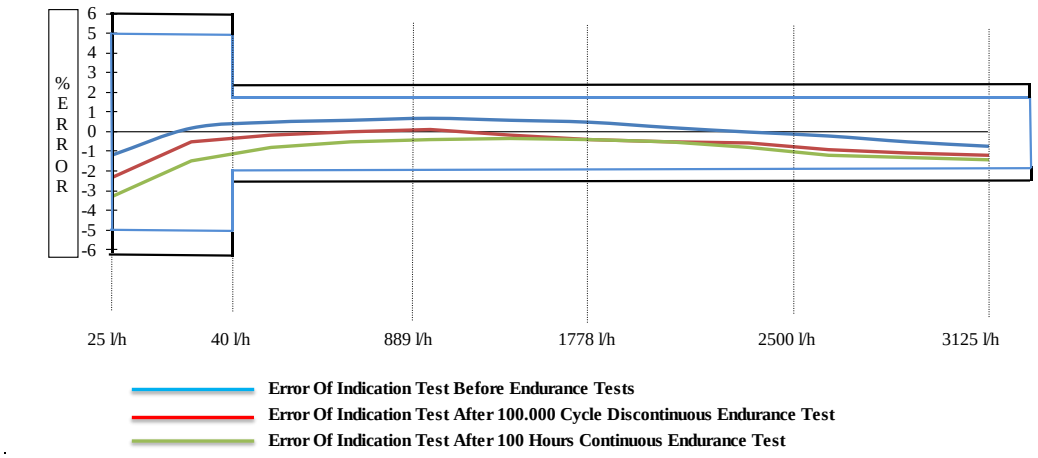

Figure 17. Error of Indication Test Results (Before and After Endurance Tests) of 20% Recycled Plastic Material - Meter 5

CHAPTER 5: CONCLUSION AND FUTURE WORK

5.1 Conclusion

According to test results;

- If the analysis of brass material is in the tolerance range according to TS EN 1982 Copper and copper alloys - Ingots and castings, and TS EN 12164 Copper and copper alloys - Rod for free machining purposes standards, recycled brass material can be used 100% in the production.
- Plastic parts have been examined in two titles, which are available to produce with recycled materials and not available to produce with recycled materials. The parts, that are not available to produce with recycled materials, are mechanism parts, because dimensions of the mechanism parts are very sensitive. The possibility of staying in the tolerance range of dimensions with small and sensitive parts is very difficult when recycled materials are used in the plastic injection process. Therefore, during production of sensitive mechanism parts (gears, rollers, star gears), recycled materials are not used. However, these mechanism parts can be recycled and these recycled materials can be used in the production of plastic parts which are available to produce with recycled materials such as impeller or impeller chamber.
- When 100% recycled plastic material is used, all water meter samples failed the static pressure test. It means, recycled materials are affecting the strength of the water meters. Thus, the water meters cannot be produced with 100% recycled plastic materials, because the samples could not pass even the static pressure test.
- When 50% recycled plastic material and 50% plastic raw material are used, two of five water meter samples are failed the static pressure test. It means, recycled materials are still affecting the strength of the water meters. And 2 of 5 water meters are equal to 40% failed. This ratio is too much for acceptance. Thus, the water meters cannot be produced with 50% recycled plastic materials, because the samples could not pass even the static pressure test.

- When 30% recycled plastic material and 70% plastic raw material are used, 5 pieces of water meter samples are passed the tests except endurance tests according to related standards. These test results are also not acceptable because water meters must pass all of the tests including endurance tests. If water meters will be produced with 30% recycled plastic material, water meter manufacturers must be ready to take feedback after quite a while from the customers because water meters cannot measure correctly after quite a while in the field.
- When 20% recycled plastic material and 80% plastic raw material are used in the production of the parts that are available for recycling, 5 pieces of water meter samples are passed all tests according to related standards.

As a result;

I. Water meter parts that are made of brass material can be produced with 100% of recycled brass material.
II. Mechanism parts cannot be produced with recycled material.
III. Other plastic parts can be produced with a mix of 20% of recycled plastic material and 80% of plastic raw material.

In this way, the water meter can pass all related tests according to standards and optimum recycled material is used in the production.

5.2 Future Work

As for future research, this study can be improved by detailed classifying water meter parts. For example;

- Parts that affect the measurement
- Parts that not affect the measurement
- Parts that contact with water
- Parts that not contact with water

Then, these parts can be examined separately and recycled material ratio that will use on the production can be found for each group.

In this study, the multi-jet dry type domestic water meters have been examined. Nevertheless, there are different types of water meters.

According to measurement principle;

- Single-jet, Multijet, Volumetric, Ultrasonic, Woltman.

According to registry unit;

- Dry Type, Wet Type, Semi-Dry Type.

For future research, different types of water meters can be examined as well.

Only considered necessary tests have been applied according to OIML R49 and TS EN ISO 4064 (static pressure test, determination of intrinsic errors, water temperature test, overload water pressure test, water pressure test and endurance tests). For future research, additional tests can be applied as well such as environmental tests. In addition to that, in this study, cost analysis has not been done. Cost analysis is an important point for companies and industry. Therefore, this study can be improved by making cost analysis. The cost of water meters, which produced with non-recycled materials, and the cost of water meters which produced with recycled materials can be compared.

Finally, this study is on only water meters but this study can be applied to heat meters and also natural gas meters as well. Thus and so, maximizing recycled materials that are used in the production can be used on the other production fields.

Hopefully, this study will shed light on the recycling process for a clean and livable world. Additionally, recycling processes are decreasing the cost of raw materials too. Therefore, in today's world, the importance of recycling systems should be understood better and studies should ramp up in this field.

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APPENDICES

Appendix A.

A.1 Description of Domestic Water Meter Parts

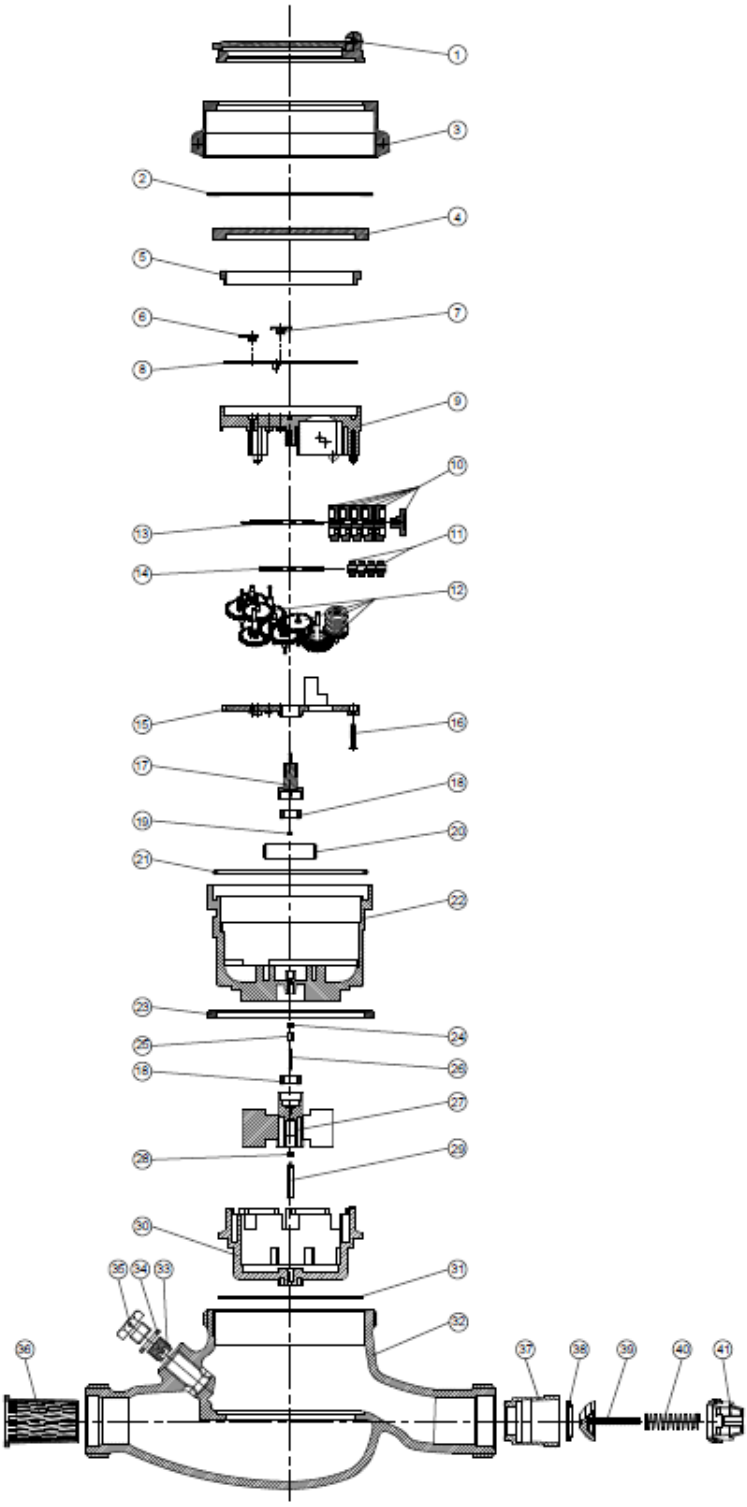

Figure 18. Water Meter Parts

In Figure 18, there are all parts of standard domestic water meters which are made of

plastic and non-plastic materials.

A 1.1 Recyclable Plastic Parts:

Table 13. Recyclable Plastic Parts

No	Part Name	TR No	Item	Material
1	Lid and Lid Frame	801	1	PC
2	Sliding Gasket	233	1	POM
4	Glass	2784	1	PC
5	Washer	2785	1	ABS
6	Indicator	2768	4	ABS
7	Flow Indicator	2671	1	ABS
8	Counter Plate	2788	1	ABS
9	Register Upper Plate	2786	1	ABS
10	Roller Group	2749	1	ABS
11	Star Gears	2752	4	ABS
12	Gear Group	2756	1	POM
15	Register Lower Plate	2787	1	ABS
17	Magnet Gear	2789	1	POM
22	Platform	2793	1	PPO GFN2
25	Platform Busing	2796	1	POM
27	Impeller	2797	1	POM
30	Impeller Chamber	2800	1	ABS
33	Adjustment Screw	1433	1	POM
34	Adjustment Bold Gasket	486	1	POM
36	Filter	254	1	HDPE
37	Non-Return Valve Part A	2636	1	POM
39	Non-Return Valve Part C	2638	1	POM
41	Non-Return Valve Part B	2637	1	POM

1- Lid and Lid Frame protect the glass of the mechanism group

2- Sliding gasket helps easy assembly between upper body and mechanism.

4- Glass protects mechanism (register).

5- Washer is used for fastening up the mechanism.

6- Indicators show consumption of the water that passed from the water meter.

7- The flow indicator is designed for automatic testing. It also shows lower flows.

8- Counter plate is a part of a mechanism located under indicators. Markings of the water meter are written here.

9- Register upper plate is located upside of the gears. Gears are assembled between lower and upper plates.

10- Roller group shows consumption of water in m^3 unit.

11- Star gears transfer movement between rollers.

12- The gear group transfers the movement of the impeller to the rollers.

15- Register lower plate is located downside of the gears. Gears are assembled between lower and upper plates.

17- Magnet gear takes the first movement of the impeller and it transfers this movement to the gears in the mechanism.

22- Platform is the part of the water meter that all mechanism parts are located inside of.

25- Platform bushing bears impeller upper pivot.

27- Impeller counts water meter volume that passed from the water meter.

30- Impeller chamber covers and protects impeller. In this way, the impeller can turn and count more sensitively.

33- The adjustment screw is used for the adjustment and calibration of the water meter.

34- Adjustment bold gasket provides tightness between lower body and adjustment bold.

36- Filter protect the water meter from the particles in the water such as stone, sand or moss.

Non-Return prevents reverse flow on the water network and it has 5 parts that 4 of them are plastic, 1 of them is non plastic.

37- Non-Return valve part A

39- Non-Return valve part C

41- Non-Return valve part B

A 1.2 Non-Recyclable Plastic Parts:

Table 14. Non-Recyclable Plastic Parts

No	Part Name	TR No	Item	Material
21	O-Ring	2794	1	SLICONE

Table 14. (Continued)

23	Gasket	2795	1	EPDM
31	Gasket	2801	1	EPDM
38	Non-Return Valve Gasket	2551	1	EPDM

21- O-ring provides tightness between glass and platform.

23- Gasket provides tightness between lover body and platform.

31- Gasket provides tightness between lover body and impeller chamber.

38- Non-Return valve Gasket

A 1.3 Recyclable Non-Plastic Parts:

Table 15. Recyclable Non-Plastic Parts

No	Part Name	TR No	Item	Material
3	Upper Body	2354	1	CW617N
32	Lower Body	1239	1	CC754S
35	Adjustment Bolt	443	1	CC754S

3- Upper body is assembled on the mechanism and lower body.

32- Lower body is the main body of the water meter which is made of brass material.

35- Adjustment bolt protect adjustment screw.

A 1.4 Non-Recyclable Non-Plastic Parts:

Table 16. Non-Recyclable Non-Plastic Parts

No	Part Name	TR No	Item	Material
13	Roller Pivot	2779	1	AISI 303
14	Star Gear Pivot	2780	1	AISI 303
16	Screw	2440	3	INOX
18	Magnet	2790	2	FERRITE
19	Sapphire Stone	2791	1	SAPPHIRE
20	Magnet Protection Ring	2792	1	6112 SHEET
24	Sapphire Stone	2781	1	SAPPHIRE
26	Impeller Upper Pivot	2798	1	AISI 303
28	Sapphire Stone	446	1	SAPPHIRE
29	Impeller Lower Pivot	2799	1	AISI 303
40	Non-Return Valve Spring	2639	1	302 STAINLESS

13- Roller pivot keeps rollers together and rollers turn on roller pivot. It is made of

AISI 303 stainless steel.

14- Star gear pivot keeps star gears together and star gears turn on star gear pivot. It is made of AISI 303 stainless steel.

16- Screw is mounted register upper plate and register lower plate.

18- Magnets transfer the movement of the impeller to the mechanism.

19- Sapphire stone is assembled inside of the platform. It decreases friction between platform and magnet gear. By this way, magnet gear can turn even low flowrates.

20- Magnet protection ring protects magnets from the magnetic field effects to the water meter and it provides accurate measurement.

24- Sapphire stone is assembled under the platform. It decreases friction between the platform and impeller upper pivot. By this way, impeller can turn even low flowrates.

26- Impeller upper pivot is assembled to the impeller and it provides accurate turning of the impeller.

28- Sapphire stone is assembled to under the impeller. It decreases friction between impeller and impeller chamber. By this way, impeller can turn even low flowrates.

29- Impeller lower pivot is assembled on the middle of impeller chamber. Impeller turns on this pivot.

40- Non-return valve spring helps opening and closing of non-return valve easier.