



Force Comparison in the range of 100 kN to 1000 kN (GULFMET.M.F.K1)



Dr. Bulent AYDEMİR

The objectives of the present GULFMET force comparison are;

- to facilitate the demonstration of metrological equivalence between the participating national laboratories in the GCC
- to check the validity of quoted calibration measurement capabilities (CMC) in the field of mass.

Participants

Laboratory	Address	Contact person
TÜBİTAK UME	TÜBİTAK Ulusal Metroloji Enstitüsü (TÜBİTAK UME) TÜBİTAK Gebze Yerleşkesi Barış Mah. Dr. Zeki Acar Cad. No:1 41470 Gebze-Kocaeli, TURKEY	Dr. Bülent Aydemir
SASO NMCC	Saudi Standards, Metrology and Quality Organization of The Kingdom of Saudi Arabia (SASO) Riyadh 11471, P.O. Box 3437 KINGDOM of SAUDI ARABIA	A.A. Binown
EMI	Emirates Metrology Institute (EMI) CERT Technology Park, Block H, Health & Environmental Building, P.O.Box 5464 Abu Dhabi, UAE	Dr. Christos Mitsas

If there are institutions that want to apply for a new one, they can be added to this list.

- The participating laboratories shall measure the force transfer transducers in their force standard machines within three weeks from the date of arrival.
- Each laboratory will have one week after finishing the measurements to transport the standards to the next participant.
- Before the force measurement each laboratory adjust the climatic conditions at the temperature **(21±1) °C** and relative humidity **(45±10) % RH** before 2 days of measurements
- All measurements should be performed according to procedure written protocol.
- The pilot lab. is UME and the results will be collected by UME.

Transfer standards

No	Description	Manufacturer	Serial No
1	Force Transfer Standard	GTM -1 MN included loading pad	64684
2	Force Transfer Standard	HBM – 100 kN included loading pad	191430052
3	Bridge Calibration Unit	HBM BN 100 A	07109
4	Temperature Data Logger	-	-

UME will send **BN10 calibrator** to check the DMP 40 measurement signals for correction

Each laboratory should have HBM **DMP 40** or **DMP41** for the performing of the measurements.



Transfer Standards

UME Force Transfer Transducers (10) will be used in comparison measurements

Force transfer Transducers	Selected force steps
100 kN	40 kN, 60 kN, 80 kN, 100 kN
1 MN	400 kN, 600 kN, 800 kN, 1000 kN

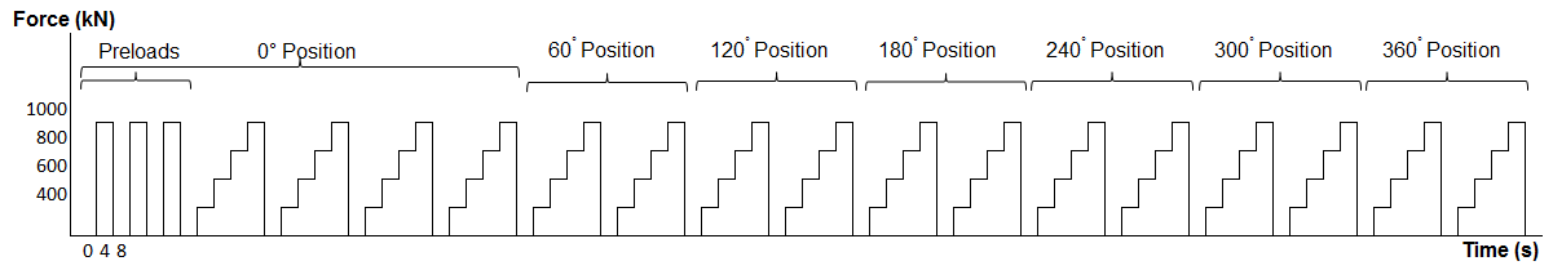
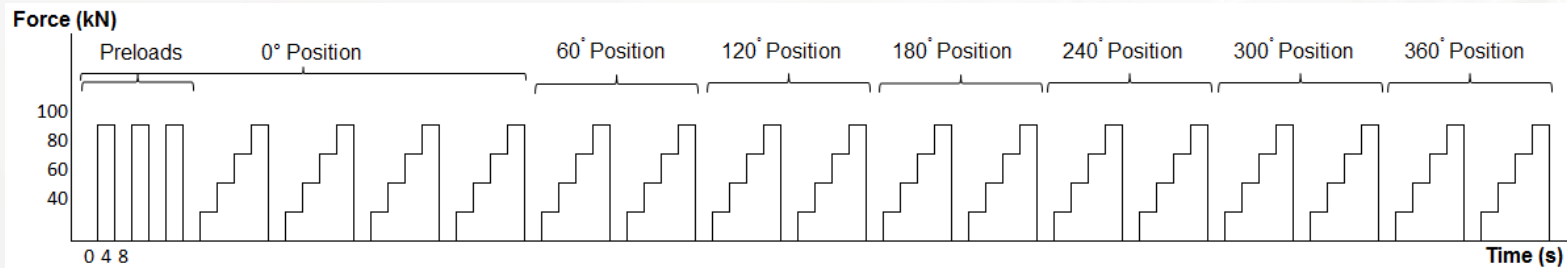
Intercompared 100 kN and 1 MN force standard machines



Loading Schedule for Comparison Measurements

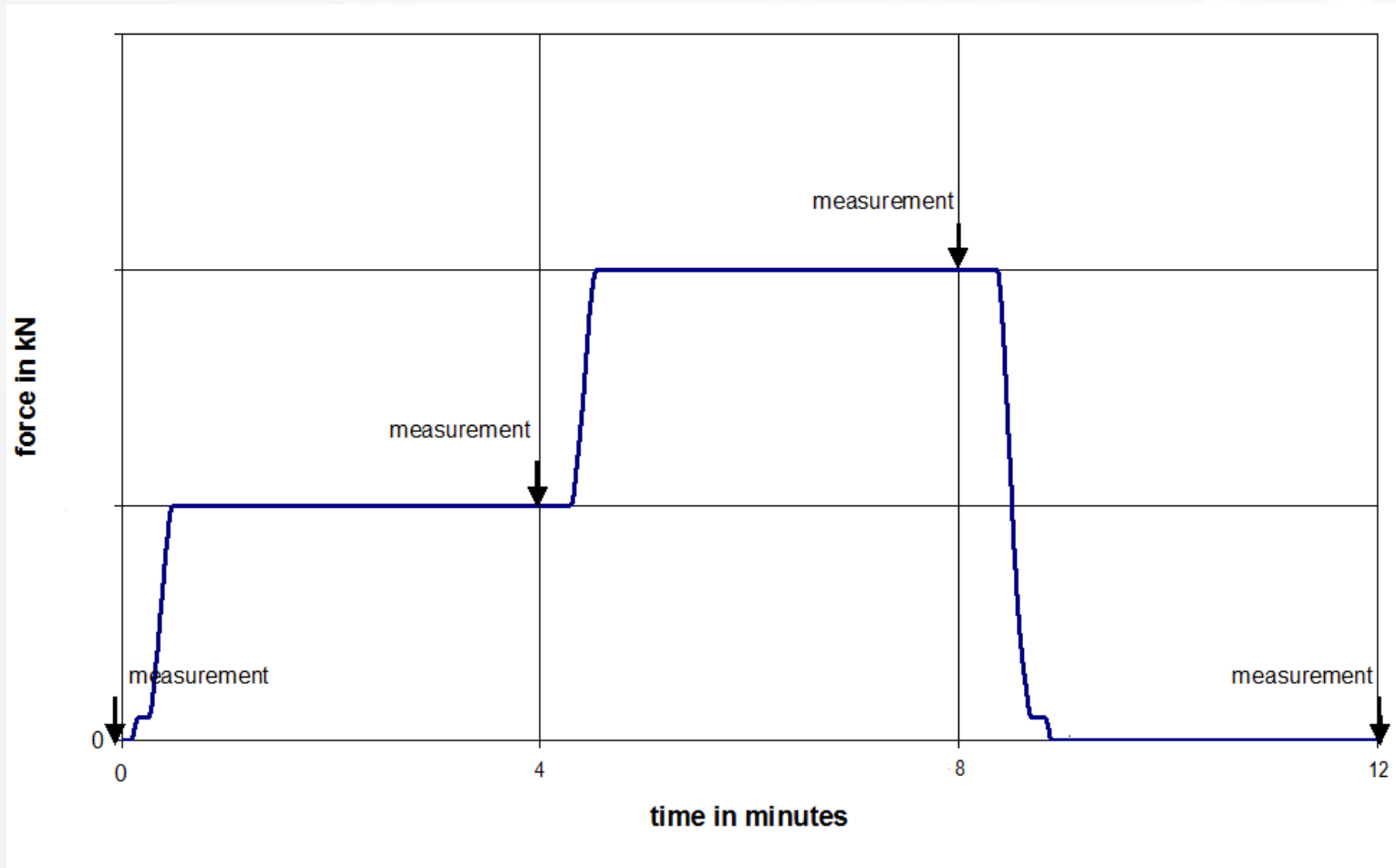
Three sets of measurements at 0° , two sets of measurements at 60° , 120° , 180° , 240° , 300° and 360° rotational positions

The measurements will be carried out at $(21 \pm 1)^\circ\text{C}$ and relative humidity $(45 \pm 10)\% \text{RH}$,



Loading Schedule for force standard machines

Loading Schedule for Comparison Measurements





GULFMET
Comparison of the Force Standard Machines

TECHNICAL PROTOCOL
Comparison of Force Standard Machines
in the range of 100 kN and 1000 kN

GULFMET.M.F.K1

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TÜBİTAK UME

(Rev. 1)
April 16, 2017

ANNEX A

1. FORM A:

PARTICIPANT INFORMATION

Laboratory Name	
Related Person Name	
Telephone No	
Fax No	
E-mail	
Adress	

Force Machine Information

Machine producer	
Capacity	
Serial No	
Principle	Deadweight / Hydrolic / Lever
Uncertainty (k=2, 95 %)	
Other information	

2. FORM B (This form is given in the excel files.)

GULFMET Force Comparison

Send this form by Fax or E-Mail to the following contact person of the pilot laboratory:

Name:	Dr. Bulent Aydemir
Full address:	TUBITAK UME, Kuvvet Laboratuvarı, TÜBİTAK Gebze Yerleskesi Baris Mah. Dr.Zeki Acar Cad. No:1 41470, Gebze / KOCAELI / TURKEY
Telephone:	+90 262 6795000 ext.5600
Telefax:	+90 262 6795001
E-mail:	bulent.aydemir@tubitak.gov.tr

From contact person of the laboratory:

Name:	
Full address:	
Telephone:	
Telefax:	
E-mail:	

Transportation protocol (arrival)

Date of arrival:	
Transportation company:	

Conditions of the transfer standards on arrival

Transportation box:	
Transfer standards:	
Other remarks:	

FORM C

Orientation Degrees	Force kN	Time hh:mm	Reading mV/V	Temperature °C	Tared Readings mV/V
0°	0,0	0:00			0,000 000
	100,0	0:04			0,000 000
	0,0	0:08			0,000 000
	100,0	0:12			0,000 000
	0,0	0:16			0,000 000
	100,0	0:20			0,000 000
	0,0	0:24			0,000 000
	40,0	0:28			0,000 000
	60,0	0:32			0,000 000
	80,0	0:36			0,000 000
	100,0	0:40			0,000 000
	0,0	0:44			0,000 000
	40,0	0:48			0,000 000
	60,0	0:52			0,000 000
	80,0	0:56			0,000 000
	100,0	1:00			0,000 000
	0,0	1:04			0,000 000
	40,0	1:08			0,000 000
	60,0	1:12			0,000 000
	80,0	1:16			0,000 000
	100,0	1:20			0,000 000
	0,0	1:24			0,000 000
	40,0	1:28			0,000 000
	60,0	1:32			0,000 000
80,0	1:36			0,000 000	
100,0	1:40			0,000 000	

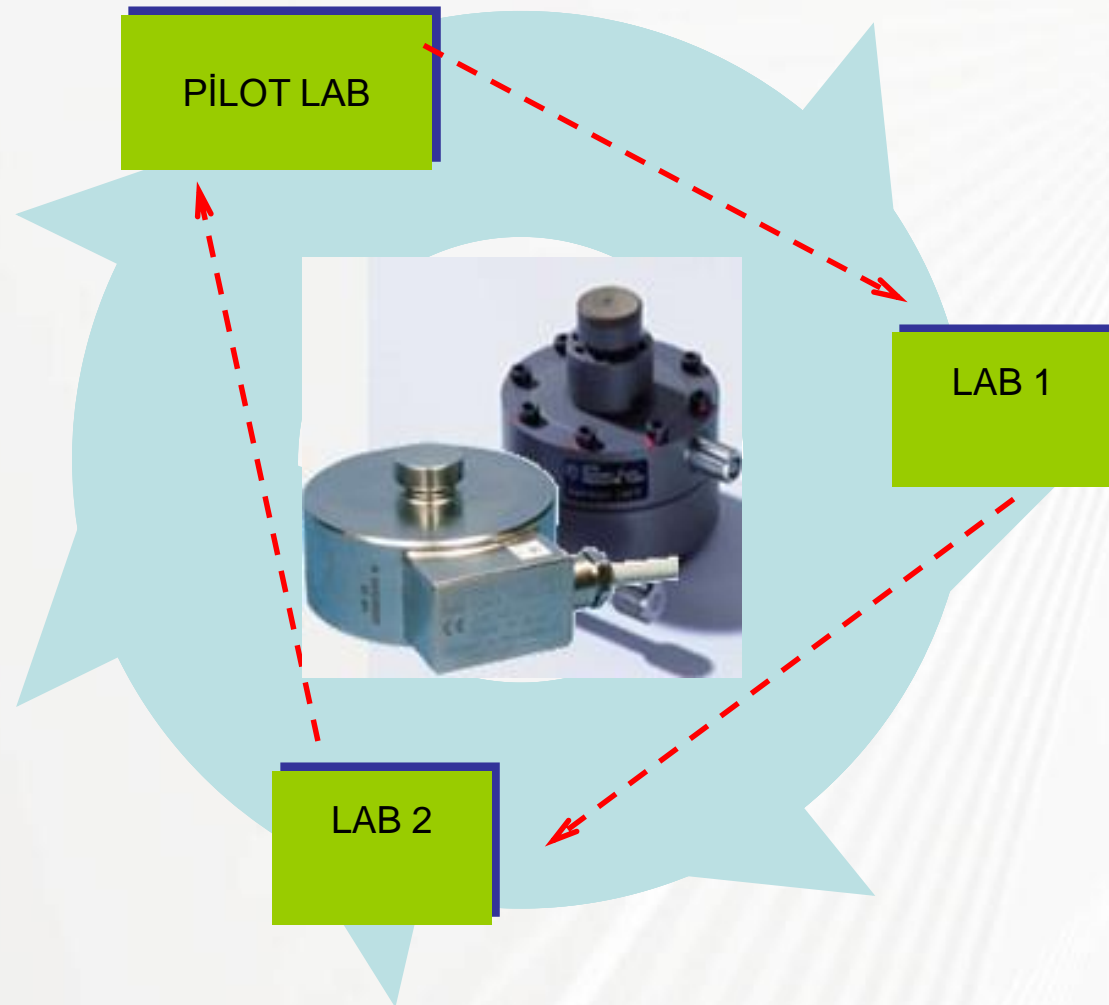
General Information	
Date	
Laboratory	
Machine Capacity	
Operator	
BN 100	
DMP 40	
Filter	
Bridge Supply	
Measuring Range	
Mode	
Transducer	
Capacity (kN)	

DMP 40 Checks		
BN 100 Setting mV/V	DMP 40 Reading mV/V	
	Initial	Final
+0.000 000		
+0,400 000		
+0,800 000		
+1,200 000		
+1,600 000		
+2,000 000		
DMP 40 Check Reading		

Before the calculation of relative expanded uncertainty of measurements, below remarks will be taken into account as well;

1. The values used for the comparison indicated by DMP 40 will be corrected by the indication of BN 100 comparator for each laboratories,
2. The reference values performed by pilot laboratory will be establish taking into account the value of the drift of the transfer force transducers
3. Temperature difference between each lab. should be corrected in calculations.

Example Comparison Circulation for 3 Lab.



Pilot Laboratory will make measurement at the beginning, if participants are more than 4, at mid of comparion and at the end of the comparison.

But, participants are only 3 then pilot measure at first and end of the comparison.

Travelling Schedule (proposed)



Travelling Schedule (proposed)

Order	Country	Date
1	UME	September 2017
2	SASO NMCC	December 2017
3	EMI - UAE	February 2017
4	UME	April 2017

**Thank you very much
for your attention**

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P.K. 54, 41470, Gebze – Kocaeli
Tel: 262 679 50 00 /2025 Faks: 262 679 50 01

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