

Certificate No. : F96-1728

Client
نام متقاضی: پولاد رسن آریا

Calibration Date
تاریخ کالیبراسیون: 1396/10/02

Recalibration Due Date
تاریخ کالیبراسیون بعدی: 1398/10/02

Unit Under Calibration
تجهیز تحت کالیبراسیون: Horizontal Test bed Machin

Measuring Range of UUC
گستره اندازه گیری تجهیز: 220000 Kgf

Calibration Code
کد کالیبراسیون: ...

Model / Identification
مشخصه / مدل تجهیز: MSS-220TB

Manufacturer
سازنده تجهیز: شرکت مهندسی ماشین سازه ساحل

Site (Dept/Room No.)
محل استقرار تجهیز: کارگاه

Issue Date : 1396/10/06

Page 1 of 9

This Calibration is traceable to National (ISIRI) & International standards through unbroken chain of comparisons which realize units of the measurement according to the international system of units (SI). reference standards is used to calibrate the transfer standards, which in turn is used to calibrate client's instrument or transfer Standard used to perform this calibration are listed in the following pages.

فرایند کالیبراسیون از طریق یک زنجیره پیوسته قابل ردیابی به استاندارد های ملی (ISIRI) و بین المللی در دستگاه یکاهای اندازه گیری بین المللی (SI) می باشد. تجهیزات مرجع مورد استفاده در کالیبراسیون تجهیزات انتقالی، یا تجهیزات انتقالی مورد استفاده در کالیبراسیون در صفحات پیوست فهرست شده اند.

This calibration certificate is only to be distributed in full and unmodified. Extracts or modifications are subject to prior consent of the RASAM Calibration Lab. This certificate, without the stamp of issuing laboratory; is not valid.

According to ISO 9001, the user is responsible for the observation of a reasonable time to repeat the calibration. We refer to the OIML D10; IDS690 and to the special testing- and calibration standards.

The 'calibration due' data shown above has been specified to us by this client and RASAM calibration laboratory takes no position with regard to the suitability or appropriateness of this interval.

This calibration also meets specifications as outlined in ISO/IEC 17025.

هرگونه نسخه برداری از گواهینامه کالیبراسیون باید به صورت کامل و از تمامی صفحات و بدون تغییر باشد. هر گونه تغییر یا تخلیص در گواهینامه کالیبراسیون باید با هماهنگی قبلی آزمایشگاه صورت پذیرد. این گواهینامه بدون مهر آزمایشگاه صادر کننده فاقد اعتبار است. بر اساس استاندارد ایران- ایزو ۹۰۰۱ مسخولیت تعیین فواصل زمانی مناسب برای تکرار کالیبراسیون تجهیز به عهده کاربر می باشد. استفاده از مدرک OIMLD10، IDS690 و نیز استاندارد های آرمون و کالیبراسیون دستگاه جهت تعیین فواصل کالیبراسیون. توصیه می گردد. تاریخ کالیبراسیون بعدی درج شده در گواهینامه کالیبراسیون توسط متقاضی تعیین شده و آزمایشگاه هیچ نظری در ارتباط با مناسب بودن دوره کالیبراسیون ندارد. فرایند کالیبراسیون بر اساس الزامات استاندارد ایران- ایزو 17025 صورت گرفته است.



Head of Calibration Lab.
Sahar Ghany

Calibrated by



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 2 of 9

1-Testing Standard & Calibration Method

استاندارد مرجع و روش کالیبراسیون

RASAM internal procedure No. :

R-IT-028

The calibration was carried out according to :

ISO 7500 - ASTM E4 - OIML R65

VERIFICATION PERFORMED BY ELASTIC CALIBRATION DEVICE; Constant Indicated Force (ISO/OIML) & Set-the-Force (ASTM) Method, Preload were applied 2 times to calibration force , for 2 minutes before calibration started. After each series the ref. loadcell were turned 120° before starting next series, A minimum of two runs of verification data for each Force were taken.

Calibration mode / کالیبراسیون در حالت

* Tension / کششی

Compression / فشاری

2-Used working standards & testing device

تجهیزات و استانداردهای کاری استفاده شده

Discription

Working / Transferring Standard used in calibration

1. Ref. Loadcell with Digital Indicator

TEC 800

R-EF-5049

RF965049

NIMTT

Primary Standard of our Laboratory

1. 3 MN Loadcell Serial No. RA903919

H2A-3MN

EF -5031

201507003677

NIMTT

2. Dead Weight Tester 700 Bar : 0.3 MN

Budenberg

EP -4006

93656701

UKAS

3. Set of Weights Class E2

Zwible

EM-1005

392-92182

ISIRI

3-Environmental condition during calibration

شرایط محیطی در حین انجام کالیبراسیون

■ Customer Site Amb. Condition:

Amb. Temperature : 20 °C

Relative Humidity : 30 %

□ In The RASAM Laboratory:

Amb. Temperature : 20 ± 2 °C

Relative Humidity : 45 ± 10 %

4-Measurement Uncertainty

عدم قطعیت اندازه گیری

The reported expanded Uncertainty (uncert.) is based on a standard uncert. multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%. the uncert. evaluation has been carried out in accordance with EA-4/02 & IDS requirements. The expanded uncert. performed herein do not contain estimates for any effects that maybe introduced by transportation of uuc between RASAM & user Lab. or any measurement uncert. introduced by user.

عدم قطعیت اندازه گیری گزارش شده بر اساس ضرب عدم قطعیت استاندارد در ضریب پوشش $k=2$ در سطح اطمینان ۹۵٪ محاسبه شده است. محاسبات عدم قطعیت اندازه گیری بر اساس مدرک ۴/۰۲ EA و استاندارد های IDS انجام گرفته است. عدم قطعیت بسط یافته اندازه گیری شامل هیچ گونه تخمینی برای اثرات ناشی از حمل و نقل تجهیز و یا هر گونه عدم قطعیت ایجاد شده توسط کاربر نمی باشد.

5-Comformity Statement Inc. : (P/M/R)

نتیجه کالیبراسیون

P/M/R Accordingly, there are three possible calibration outcomes :

1. **PASS** : The cal. result falls within the interval described by the ± standard MPE

نتیجه کالیبراسیون داخل محدوده خطای مجاز

2. **MARGINAL** : The cal. result falls either "in-MPE interval" or "out-of- MPE interval)

نتیجه کالیبراسیون داخل یا خارج محدوده خطای مجاز

3. **REJECT** : The cal. result falls outside the interval described by the ± standard MPE

نتیجه کالیبراسیون خارج از محدوده خطای مجاز

6-Comment

کارشناس هیچ نظری در ارتباط با دستگاه کالیبره شده ثبت نکرده است.



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 3 of 9

7- Calibration Information & Data

اطلاعات و داده های کالیبراسیون دستگاه

7-1 Unit Under Calibration Specifications.

مشخصات اندازه شناختی تجهیز تحت کالیبراسیون

Measuring Range
گستره اندازه گیری 220000 Kgf

Calibration Range
گستره کالیبراسیون 210000 Kgf

Nominal Resolution
تفکیک پذیری اسمی 100 Kgf

Actual Resolution
تفکیک پذیری واقعی 100 Kgf

Equal to UUC display indication without load (at zero)

برابر با نشاندگی نمایشگر تجهیز تحت کالیبراسیون

Equal to half of variation in UUC indication without load.

برابر با نصف دامنه تغییرات نشاندگی تجهیز تحت کالیبراسیون

7-2 Preloading

اعمال پیش بار قبل از کالیبراسیون

- * Preload : First time to calibratin force, waiting for 2 minutes.
- * Preload : Second time to calibratin force, waiting for 2 minutes.
- * Preload : Third time to calibratin force, waiting for 2 minutes.

7-3 Calibration Coefficient/R.O.

ضریب کالیبراسیون اعمال شده به دستگاه

Calibration Coefficient /R.O.:
ضریب کالیبراسیون جدید

60.7 mV/V

previus Coefficient /R.O.:
ضریب کالیبراسیون قبلی

60.6 mV/V

7-4 Calibration Equations

معادلات درجه یک و دو کالیبراسیون

$$y = 1.0104x - 667.19$$

$$R^2 = 1$$

$$y = 8E-08x^2 + 0.9926x$$

$$R^2 = 1$$

y = Reference Value

x = UUC Indication

7-5 Zero Error (%)

خطای نسبی صفر

run 1 0 run 2 0 run 3 ...



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 4 of 9

7-6 Classification of unit under calibration

تعیین کلاس درستی دستگاه تحت کالیبراسیون

| نشاندگی دستگاه | مقدار مرجع | خطای دستگاه | خطای مجاز | کلاس دستگاه | عدم قطعیت | ضریب تصحیح | P/M/F |
|-----------------|-----------------|-----------------|-----------|----------------|-------------------|-------------------|-------|
| Machine Display | Reference Value | Deviation (q) % | MPE (±) % | Accuracy Class | Uncertainty (±) % | Correction Factor | |
| 0 | 0 Kg | ... | ... | ... | ... | ... | pass |
| 25000 | 24865 Kg | 0.54 | 1 | 1 | 0.28 | 0.9946 | pass |
| 40000 | 39675 Kg | 0.82 | 1 | 1 | 0.74 | 0.9919 | pass |
| 60000 | 59500 Kg | 0.84 | 1 | 1 | 0.40 | 0.9917 | pass |
| 80000 | 79325 Kg | 0.85 | 1 | 1 | 0.52 | 0.9916 | pass |
| 100000 | 100380 Kg | -0.38 | 0.5 | 0.5 | 0.20 | 1.0038 | pass |
| 120000 | 120505 Kg | -0.42 | 0.5 | 0.5 | 0.23 | 1.0042 | pass |
| 140000 | 140880 Kg | -0.62 | 1 | 1 | 0.15 | 1.0063 | pass |
| 160000 | 161005 Kg | -0.62 | 1 | 1 | 0.14 | 1.0063 | pass |
| 180000 | 181145 Kg | -0.63 | 1 | 1 | 0.10 | 1.0064 | pass |
| 200000 | 201555 Kg | -0.77 | 1 | 1 | 0.13 | 1.0078 | pass |
| 210000 | 211845 Kg | -0.87 | 1 | 1 | 0.09 | 1.0088 | pass |



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 5 of 9

7-7 Additional calibration data

داده های کالیبراسیون دستگاه

Method of data collection : ... continuous * step - step
Set speed during data collection 14 & 14 mm/min (#)
(#) It is possible that the set speed might have increased during calibration

| نشانه‌ی دستگاه | نیروی مرجع | نیروی مرجع | نیروی مرجع | خطای نشاندهی | تکرار پذیری | تفکیک پذیری نسبی | برگشت پذیری |
|----------------|------------|------------|------------|--------------|---------------|------------------|---------------|
| Machine | true force | true force | true force | Display dev. | repeatability | Rel. Resolution | Reversibility |
| Display | run 1 | run 2 | run 3 | (q) % | (b) % | (u) % | (u) % |
| 0 | 0 | 0 | ... | ... | ... | ... | ... |
| 25000 | 24850 | 24880 | ... | 0.54 | 0.12 | 0.4022 | ... |
| 40000 | 39550 | 39800 | ... | 0.82 | 0.63 | 0.2520 | ... |
| 60000 | 59400 | 59600 | ... | 0.84 | 0.34 | 0.1681 | ... |
| 80000 | 79150 | 79500 | ... | 0.85 | 0.44 | 0.1261 | ... |
| 100000 | 100300 | 100460 | ... | -0.38 | 0.16 | 0.0996 | ... |
| 120000 | 120390 | 120620 | ... | -0.42 | 0.19 | 0.0830 | ... |
| 140000 | 140800 | 140960 | ... | -0.62 | 0.11 | 0.0710 | ... |
| 160000 | 160920 | 161090 | ... | -0.62 | 0.11 | 0.0621 | ... |
| 180000 | 181200 | 181090 | ... | -0.63 | 0.06 | 0.0552 | ... |
| 200000 | 201650 | 201460 | ... | -0.77 | 0.09 | 0.0496 | ... |
| 210000 | 211790 | 211900 | ... | -0.87 | 0.05 | 0.0472 | ... |



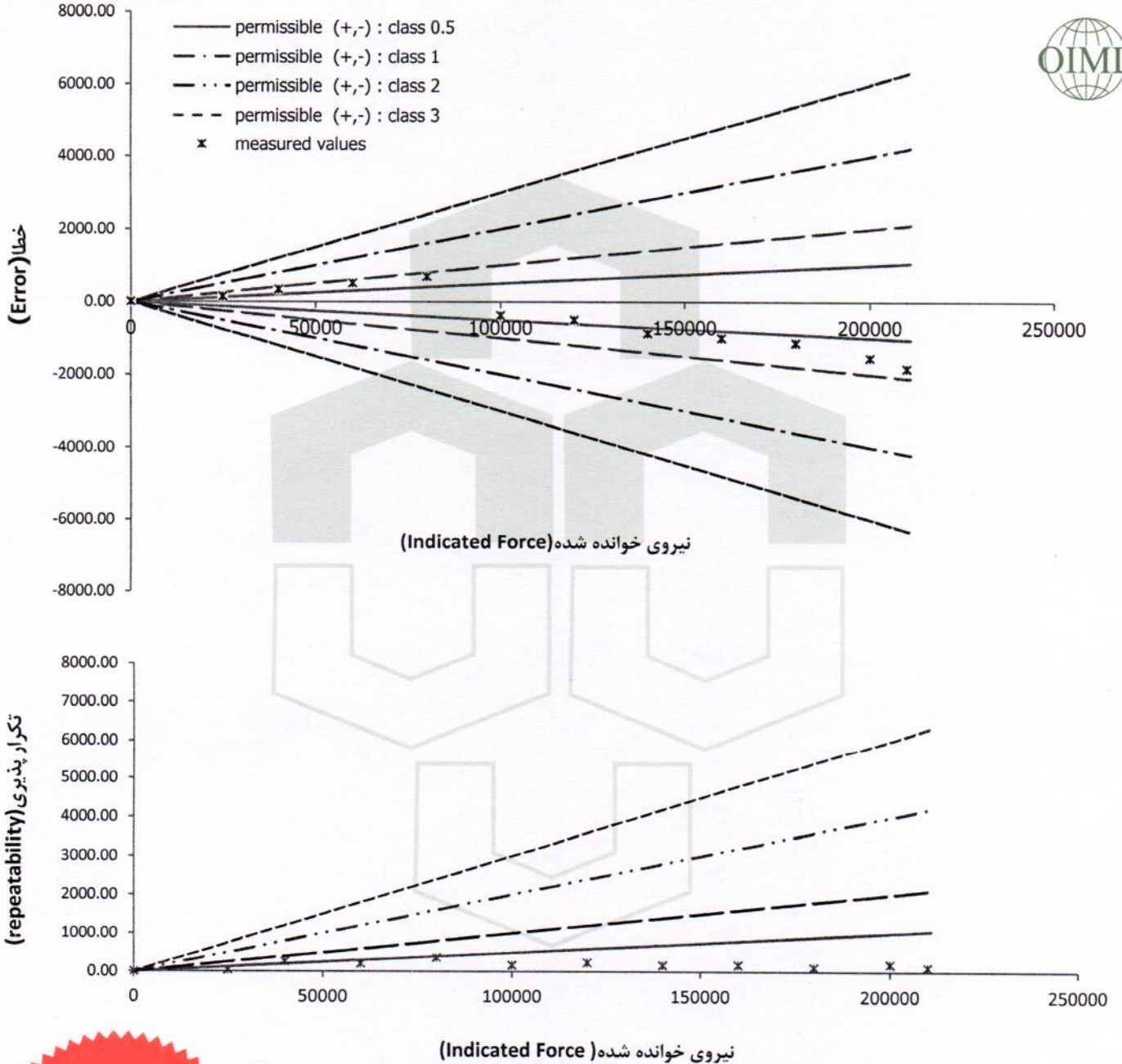
Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 6 of 9

7-8 calibration error & repeatability graph

All Values in: Kgf



Certificate No. F96-1728

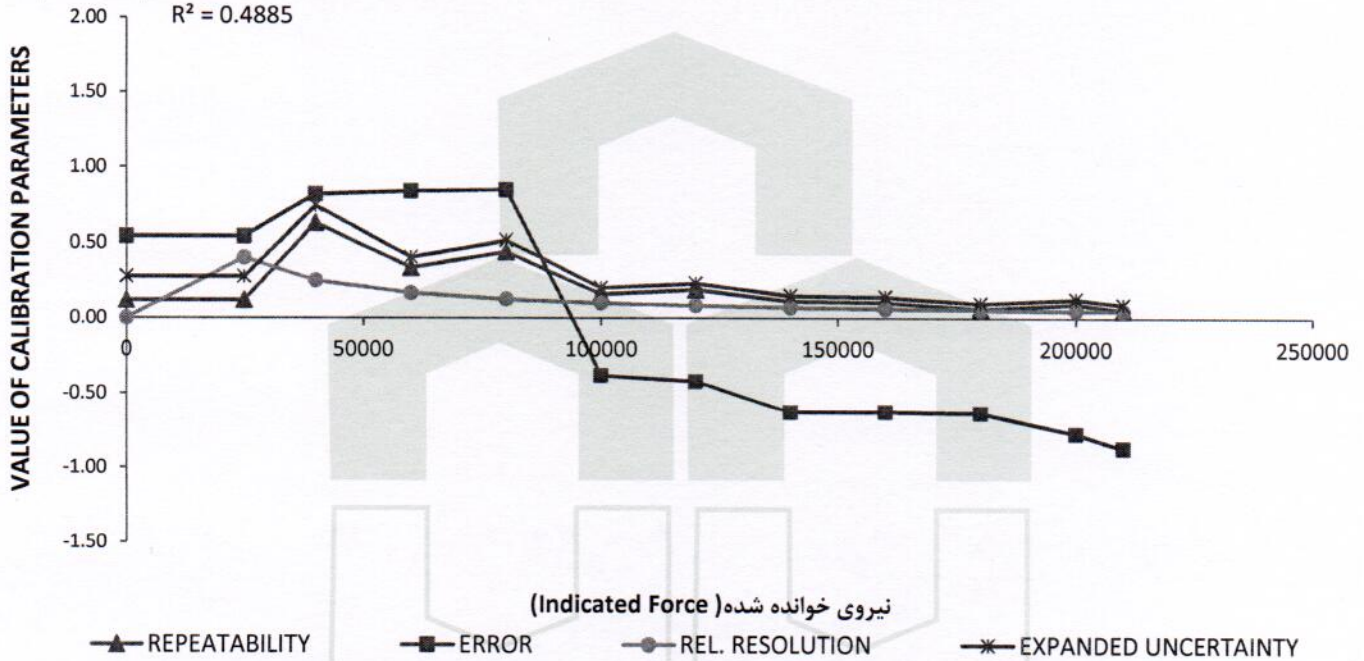
Date of Issue: 1396/10/06

Page 7 of 9

ERROR of Indication = $-0.0056x - 0.1419$
 $R^2 = 0.4885$

Expanded Uncertainty = $0.0125x + 0.3575$
 $R^2 = 0.4693$

Repeatability of data = $0.0112x + 0.2838$
 $R^2 = 0.4885$



8- Uncertainty components

- 1- The uncertainty component due to Reference Device (that can be reference weights or static calibration device)
- 2- The uncertainty component due to Drift of Reference Device
- 3- The uncertainty component due to Resolution of unit under calibration (the actual resolution)
- 4- The uncertainty component due to Repeatability at each seprate applied force
- 5- The uncertainty component due to reversibility (if decremental forces recorded)
- 6- The uncertainty component due to the Temprature variation that is considered equal to $\pm 2^\circ\text{C}$



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 8 of 9

9- Pre-Assumptions

9-1 Gravity and Air Buoyancy Corrections

In this calibration certificate the coefficient of Gravity and Air Buoyancy Correction is considered equal to 1.0000

BUT during use of verified testing machines, corrections for local values of gravity and air buoyancy can be made by user with sufficient accuracy using the multiplying factors from following table :

Unit Force Exerted by a Unit Mass in Air at Various Latitudes

| Latitude, ° | Elevation Above Sea Level, ft(m) | | | | | |
|-------------|----------------------------------|-----------------------------|------------------------------|-------------------------------|--------------------------------|--------------------------------|
| | -100 to 500 (-30.5 to 152) | 500 to 1500 (152 to 457) | 1500 to 2500 (457 to 762) | 2500 to 3500 (762 to 1067) | 3500 to 4500 (1067 to 1372) | 4500 to 5500 (1372 to 1676) |
| 20 | 0.9978 | 0.9977 | 0.9976 | 0.9975 | 0.9975 | 0.9974 |
| 25 | 0.9981 | 0.9980 | 0.9979 | 0.9979 | 0.9978 | 0.9977 |
| 30 | 0.9985 | 0.9984 | 0.9983 | 0.9982 | 0.9982 | 0.9981 |
| 35 | 0.9989 | 0.9988 | 0.9987 | 0.9987 | 0.9986 | 0.9985 |
| 40 | 0.9993 | 0.9993 | 0.9992 | 0.9991 | 0.9990 | 0.9989 |
| 45 | 0.9998 | 0.9997 | 0.9996 | 0.9996 | 0.9995 | 0.9994 |
| 50 | 1.0003 | 1.0002 | 1.0001 | 1.0000 | 0.9999 | 0.9999 |
| 55 | 1.0007 | 1.0006 | 1.0005 | 1.0005 | 1.0004 | 1.0003 |

9-2 Conversions

Units of reference forces are Kgf; if the reference force is reported in other force units, it is based on following considerations

1 kgf = 9.80665 N

9-3 Application of Force

In the verification of a testing machine, approaching to the force is performed by increasing the force from a lower force

9-4 Selection of Verification Forces

If lower limit of the verified force of the testing machine include forces below 200 times the resolution of the force indicator; it is because of customer demand and is just for more information

9-5 Eccentricity of Force

By using suitable equipments it is endeavored to apply all calibration forces so that the resultant force is as nearly along the axis of a testing machine as is possible

9-5 Temperature Equalization : Ref Device

When using an elastic calibration device to verify the readings of a testing machine, the device is placed near to, or preferably in, the testing machine a sufficient length of time before the test to assure that the response of device is stable



Certificate No. F96-1728

Date of Issue: 1396/10/06

Page 9 of 9

10- Recommendations

10-1 Application of Force

According to ASTM E4 :

If testing machine is to be used under decreasing forces, it is better to be calibrated under increasing forces as well as under increasing forces.

If Testing machines that contain a single test area and possess a bidirectional loading and weighing system need to be verified separately in both modes of weighing.

10-2 Time Interval Between Verifications

It is recommended that testing machines be verified annually or more frequently if required.

Testing machines shall be verified immediately after repairs (this includes new or replacement parts, or mechanical or electrical adjustments) that may in any way affect the operation of the weighing system or or the values displayed.

Verification is required immediately after a testing machine is relocated (except for machines designed to be moved from place to place in normal use), and whenever there is a reason to doubt the accuracy of the force indicating system, regardless of the time interval since the last verification

10-3 Accuracy Assurance Between Verification

Spot checks may be performed at force levels of interest utilizing a calibration device Make spot checks at approximately 20 % and 80 % of a range

10-4 Determination of Lower Force

- | | | |
|---|-------|-----|
| * Min Force acc. to ISO7500 for Class 0.5 : | 40000 | Kgf |
| * Min Force acc. to ISO7500 for Class 1 : | 20000 | Kgf |
| * Min Force acc. to ISO7500 for Class 2 : | 10000 | Kgf |
| * Min Force acc. to ISO7500 for Class 3 : | 6700 | Kgf |



