

## STANDARD OPERATING PROCEDURE (SOP)

## FOR OPERATING UCS TESTING MACHINE



# UNIAXIAL COMPRESSIVE STRENGTH (UCS) 2

STANDARD OPERATING PROCEDURE (SOP) FOR OPERATING THE UNIAXIAL  
COMPRESSIVE STRENGTH (UCS) TESTING MACHINE FOR STRENGTH TEST  
AND ANALYSIS PURPOSES

LOCATION - FACILITY	MOSELEY MORAMORO
SUBDIVISION	MINING – OK TEDI LABORATORY
REVISED EDITION	1 <sup>ST</sup> EDITION
REVIEW DATE	1 <sup>ST</sup> JULY 2022
DRAFTED BY	P. RUMINTS (SENIOR TECHNICAL OFFICER)

## Table of Content

1.0 Note .....	1
1.1 Purpose .....	2
1.2 Hazards .....	3
1.3 Specimen dimensions .....	4
2.0 Equipment Details .....	5
2.1 Components .....	6
2.2 Specifications .....	7
3.0 Setting up .....	8
3.1 Setting up procedures .....	9
4.0 Operating Procedures .....	10
4.1 Operating Procedures .....	11



# NOTE

## USAGE POLICIES & INSTRUCTIONS

- This equipment can only be operated upon approval from either the Laboratory Manager or a Technical Officer, or operated with the assistance or supervision of a technical officer.
- Strict compliance to operating procedures and safety requirements is required to operate this equipment. No Exceptions for substandard practices!
- If this equipment is acting unusual while operating STOP IMMEDIATELY! Please REPORT this malfunction to the Technical Officer and discuss the severity of the fault before proceeding or tag-out as faulty equipment.
- Any accidental damage to equipment or incidents encountered while operating this equipment must be reported immediately.



# EQUIPMENT DETAILS

## Uniaxial Compressive Strength (UCS) Testing Machine #2

### Purpose:

This SOP ensures that the operator may operate this equipment appropriately according to the operating procedures to get reliable output without damages to the equipment or causing injuries to the operator. The Uniaxial Compressive Strength (UCS) testing machine #2 is used to conduct compression strength tests on harder industrial materials expected to fail within the range of 250 kN – 2000 kN, mostly rock and brick specimens, to determine the compressive strength of the rock specimen from applying load on the specimen until failure or fracture.

This UCS Testing machine is composed of a main unit which applies the load to a test specimen and a dynamometer which displays the load applied, as measured.

### Hazards:

- Eye protection (safety glasses) against projectile fragmented pieces
- Footwear (safety boots) for equipment components or test specimen fragments falling on to the foot.

### Safety Requirements:

#### Personal Protective Equipment (PPE)

1. Safety glasses
2. Safety boots
3. Industrial Hardware Clothing (Reflector ware)

### Tools & Materials Required:

#### Recommended Test Specimens

1. Rock specimen
2. Brick specimen
3. Steel specimen

#### Test Specimen Prepared

1. Cylindrical
2. Cubic

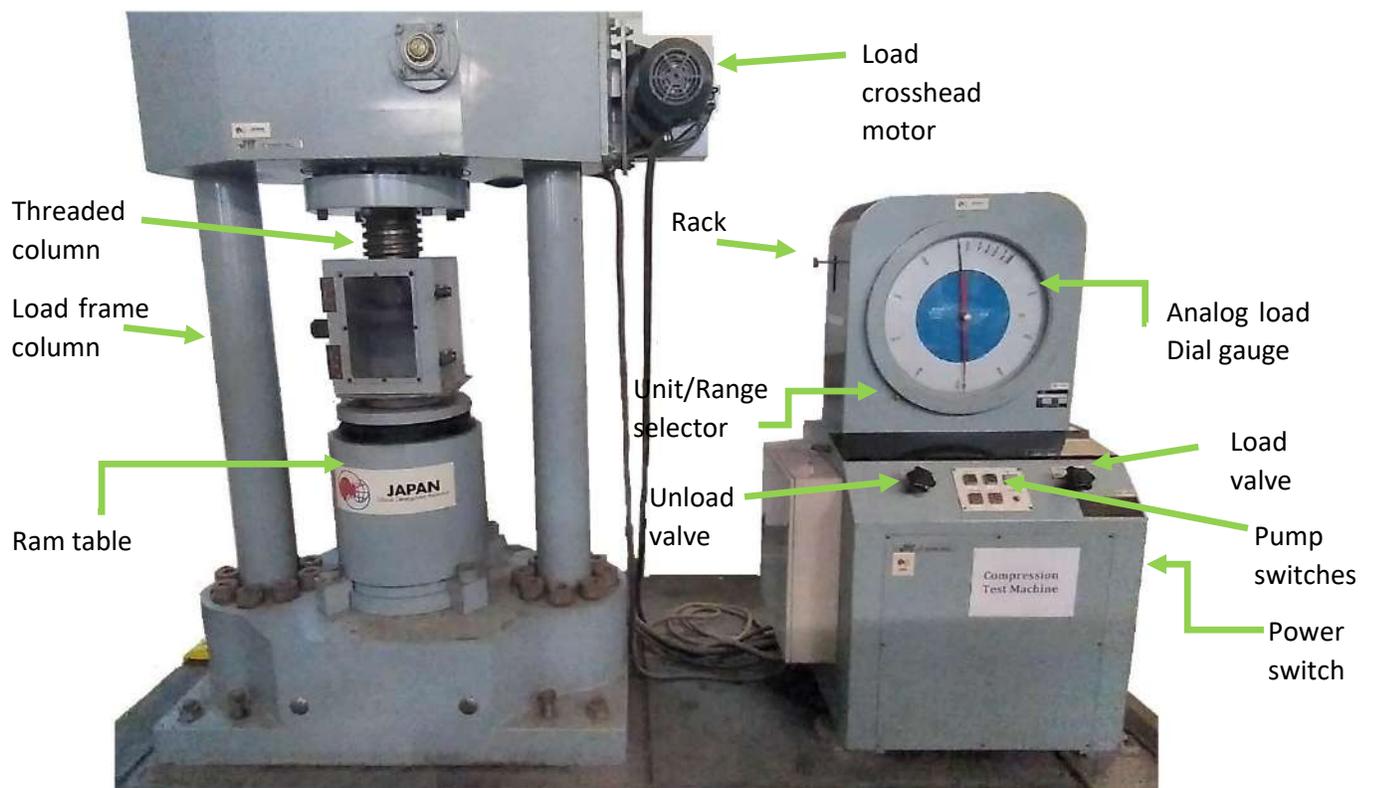


## Specifications

### HYDRAULICS CAPACITY - WEIGHT/LOAD LIMITS

No	Specifications	Capacities
1	Maximum weighing capacity	2 000 000 N
2	Weighing capacity (4 stages)	2000, 1000, 500 & 200 kN
	Minimum graduation	2000 , 1000, 500, 200 N
3	Divided in	1/600
4	<b>Compression Test</b>	
5	Maximum Distance between Columns	500 mm
6	Effective Area of Table	500 x 500 mm
7	Ram Stroke	200 mm
8	Maximum Ram speed (at 50Hz, no load)	approx. 110 mm/min
9	Crosshead elevation speed (at 50Hz)	approx. 350 mm/min
10	Oil-pressure supply motor	3 phase, 4P, 1.5 kW
11	Lower Crosshead elevation motor	3 phase, 4P, 0.4 kW

## Compositions



# SETTING UP

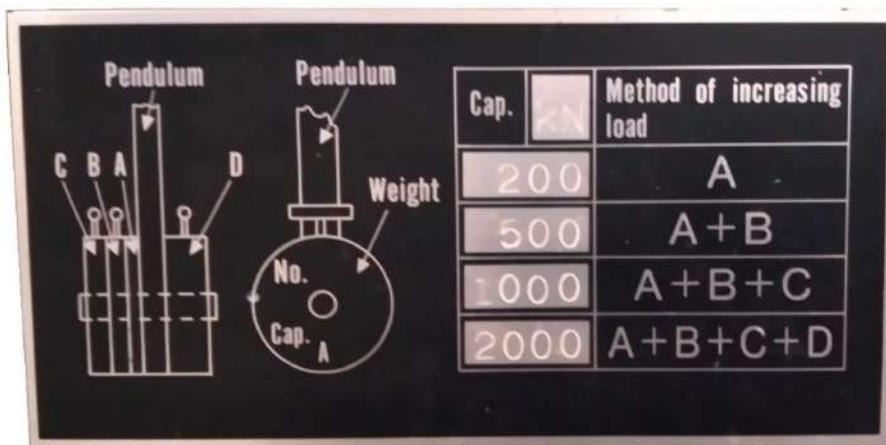
## Setting-Up Procedures

### Preparations for Test

Prior to starting up this equipment and operating this equipment, there are a number of features of this equipments that needs to be set up to appropriate modes before proceeding to operate the equipment;

#### 1) Selection of Load and Scale

Pendulum weight and scale are selected matching the desired load weighing capacity, according to the strength of the test specimen. For the hardest rocks like quartz and granite are appropriate for maximum counter weights as 2000 kN while the moderately hard down to soft rocks like sandstone, mudstone and siltstone should be assigned counter weights in the range of 1000 kN down to 500 kN and 200 kN and setting unit range relatively to match the weights. Do not use load within its 20% range, since the accuracy is not guaranteed.



#### 2) Adjust the Unit

Adjust the Unit per division of graduations from the range selector to match the selected counter weights.

No.	Counter Weights	Loads (kN)	Unit Selection (N)
1	A	200	50
2	A + B	500	100
3	A + B + C	1000	250
4	A + B + C + D	2000	500

#### 3) Zero adjustments of Pointer

The left valve is closed, the right valve is opened gradually so as to ascend the main ram by about 10mm. Then the main ram is stopped by closing the right valve. In this condition the Pointer is adjusted to show zero point by turning the rack rod. In this time turning the Set Pointer and touch it to the pointer.



# OPERATING PROCEDURE

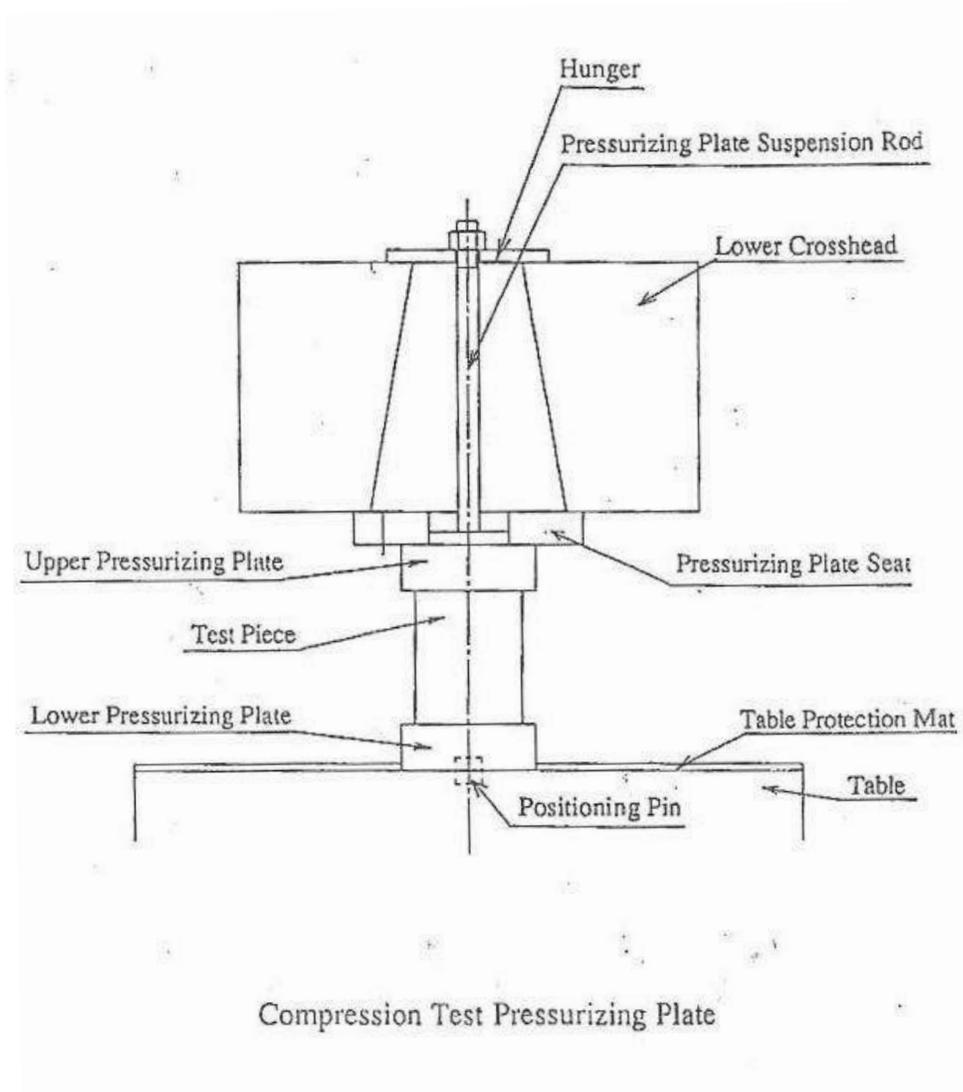
## Operating Procedures

### Compression Test

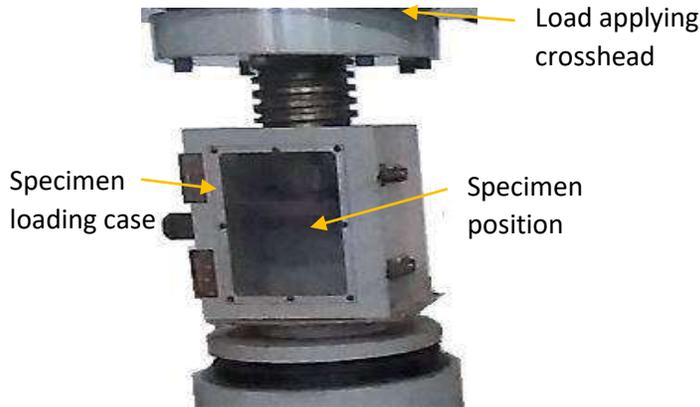
#### Test Jig mounting

For conducting Compression Tests follow the equipment set up procedures below to set up the equipment before proceeding onto actually conducting the experiment on the test specimen;

- i. Position the test specimen in the centre of the casing, fitted under the upper pressurizing plate and aligned to the center of the lower/ram table top plate



- ii. Lower the Crosshead by operating the Crosshead DOWN [↓] pushbutton switch to get to a reasonable height to allow space for setting up the test specimen under the crosshead. Push the DOWN [↓] pushbutton switch for elevation the crosshead and lower the Lower Crosshead till the gap between the test piece and Upper Pressurizing Plate is reduced to approx. 2 or 3 mm.



### Operating and conducting compression test

- 1) After setting up the test specimen in position under the crosshead to apply load, switch the pump and set the dynamometer dial to zero reading and ensure the unit selection is set to match load to desired range.
- 2) Start applying load.
  - i. Close the left valve and open the right valve slowly and apply the load carefully while watching the load pointer of the scale plate.
  - ii. Close the right valve and open the left valve, after the test piece breaks. Lower the ram till the ORIGIN position then stop the ram by turning the left valve to close.
- 3) Remove the broken test piece.
- 4) Read the maximum load value (final failure load) from the peak load indicator (*the set pointer*).
- 5) Repeat the procedures, beginning at Step (1) if another compression test is desired.
- 6) Test end
  - i. Close the right valve and open the left valve and lower the ram to the lowest position when finishing the test.
  - ii. Push the PUMP [OFF] pushbutton switch to stop the hydraulic pump.

