WORK INSTRUCTIONS FOR ENGINEERS

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OP-3-68. CHECKLIST FOR POINT LOAD TEST

No.	CHECKLIST ITEMS*	Checked By Gue & Partners	Site Supervisor
1	**APPARATUS** The testing machine consists of a loading system (for measuring the load, P required to break the specimen) and a system for measuring the distance D between the two platens contact points. (Fig. 1)		
1.1	**Loading System:** • Platen-to-platen clearance that allows testing of rock specimens is _____mm. Typical range is about 15-100mm. • Loading capacity is _____kN. Is this sufficient to break the largest and strongest rock specimens? (Yes/No). • The platens remain co-axial within ± 0.2mm through out the testing. No spherical seat or other non-rigid component is permitted in the loading system. • Spherically-truncated, conical platens of the standard geometry shown in Fig. 2 should be used. • The platens are made of hard material such as tungsten carbide or hardened steel. (Yes/No)		
1.2	**Load Measuring System:** • Load measuring system: Load cell / hydraulic pressure gauge / transducer • Accuracy of failure load measurement : ± _____kN • Readout Unit: digital / analogue • Resistant to hydraulic shock and vibration. (Yes/No)		
1.3	**Distance Measuring System:** • Instrument to measure the distance, D between specimen-platen contact points: Displacement transducer / direct reading scale (ruler) • Accuracy of distance, D measurement: ± _____mm • Resistant to hydraulic shock and vibration. (Yes/No) • Check of the “zero displacement” value when two platens are in contact. • Callipers or steel ruler is prepared to measure the width, W of specimen.		
2	**TESTING PROCEDURES**		
2.1	**Procedure** • A test sample is defined as a set of rock specimens of similar strength and usually obtained from same depth for which a single point load strength is to be determined. • Select a suitable rock specimen, based on the guideline in Items No.2.2 to 2.4. • Record all relevant Dimensions of the test specimen, such as diameter, widths and length according to the dimensions required for respective tests.		

	D = _____mm W_1 = _____mm , W_2 = _____mm • Insert the specimens in the test machine and close the platens to make contact to the test specimens. • Distance L between the contact points and the nearest free end >0.5 D (core diameter) or 0.5W (Width) • Record the failure load (P), P = _____kN • Anisotropic rock should be tested in both directions which give the greatest and least strength values, which are in general parallel and normal to the plane of anisotropy. • Test should be rejected if the fracture surface passes through only one loading point. (Fig.3) • Repeat the tests for other rock specimens from the same rock samples.		
2.2	**Selection of Rock Specimen For Diametral Test** • Length/diameter ratio > 1 (Fig.4a) • More Applicable to laboratory Point Load Test.		
2.3	**Selection of Rock Specimen For Axial Test** • Length/diameter ratio of 0.3 to 1 (Fig. 4b) • More Applicable to laboratory Point Load Test.		
2.4	**Selection of Rock Specimen For Block and Lump Test** • Rock blocks or lumps of size 50± 35mm (Fig.4c & 4d) • Ratio D/W should be between 0.3 and 1.0. Preferably close to 1.0. • Suitable for In-situ Point Load Test. • The smallest width, W is used irrespective of the actual mode of failure.		
3	**CALCULATIONS**		
3.1	**Uncorrected Point Load Strength, I_s** • $\mathbf{I_s = P/D_e^2}$ D_e = equivalent core diameter • $\mathbf{D_e^2 = D^2}$ for Diametral Test • $\mathbf{D_e^2 = 4A/\pi}$ for Axial, Block and Lump Tests. • **A = WD** Minimum cross sectional area of a plane through the platen contact points.		
3.2	**Size Correction, F** • Size-corrected Point Load Strength Index, $\mathbf{I_{s(50)}}$ of a rock specimen is defined as the value of I_s that would have been measured by a Diametral test with D= 50mm. • $\mathbf{I_{s(50)} = F \times I_s}$ • **F =** Size correction factor • $\mathbf{F = (D_e/50)^{0.45}}$		

3.3	**Correlation of Uniaxial Compressive Strength, UCS** • If both uniaxial compressive test and point load test are carried out for the same rock sample: • Plot $I_{s(50)}$ vs UCS • Ratio of UCS/ $I_{s(50)}$ should be established by drawing a best fit linear line in the plot. • Normally, UCS = 20-25 X $I_{s(50)}$		
3.4	**Mean Value Calculation** • Mean value of $\mathbf{I_{s(50)}}$ should be calculated by deleting the two highest and lowest values and the mean value to be calculated from those remaining values of other specimens.		
3.5	**Point Load Strength Anisotropy Index, $I_{a(50)}$** • $\mathbf{I_{a(50)}}$ **=** ratio of mean $\mathbf{I_{s(50)}}$ values measured perpendicular and parallel to planes of weakness. • $\mathbf{I_{a(50)}}$ values close to 1.0 for quasi-isotropic rocks and higher values when the rock is anisotropic.		
3.6	**Reporting of Results** • Calibration for the test machine. • Sampler number, source location and rock type, and the nature and in situ orientation of any planes of anisotropy or weakness. • Water content of the rock at the time of testing. (If necessary) • Information on which specimens were loaded parallel (//), perpendicular (L), or at unknown or random directions with respect to planes of weakness. • For all isotropic samples, a summary tabulation of mean $\mathbf{I_{s(50)}}$ values. • For all anisotropic samples, a summary tabulation of mean $\mathbf{I_{s(50)}}$ values for sub-samples tested perpendicular and parallel to the planes of weakness, and of the corresponding $\mathbf{I_{a(50)}}$ values.		

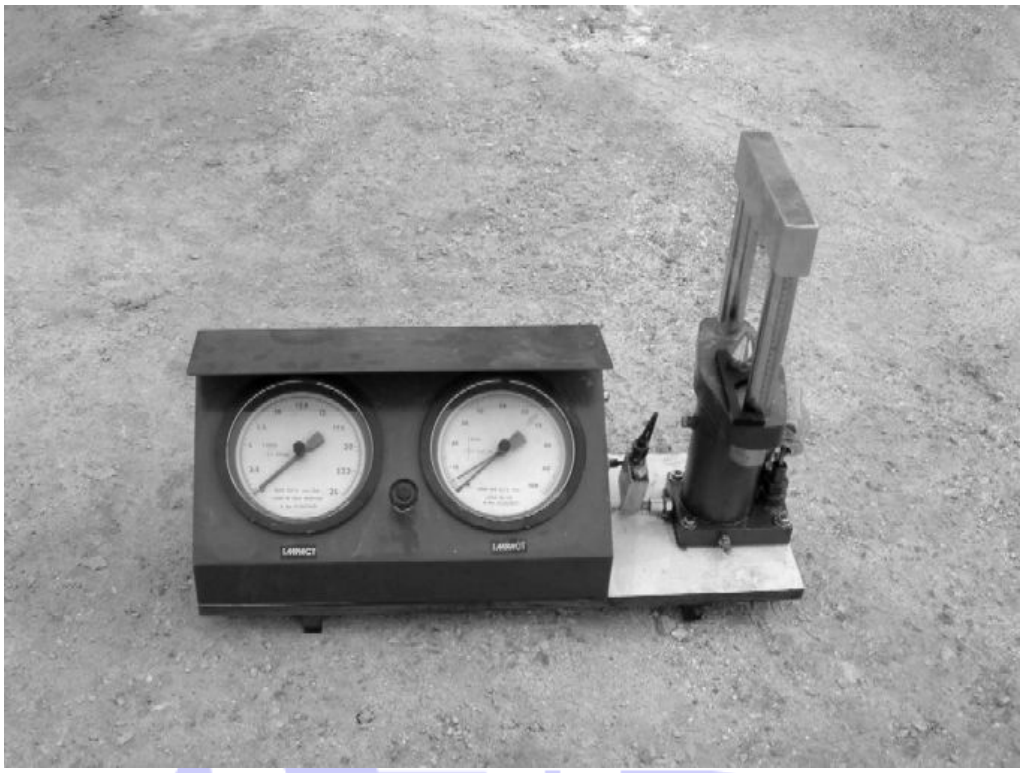

Figure 1. Point Load Test Machine

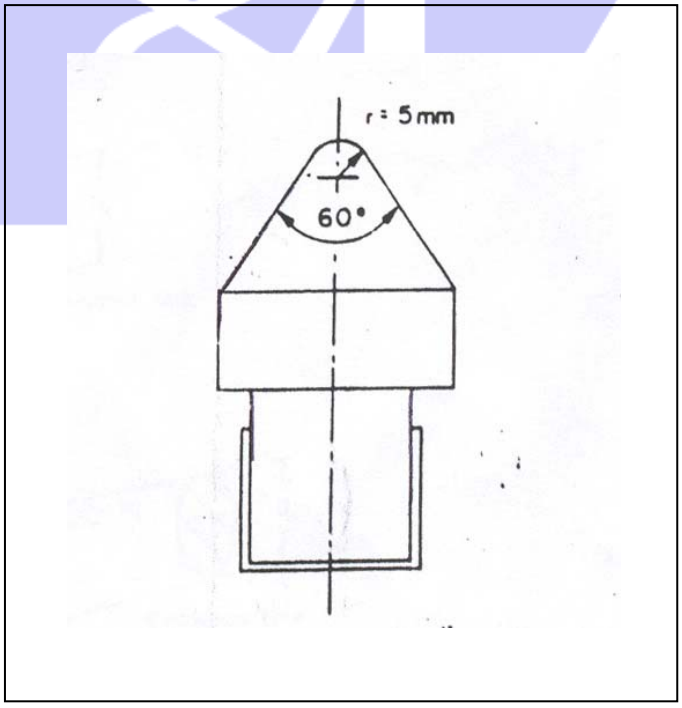

Figure 2. Platen Shape And Tip Radius

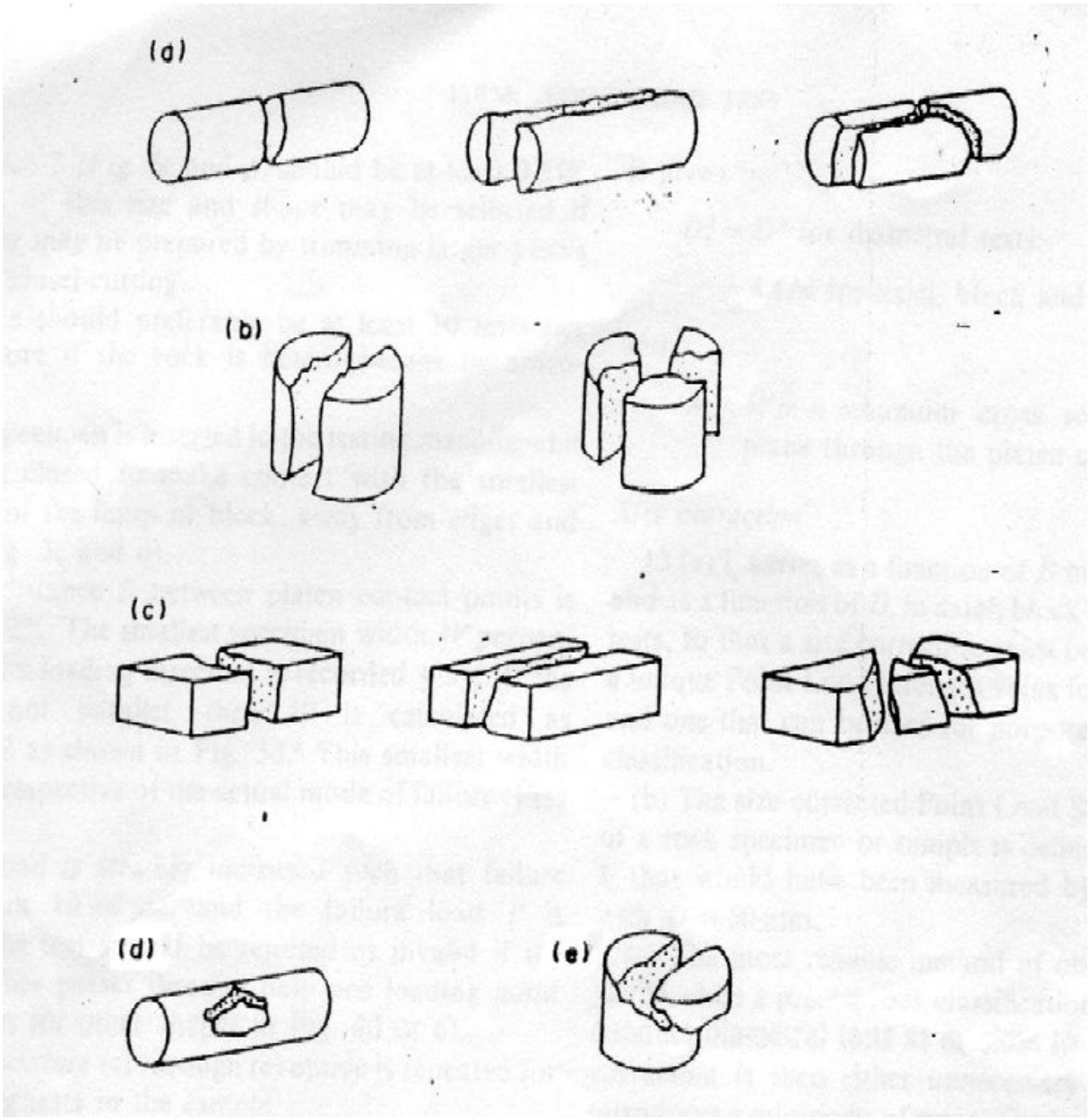

Figure 3. Typical Modes of Failure For Valid and Invalid Tests
(a) Valid Diametral Tests ; (b) Valid Axial Tests : (c) Valid Block Tests :
(d) invalid Core Test : (e) Invalid Axial Test.

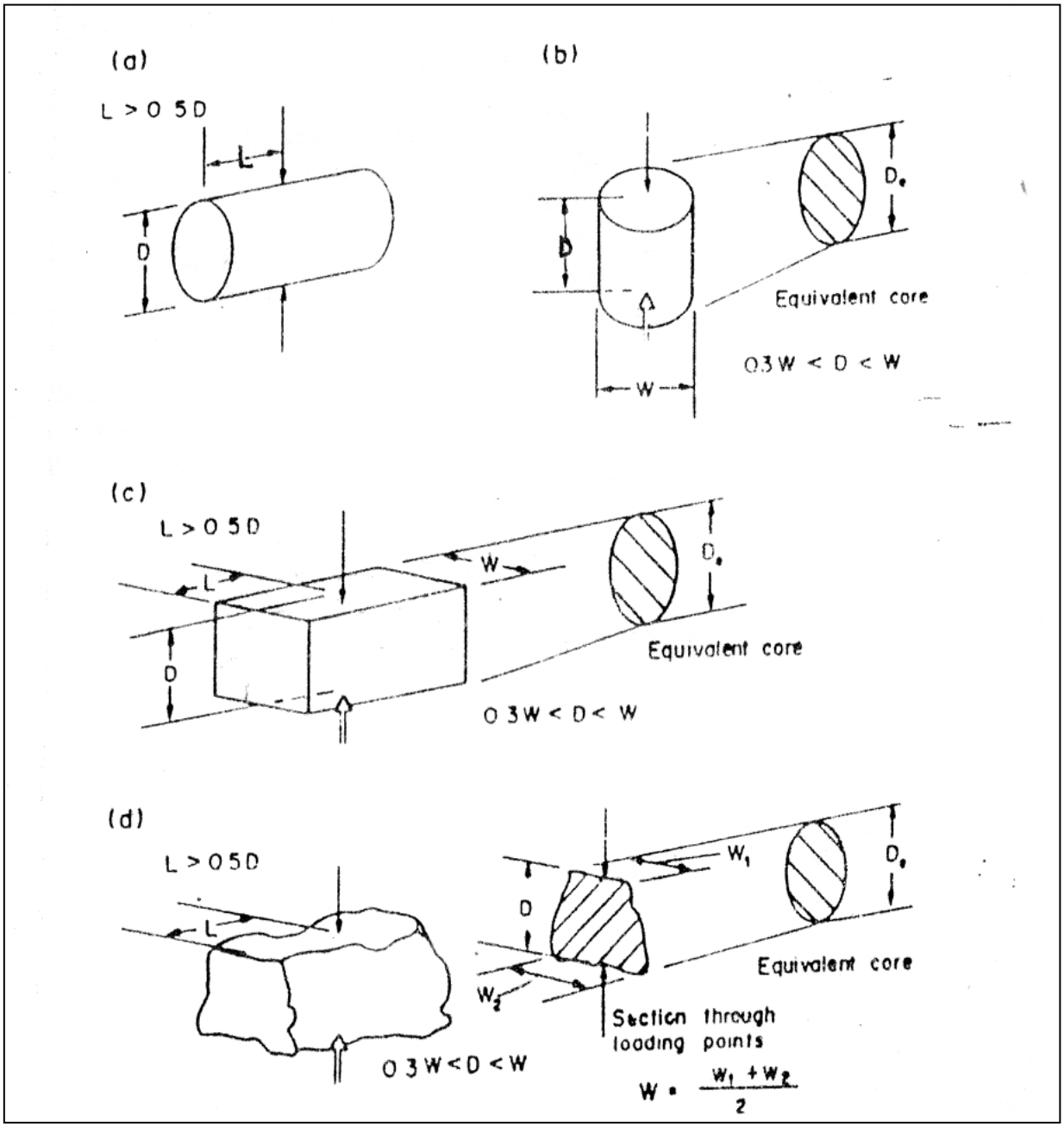

Figure 4. Specimen Shape Requirement for:
(a) Diametral Test ; (b) Axial Tests : (c) Block Tests :
(d) Irregular Lump Test: (e) Invalid Axial Test.