

## APPENDIX VII-A.

## PRINCIPLE AND METHODS OF WORKING OUT HIRE CHARGES FOR TOOLS AND PLANT AND MACHINERY.

The hire charges for the use of vehicles and machinery, shall be fixed to cover interest, depreciation repairs on return or overhauling, including operating costs comprising of charges for fuel and crew shall be fixed in accordance with the principles and details enumerated below.

(i) The hire rate may be calculated either on hourly or linear (kilometre) basis whichever is suitable to the plant in question. The method of arriving at hourly rate is detailed below, and this will apply mutatis mutandis for the calculation of hire charges on linear basis also.

2. The hourly cost of working of machinery is made up of several components as under.—

- |                      |                                    |
|----------------------|------------------------------------|
| I. Capital Account : | (a) Depreciation.                  |
|                      | (b) Interest charges.              |
| II. Reserve fund :   | (a) Major Overhauls and Repairs.   |
| III Running account  | (a) Field maintenance and repairs. |
|                      | (b) Fuel lubricants, etc.          |
|                      | (c) Operating crew.                |

Each of these components is explained below in detail.

I. (a) *Depreciation* :—Depreciation usually refers to the process of changing into unit rates a fair amount of the "first cost" of construction plant to cover up the wear and tear and loss in value. It practically means that the "first cost" is transferred or debited to the various works on which the machinery has been used. Depreciation is strictly connected with the life of machines. The lives of various tools and plants are given in Annexure 'A' to these rules. Defining lives of plant in terms of hours is the best method as records of service hours are available generally and in projects in particular.

Note :—For purposes of calculations 95 per cent of the Capital cost, setting apart 5 per cent for scrap value, should be taken into account.

*Tyres* :—The cost of the tyres is a substantial part of the total price of a plant and their lives are not the same as those of the plant. Therefore, the cost of tyres shall be treated quite separately for the pro-rata cost in the unit rate. The average life of tyres of various types of equipment is given in annexure 'B' to this rule.s

If 'C' be the capital cost of machinery and 'N' the number of hours of life, then the rate of depreciation per hour will be Rs. C/N and this has to be calculated separately for—

- (1) The cost of machinery excluding the cost of tyres;
- (2) the cost of tyres independently.

I (b) *Interest charges* :—Interest shall be computed on hourly basis and included in the 'HIRE RATE'. The percentage of interest on the capital invested shall be taken 7 per cent per annum in the absence of orders to the contrary from Government. For purposes of assessing this rate the number of working hours of the machinery shall be taken as 2,000 hours per annum.

II. *Major overhauls and repairs* :—Under this head the cost of labour and the spare parts involved in overhauls as well as major repairs caused by accidents etc., are included. Expenditure on such items cannot conform to any uniform pattern but the method as indicated below shall be followed.

In such repair, overhaul, replacement etc., shall be a percentage on purchase price. The percentage shall be 75 of the total cost towards this account. The recoveries effected on hourly basis for this purpose shall be kept as a "Reserve Fund" for the particular machinery and all charges as and when incurred shall be debited to this fund. The balance at credit of this fund shall be transferred along with the machine, when transfers are effected.

III. (a) *Field maintenance and repairs* —The normal day-to-day cost of maintenance of the machinery on the field and servicing charges etc., including sundry repairs shall be calculated under this item. Replacement cost of which does not exceed 1 per cent of the initial cost of machine (items in excess of 1 per cent shall be accounted for under the Head of II above) shall also be included under these charges. A provision of 25 of the depreciation of the machine less cost of tyres and 15 per cent of depreciation of the tyres shall be made.

III (b) *Fuel lubricants etc (Propulsion charges)*—The fuel and lubricant consumption is dependant on the horse power of the equipment and its type. Expenditure on fuel lubricants and like consumables required for the propulsion and proper working of the machinery shall be computed.

(c) *Operation crew*:—The pay and allowances of the drivers, cleaners etc., who are employed in actually operating the machine on the works shall be included under this sub-head. The expenditure incurred on leave reserve personnel and incidentals like wages paid during non-working season and also provision for payment of retrenchment, compensation shall all be covered under this sub-head. The actual cost of such labour prevailing in the locality plus 25 per cent to cover the incidentals mentioned above, shall be taken into account in working out the hourly cost of operation crew.

2. The charges under the head III 'Running Account' shall be borne by the suspense estimate sanctioned for each machinery every year and the cost adjusted promptly.

3. The Executive Engineer will be held responsible for the prompt and correct calculation of hire rate for each type of plant and machinery. The Hire Rate shall be reviewed each year. The Hire rate so computed shall be got approved by the Superintending Engineer and the Accountant-General, Madras.

4. The Hire rate approved by the Accountant-General, Madras shall be applicable to all works whether in the same division or in other divisions in the Public Works Department i.e. wherever the machinery is working, the concerned work on which the machinery is employed should bear the Hire Rate and necessary credit shall be afforded to Special Tools and Plant estimate in regard to the interests and depreciation charges the suspense estimated for the maintenance and of Machinery covering the field maintenance repairs, fuel and crew charges III (a), (b) and (c) should get credited correspondingly in respect of the maintenance items.

5. Should the machinery be hired out to a division outside the Public Works Department then the hire charges to be recovered shall be based on the Hire Rate and adjustment should be made only accordingly. If the hiring Division incurred the expenditure on the fuels, and crew charges etc. or over any of the repair charges that may be found necessary during working of the machine then such costs will have to be debited by the hiring division to the owning Division duly supported by vouchers, for necessary payment.

6. Should the machinery be hired to private parties the Hire Rate plus centage charges shall be recovered.

NOTE —In case the fuel supplied by the hirer, hire charges after deducting the fuel charges shall be recovered from the hirer.

7. For areas, where extra percentages over Schedule of rates for works (Conveyance, labour and materials etc. are allowed, the hire charges of Tools and Plant as worked out by the above methods) be enhanced by the respective extra percentages.

NOTE 1.—For working out the hire charges current market value instead of original capital cost, may be taken even for old machinery, Since, this will give uniform hire charges for each type of machinery.

NOTE 2.—Hourly use rate does not include interest charges on capital outlay on the acquisition of Tools and Plant. Even when interest is charged on capital outlay on scheme interest charges on the cost of acquisition of machinery may not be included while arriving at the use rate only for purposes of adjustment of running and other expenses of the machinery for work done departmentally. This principle may also be applied to cases where the machinery is lent to the contractor for use on departmental works free of hire charges under the agreement

8. The minimum hours to be charged for different periods while giving on hire for private parties might be as below :—

Annual Basis	2,000 hours
Monthly basis	250 hours
Weekly basis	60 hours
Daily basis	10 hours.

ANNEXURE—A.

*Life and Repair Provision of Equipment.*

Serial number.	Equipment Category.	Capacity.	Life of equipment.		Repair provision (per-centage of cost of equipment).	Remarks.
			Years.	Hours.		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Excavators	Upto 1.5 cuys	10	12,000	150	..
	Strovels and Draglines.	1.5 to 3.0'' (Diesel)	12	15,000	150	..
		Above 3.0 cuys (Diesel)	15	25,000	150	..
		2.5 to 4 cuys (Electric)	15	25,000	150	..
		4 Cuyds and above (Electric)	20	40,000	150	..
	Walking Draglines.	..	20	30,000	150	..
	Bucket Wheeled excavators.	..	20	30,000	150	..
	Dredger In fresh Water	Hull	25	..	60	..
		Machine	10	..	60	..
	Barges	Hull	16	..	60	..
		Machine	10	..	60	..
	Tugs	Hull	16	..	60	..
		Machine	10	..	60	..

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	Dumpers	Bottom upto 20 T	8	10,000	140	..
		Dumpers 20T to 50 T	10	16,000	140	..
		Above 50 T	12	20,000	140	..
		Rear Dumpers upto 15 T.	8	10,000	140	..
		15 T to 35 T	10	12,000	140	..
		Above 35 T (Upto 50 T.)	12	15,000	140	..
		50 T above	15	20,000	140	..
3	Scrapers.	Highway Dumpers	8	10,000	140	..
	A.—Motorised Push Loaded	} up to 10 cu yds	8	9,000	150	..
	Elevating and self loading.	} Above 10 cu yds	10	10,000	150	..
			10	10,000	150	..
	E. Towed		12	15,000	75	..
4	Tractors—					
	Crawler	Upto 100 H.P.	8	9,000	200	..
		Above 100 to 300 H.P.	10	12,000	240	..
		Above 300 H.P.	12	16,000	240	..
	Wheeled	Upto 75 H.P.	8	12,000	150	..
		Above 75 H.P.	10	15,000	150	..
5	Graders		10	12,000	150	..
6	Loaders—					
	Crawler		10	12,000	200	..
	Wheeled		10	15,000	150	..
	Belt loaders		16	20,000	70	..
	Reclaimers and stackers		20	30,000	70	..
7	Compactors—					
	Self propelled Sheep foot rollers		10	12,000	80	..
	Drawn sheep foot rollers		8	10,000	70	..
	Vibratory rollers		8	8,000	150	..
	Smooth drum rollers		8	10,000	80	..
	Smooth drum vibratory rollers		8	8,000	150	..
	Pneumatic tyred rollers		8	10,000	80	..
	Highspeed compactors		10	16,000	100	..
	Water Sprinklers		10	16,000	100	..
	Canal Trimmer and Lining equipment above 200 cu yds/Hr.		16	20,000	100	..

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
10	Drills—					
	Blast hole drills		10	10,000	80	..
	Core drills		8	8,000	80	..
	Wagon drills		8	8,000	80	..
	Tricone rotary drill		10	10,000	80	..
11	Compressors—					
	A—Diesel compressors—					
	(i) Portable upto 300 cfm.		8	10,000	100	..
	(ii) Portable above 300 cfm.		10	12,000	100	..
	B—Electric compressors—					
	(i) Portable upto 300 cfm.		10	16,000	80	..
	(ii) Portable above 300 cfm.		12	20,000	80	..
	(iii) Stationery		20	30,000	80	..
12	Blowers		12	..	80	..
13	Cooling Plants—					
	(i) Aggregate cooling plant	}	20	40,000	75	..
	(ii) Ice plant					
14	Batching and Mixing Plant—					
	(i) Cement handling Batching and Mixing Plant.		18	30,000	75	..
	(ii) Transit Mixers	}	10	10,000	120	..
	(iii) Agitating Cars					
	(iv) Portable Concrete Mixers					
15	Pumps—					
	(i) Diesel Engine driven above 10 H.P.		8	10,000	100	..
	(ii) Electrical		12	20,000	70	..
16	Well Points		12	20,000	100	..
17	Cranes—					
	(i) Mobile (Pneumatic wheeled)					
	4 to 6 tonnes		10	12,000	120	..
	8 to 12 tonnes					
	15 to 25 tonnes		12	15,000	120	..
	26 tonnes and above		..	..	..	..
	(ii) Crawler mounter upto 3 tonnes	}	10	12,000	120	..
	4 to 10 tonnes					
	Over 10 tonnes		12	15,000	120	..
	(iii) Tower cranes		20	30,000	120	..
	(iv) Truck mounted		10	16,000	140	..

## APPENDICES

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
18	Transport Equipment—					
	A—Heavy transport Vehicles—					
	(a) Trucks and Highway Dumpers—					
	(i) Diesel upto 3 tonnes		10	20,000	140	..
	Diesel 3 to 5 tonnes					
	5 tonnes and above					
	(b) Tractor trailers upto 5 tonnes					
	5 tonnes to 10 tonnes		10	25,000	140	..
	10 tonnes and above		12	20,000	140	..
	B—Light transport vehicles					
	(i) Jeeps		..	16,000	140	..
	(ii) Station wagons					
	(iii) Cars					
	(iv) Ambulance cars					
	C—Ariel Transport—					
	(i) Rope ways		20	40,000		..
	(ii) Cable ways					
	D—Rail Transport—					
	Locomotives Diesel		10	16,000	120	..
	Electrical wagons		22	40,000	100	..
	Rail cars		20	30,000	70	..
19	Diesel Generating Sets—					
	Upto 50 Kva.		10	20,000	100	..
	Above 50 Kva.		15	30,000	120	..

## ANNEXURE—B.

## LIFE OF TYRES.

Equipment.	Life expectancy hours.	
	Average material. (2)	Abrasive material. (3)
Scrapers	3,000	2,500
Dumpers—Bottom	3,500	3,000
Dumpers—End	3,000	2,500
Tractors	2,500	2,000
Rubber-Belt for loaders	3,000	2,500
Drawn scrapers	4,000	3,500

Motor Vehicles 20,100 Kms. (vide G. O. Ms. No. 4035, Home Department, dated 26th December 1964.)

FACTORS AFFECTING EARTHMOVER TYRE LIFE.

<i>Group I.</i>	<i>Maintenance includes inflation.</i>
(1)	(2)
Excellent	1.1
Average	1.0
Poor	0.7
Very bad	0.4
<i>Group II</i>	<i>Maximum speeds.</i>
15 kilometre per hour	1.2
30 kilometre per hour	1.0
45 kilometre per hour	0.8
60 kilometre per hour	0.5
<i>Group III.</i>	<i>Curves.</i>
None	1.1
Moderate	1.0
Severe, Single wheels	0.8
Severe, Dual wheels	0.7
Severe tandem wheels	0.6
<i>Group IV.</i>	<i>Surface.</i>
Snow, packed, no road	..
Exposed earth	3.0
Hard packed earth	1.0
Soft earth or sand maintained	1.0
Gravel road, well maintained	0.9
Soft earth, some rock	0.8
Mud, ordinary	0.8
Gravel road, poorly maintained	0.7



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(1)	(2)
Mud, abrasive or with rock	0.5
<i>Blasted Rock.</i>	
Soft coal	0.9
Soft shale or limestone	0.7
Granite, Gneiss trap ba-salt. hard shale or limestones	0.6
Slate or schist	0.6
Lava, hard surface	0.3
Obsidian, Volcanic glass flin	0.1
<i>Black top</i>	
Clean wet	1.4
Cold weather	1.2
Hot weather 75° to 100° F	0.8
Very hot over 100° F	0.5
<i>Group V Loads</i>	
Recommended by Tyre and Rim Associations—	
Full load	1.0
50 per cent under load	1.2
20 per cent under load	1.1
10 per cent over load	1.0
20 per cent over load	0.8
40 per cent over load	0.5
<i>Group VI.</i>	
	<i>Wheel position.</i>
Training	1.0
Front (non-driving) driving	0.9
Rear dump	0.1
Rear dump tandem	0.7
Bottom dump	0.7
Scraper, self propelled	0.6

*Group VII.*

(1)	Grades' Drive tyres only (2)
Level firm surface	1.0
6 per cent maximum	0.9
10 per cent maximum	0.8
15 per cent maximum	0.7
25 per cent maximum	0.4
Loose or slippery surface—	
6 per cent maximum	0.6
10 per cent maximum	0.6
15 per cent maximum	0.4

*Group VIII**Miscellaneous conditions and combination.*

Favourable or counteracting	1.5
None	1.0
Unfavourable	0.8
Very unfavourable	0.6

Following is an example showing how the tyre life would be worked out, realisation to particular factors chosen from the above table, as applicable for a particular job, where the tyres equipment may be in use.

Optimum tyre life 6,000 hrs or 1,00,000 kilometres.

Example—To determine the tyre life the following condition of working:—

1. Maintenance average	1.0
2. Speed 45 kilometres (Maximum)	0.8
3. Curves, moderate	1.0
4. Surface soft earth, some rock	0.8
5. Load 20 per cent over load	0.8
6. Wheel position driving bottom dump	0.7
7. Grades 10 per cent maximum firm surface	0.8
8. Miscellaneous condition, none	1.0

Tyre life (6,000 hrs. or 1,00,000 kilometres)

$8'0 \times 0'8 \times 1'0 \times 0'8 \times 0'8 \times 0'7 \times 0'8 \times 1'0 = 1'720$  hrs or 29,000 km.

## ANNEXURE C.

## MODEL CALCULATION FOR HIGHER RATE FOR PAY SCRAPER.

The overall cost of machinery Rs. 2,00,000  
 Cost of tyre is assumed as  $\frac{1}{6}$   
 of the overall cost of machinery  $\frac{1}{6} \times 2,00,000 =$  Rs. 33,300

If the cost of tyres is not known cost of machinery  
 less cost of tyre .. .. . Rs. 1,66,700

Life of machinery .. 15,000 Hours.

1. *Depreciation* —

(a) Cost of machine less cost of tyres Rs. 1,76,700

Life of machine 15,000 Hrs.

Depreciation per hour  $\frac{1,66,700}{15,000} = 11.1$  or Rs. 11.1

(b) Cost of tyres Rs. 33,300

Life of tyres 3,000 hrs.

Depreciation per hour  $\frac{33,300}{3,000} = 11.1$  or Rs. 11.1

(c) Interest Charges at 7 per cent of the  
 Capital cost —  $\frac{7}{100} \times 2,00,000 =$  Rs. 14,000

Working hours per year  $200 \times 10 = 2,000$  hrs.

Interest charges per hour  $\frac{14,000}{2,000} = 7$  or Rs. 7.00

(a+b+c) Total Rs. 29.2

II. *Major Repair and Overhaul* —

Of machine at 75% per cent of depreciation

$\frac{75}{100} \times 11.1 = 8.3$  or Rs. 8.3

III. *Operating Cost*. —

maintenance and repairs

of machine at 25 per cent of depreciation

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(ii) Of tyres 15 per cent of depreciation

$$\frac{15}{100} \times 11.1 = \frac{1.7}{4.5} \text{ or Rs. 4.5}$$

	Rs.	P.
(b) Fuels and lubricants etc. 20 lts. of H.S.D. at Rs. 3.50 per litre .. .. .	70	00
Lubricants, grease, cotton etc. 25 per cent of fuel cost extras for fluctuation in rates R.C. H.S.D. oil etc. 10 per cent of the above .. .. .	17	50
	8	70
(c) Labour charges (wages of Driver and cleaner) L. S. (as per actual annual cost over the operational hours during the year) .. .. .	5	00
(a+b+c) Total	101	20

ABSTRACT.

	Rs.	P.
I. Depreciation .. .. .	29	02
II. Major Repairs overhaul .. .. .	8	03
III. Operating cost etc. .. .. .	105	07
	143	05
		or 144 00