Designation: G 75 – 82

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Test Method for SLURRY ABRASIVITY BY MILLER NUMBER[1]

This standard is issued under the fixed designation G 75; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers a laboratory procedure for determining the slurry abrasivity of pumpable mixtures of liquid and solids. It is the intent of this test to produce a relative index or Miller Number that can be used to compare the effect of different slurries on the wear of the machinery and equipment used in the transportation of such material through pipelines.

1.2 Test results are used to calculate the rate of mass loss of duplicate standard metal blocks after having been run for a period of time in the slurry of interest.

1.3 A definite procedure to be followed is described so as to furnish reliable and reproducible results.[2]

2. Applicable Documents

2.1 *ASTM Standards:*

A 532 Specification for Abrasion-Resistant Cast Irons[3]

D 2240 Test Method for Rubber Property—Durometer Hardness[4]

E 11 Specification for Wire Cloth Sieves for Testing Purposes[5]

E 122 Recommended Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process[5]

E 177 Recommended Practice for Use of the Terms Precision and Accuracy as Applied to Measurement of a Property of a Material[5]

G 40 Terminology Relating to Erosion and Wear[6]

2.2 *Standards of Other Organizations:*

MIL-R-6855C Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes[7]

3. Summary of Method

3.1 The relative slurry abrasivity is determined by using the measured mass loss of a standard metal wear block, driven in a reciprocating motion by a rotating crank, riding in the bottom of a tray containing a slurry of 50 % by mass of the solids mixed in distilled water. A direct load is applied to the block. For each test, the bottom of the tray is equipped with a new piece of a sheet of neoprene[8] to act as a lap. The interior of the tray has a flat-bottomed V-shape formed by the filler, that confines the slurry particles to the path taken by the wear block. At one end of each stroke, the wear block is lifted off the lap by a cam action for sufficient time to allow fresh slurry material to flow under the block. The block holder is made of plastic, as are the trays, so that electrolysis inherent in certain slurries is eliminated.

4. Significance and Use

4.1 The Miller Number[9] is an index of the relative abrasivity of slurries. Experience has shown that slurries with a Miller Number of approximately 50 or lower are pumped with minimum abrasive damage to the system. Above a Miller Number of 50, precautions must be observed and greater damage from abrasion is to be expected. The Miller Number may be used to

[1] This test method is under the jurisdiction of ASTM Committee G-2 on Erosion and Wear and is the direct responsibility of Subcommittee G02.30 on Wear.

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[2] *Manual on Presentation of Data and Control Chart Analysis*, ASTM STP 15 D, 1976.

[3] *1983 Annual Book of ASTM Standards*, Vol 01.02.

[4] *1983 Annual Book of ASTM Standards*, Vol 09.01.

[5] *1983 Annual Book of ASTM Standards*, Vol 14.02.

[6] *1983 Annual Book of ASTM Standards*, Vol 03.02.

[7] Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

[8] This is a registered trademark of E. I. du Pont de Nemours and Co., Wilmington, DE 19898.

[9] "The Miller Number—A New Slurry Rating Index," *AIME Paper 73-B-300*, SME Fall Meeting, Pittsburgh, PA, Sept 19–21, 1973.

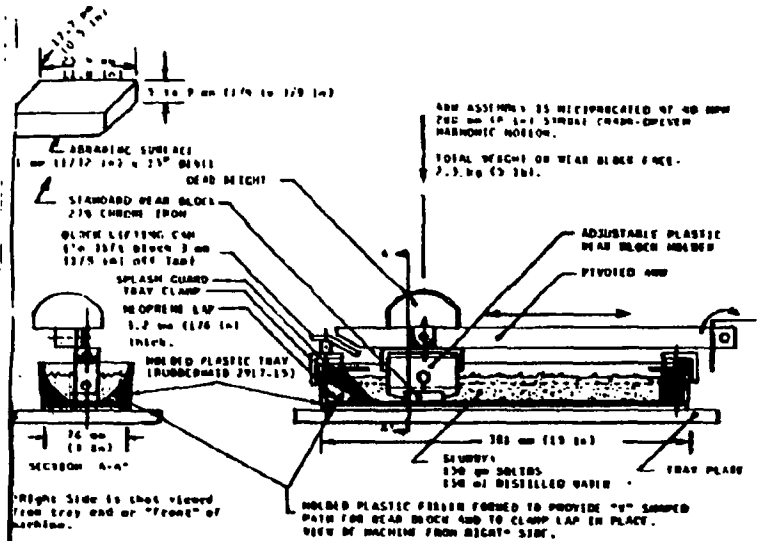

FIG. 1 Miller Number (Slurry Abrasivity) Testing Machine

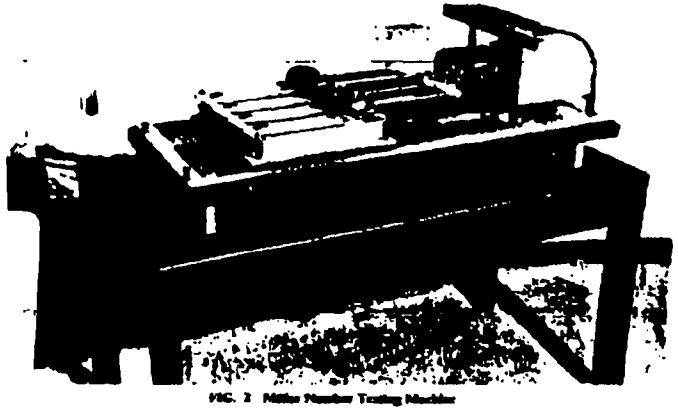

FIG. 2 Miller Number Testing Machine

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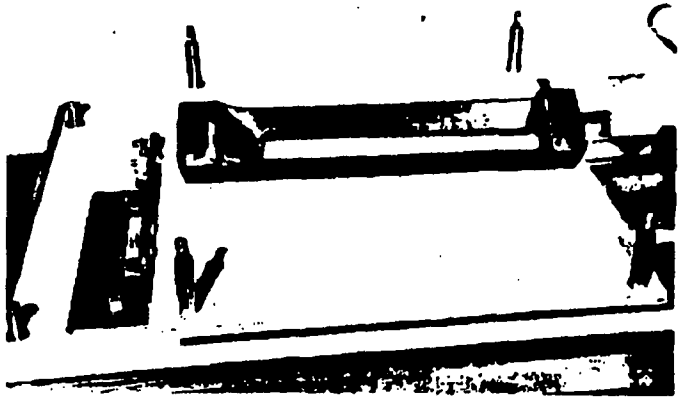
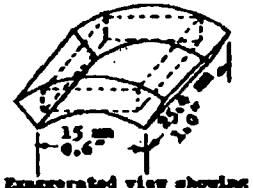


FIG. 3 Tray Filler—Note Sloping "Dump" on Left End



Exaggerated view showing how Wear Block is ground flat out of circular segment of cylinder, with abrading surface on original I.D. of cylinder.

Note—Exaggerated view showing how Wear Block is ground flat out of circular segment of cylinder, with abrading surface on original I.D. of cylinder.

FIG. 4 Wear Block Segment

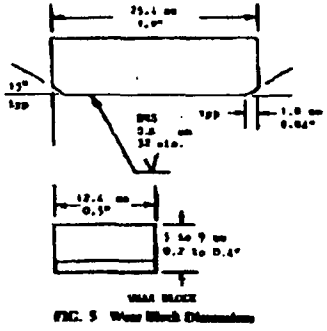
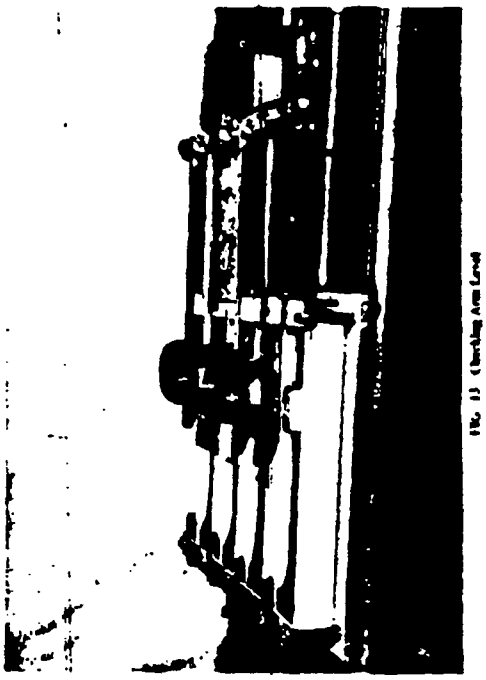


FIG. 5 Wear Block Dimensions



FIP MILLST.DOC

MILLER NO.		TEST NO.	MATERIAL CUSTOMER
0‡ 0		38	[redacted] Panama Detersent [redacted]
0‡ 0		53	[redacted] Chem Potash-Brine [redacted]
0‡ 0		47	[redacted] Panama Detersent [redacted]
0- 0		173	Syncrude P&V-Nozzle Water Hydro [redacted]
0.9‡ 0		510	FCC Sump [redacted]
1-12		28	[redacted] Non-Metallic [redacted]
1-37		7	Sulphur-Water - [redacted]
1.1‡ 0		505	Hotwell Sample 8-23-85 [redacted]
2‡20	2‡21	330	Alsands - [redacted].
2‡20	1‡24	331	Alsands - [redacted].
2-42	3-34	347	Potash Sample
2.6‡ 0		509	Grit Line Sand Isl Sewage Dupont Canada
3- 0		324	Catalyst-[redacted]
3-48		978	[redacted] Disch [redacted]
3-48		204A	Coal Solvent-[redacted].
4- 6		200	Mag. Hydrate [redacted].
4-38		136	Sodium Sulphate - [redacted]
5-25		164	[redacted] Bruce Mansf. Sludge [redacted]
5‡26		288	[redacted]-Solids EROL [redacted]
5-33		207	Bauxite Slurry-[redacted] Jamaica
5‡44	3-17	372	Bentonite (aquagel) SI API Evaluation
5.1‡ 0		508	Potash-Denison Dupont Canada
5.5‡ 5	4.2‡ 0	502	Ground Marble [redacted]
6-22		135	Detersent Slurry- [redacted]
6-26		10	GEBO Coal 30 Mesh [redacted]
7- 3		184	Coal-Saskatchewan [redacted]
7- 6		188	Bentonite Prd. [redacted] Kaolin [redacted]
7‡.7		182	Coal-Saskatchewan [redacted]
7- 8		102	[redacted] Coal [redacted]
7‡ 8		63	Bechtel Arasonite San [redacted]
7‡13	3- 1	336	Dracco/ PSI
7-23		168	Kaolin Slurry/[redacted]
7-31		150	[redacted]-solid Waste
8-12		206	Pulverized KY Coal-[redacted]
9‡ 4		238	Black Mesa Coal [redacted]
9‡11		68	[redacted] Coal [redacted]
9-24		209	* Primary Sludge DuPont
9-35		154	Alcoa Bauxite [redacted]
9-38		204B	Coal-[redacted].
10‡ 1		34	Potash In Brine-[redacted]
10- 2		235	Black Mesa Coal-[redacted]
10- 4		29	Oilwell Std. Mud [redacted]
10- 5		242	CA-O Milk of Lime-[redacted]
10‡ 6		88	[redacted] Gilsonite Ore [redacted]
10-14		87	[redacted]. Mud [redacted]
10-24		289A	* Secondary Sludge DuPont
10‡26		139	CNR Coal
10-27		9	GEBO Coal 16 Mesh [redacted]
11-0		91	[redacted] Silt [redacted]
11‡ 2		35	Potash in Brine-[redacted]
11- 2		197A	F-100 Carbon [redacted]
11- 3		12	Black Mesa Coal 30 Mesh [redacted]
11‡ 7		197	F-100 Carbon - [redacted]
11- 9	13‡ 0	503	Fly Ash [redacted]
11-11		92	[redacted] Rutile U-S