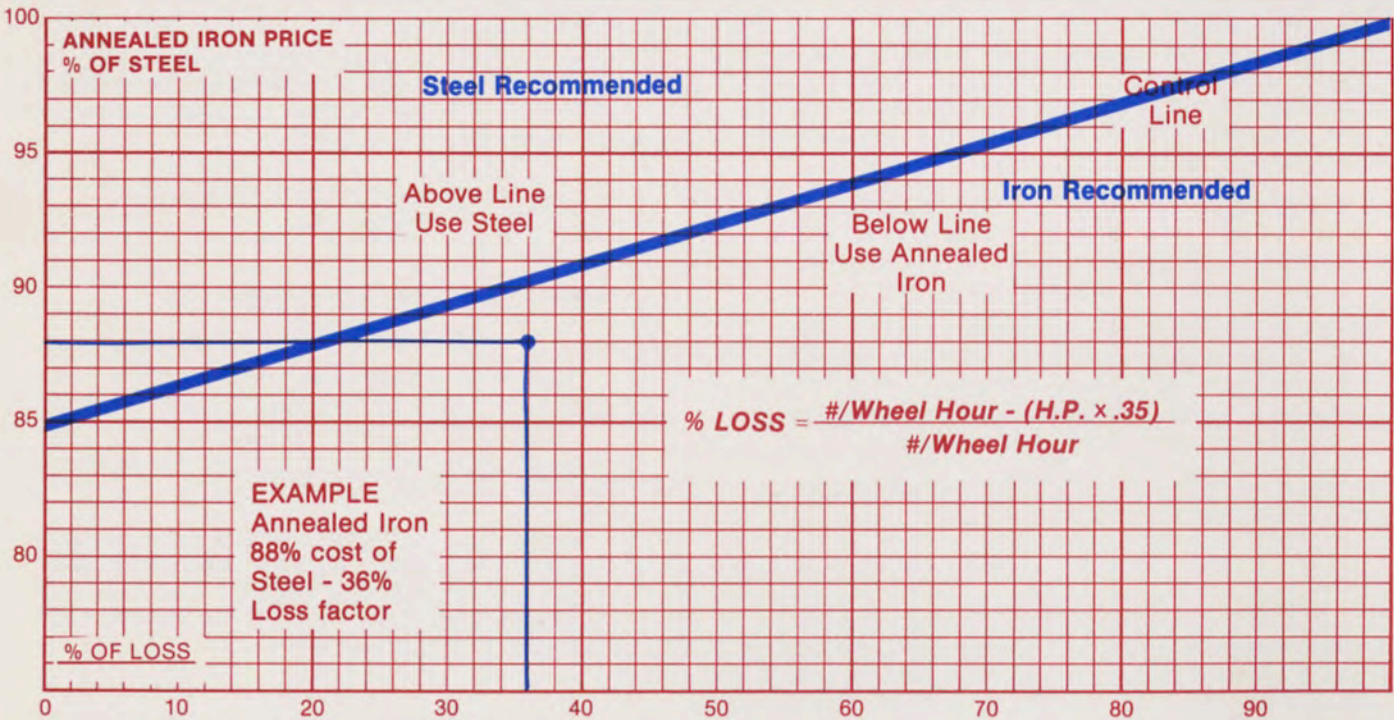


SAE Shot and Grit Size Specifications with Suggested Removal Sizes

| SHOT | | | | | | | | | | | | Removal Size | |
|--------------|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------------|--------------|----------|
| nominal size | .017 | .017 | .017 | .017 | .011 | .011 | .004 | .004 | .004 | .004 | | | |
| SCREEN SIZE | MESH NO. | S780 | S660 | S550 | S460 | S390 | S330 | S280 | S230 | S170 | S110 | | |
| 0.111 | 7 | All Pass | All Pass | | | | | | | | | | |
| 0.0937 | 8 | | All Pass | All Pass | | | | | | | | | |
| 0.0787 | 10 | 85% min | 80% min | | All Pass | All Pass | All Pass | | | | | | |
| 0.0661 | 12 | 97% min | 90% min | 85% min | 80% min | | 5% max | All Pass | All Pass | | | | |
| 0.0555 | 14 | | 97% min | 90% min | 85% min | 80% min | | 5% max | All Pass | All Pass | | | |
| 0.0469 | 16 | | | 97% min | 90% min | 85% min | 75% min | | 5% max | All Pass | All Pass | | |
| 0.0394 | 18 | | | | 96% min | 85% min | 85% min | 75% min | | 5% max | All Pass | All Pass | |
| 0.0331 | 20 | | | | | 96% min | 85% min | | | 10% max | All Pass | | |
| 0.0280 | 25 | | | | | 85% min | 96% min | 70% min | 85% min | | All Pass | 10% max | |
| 0.0232 | 30 | | | | | | | 96% min | 85% min | | | | All Pass |
| 0.0197 | 35 | | | | | | | | 97% min | | | | 10% max |
| 0.0165 | 40 | | | | | | 80% min | 70% min | | 85% min | All Pass | | |
| 0.0138 | 45 | | | | | | | | | 97% min | | | |
| 0.0117 | 50 | | | | | | | 80% min | 65% min | | | 80% min | |
| 0.007 | 80 | | | | | | | | 75% min | | 65% min | 90% min | |
| 0.0049 | 120 | | | | | | | | | | 75% min | | |
| GRIT | nominal size | G10 | G12 | G14 | G16 | G18 | G25 | G40 | G50 | G80 | | | |
| | | .017 | .017 | .017 | .017 | .011 | .011 | .004 | .004 | .004 | Removal Size | | |

Abrasives Selection Chart



U.S. ABRASIVES
P.O. BOX 155 • 2900 CENTER STREET
TIPPECANOE, INDIANA • 46570-0155
Telephone 1-800-348-2533



ABRASIVE SELECTION

First a Little History

In the "Post War Period" and the 50's, there were three types of abrasives available for cleaning and peening applications, chilled iron, annealed iron and steel. In the 60's, new emission control laws caused many iron foundries and iron abrasive producers to close their operations because of the cost of emission control equipment. Some switched to producing steel abrasives and others just closed up shop. Steel abrasive producers using electric furnaces for melting were not confronted with this requirement, hence, expanded and absorbed the market left by the iron manufacturers.

Reduced availability of iron abrasives resulted in many users switching to steel of necessity.

U.S. Abrasives, in its new plant in Tippecanoe, Indiana, has over-come this economic problem by combining the production of both high quality iron castings and iron abrasives from a common cupola.

THE RESULT IS QUALITY IRON ABRASIVE, PARTICULARLY ANNEALED IRON WITH ITS DEMONSTRATABLE ADVANTAGES IS AGAIN AVAILABLE IN QUANTITY IN THE MARKET PLACE.

Now To Abrasive Selection

Abrasives fail after repeated impacts into two or more particles — tend to reform under additional impacts — and then refracture. This cycle is repeated until the particles are too small to be of any value in cleaning or peening and are removed from the system.

"WHETHER AN ABRASIVE OPERATING MIX IS PREDOMINATELY ANGULAR OR PARTIALLY ANGULAR OR MOSTLY ROUND IS A DIRECT FUNCTION OF THE BREAKDOWN RATE."

If you require an angular operating mix, chilled iron is the elective abrasive. If a partially angular operating mix is desired, annealed iron is the elective abrasive; and if a mostly round operating mix is desired, steel is the elective abrasive.

Now let us examine the characteristics of each and the type of applications where each apply.

Chilled Iron

Chilled iron operating mix is predominately angular and is the elective abrasive for airblast applications where its higher breakdown rate is more than offset by power and labor savings due to its faster cleaning speed. In addition, the particles under foot present much less hazard to the operator because of their angularity.

Other elective applications for chilled iron are mill-roll etching, surface preparation for coatings (where a clean sharply etched surface is necessary for lasting adhesion) and many heat-treat operations where the contaminants are an integral part of the surface.

Annealed Iron

Annealed Iron operating mix is partially angular and is an excellent general purpose abrasive. Because of its percentage of angular pellets it will clean somewhat faster than steel, particularly on parts with hard to clean areas, such as, burnt-in sand, etc. Variations in the condition of work being processed are more easily accommodated than with less aggressive abrasives.

Though its breakdown rate is somewhat greater than steel, its lower initial price and faster cleaning rate more than offset this difference. Add to this the fact that abrasive losses of any kind, spillage, leakage or carryout work directly against the cost effectiveness of the more expensive abrasive, making annealed iron the elective abrasive for many cleaning applications.

Electric Furnace Steel

Electric furnace steel will have an operating mix that will be predominately round, even in the higher hardness ranges. It has the lowest breakdown rate of all the abrasives, and is the most widely used material. Electric furnace steel should be the elective abrasive where physical loss is maintained below 15-20% and the surface contaminants are easily removed.

The Effect of Physical Losses on Abrasive Selection

In applications where steel or annealed iron will work equally well, physical losses may dictate the logical selection. The chart on the following page provides the basis for this determination. To use this chart, it is necessary to do the following:

STEP 1. Establish your physical loss percentage, % of loss is (actual wheel hour consumption) minus (no loss consumption*) divided by (actual wheel hour consumption).

$$\% \text{ Loss} = \frac{\#/\text{Wheel Hour} - (\text{H.P.} \times .35^*)}{\#/\text{Wheel Hour}}$$

Locate this spot on the horizontal line.

Step 2. Select the annealed iron price (% of steel). Freight is an important factor, so delivered prices should be used.

Locate this point on the vertical line.

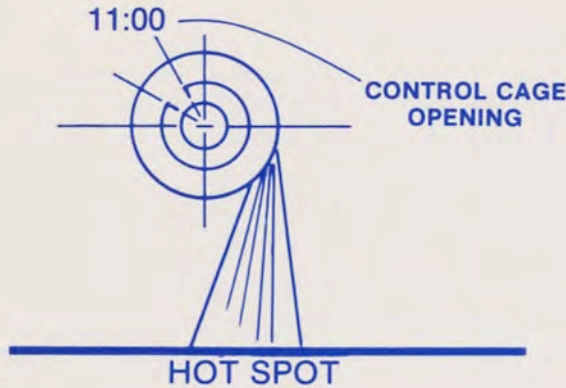
Draw lines from these two points. Where the lines intersect, will give you a basis for abrasive selection. If the point is above the line, steel should be your choice; if the point is below the line, annealed iron will be the more economical.

The example drawn on the graph shows a 20 H.P. motor, using 11 pounds of shot per hour with a price 88% the price of steel.

$$\frac{11 - (.35^* \times 20 \text{ H.P.})}{11} = \frac{11 - 7}{11} = 36\%$$

*No loss consumption is .35#/H.P./Hour

CONTROL EQUIPMENT PERFORMANCE (Cont.)



Efficient abrasive operating mixtures should contain large, medium and small pellets. The large pellets disturb the surface, loosening contaminants. The small abrasive particles scour the loosened contaminants from the work surface. These smaller abrasive pellets also provide coverage of the work, greatly increasing cleaning speed.

A BALANCED ABRASIVE MIX GIVES MOST EFFICIENT CLEANING ACTION

Abrasive Operating Mix

Efficient abrasive operating mixes contain a balance of large pellets needed to loosen contaminants and medium to small to scour the surface clean. Too high a percentage of large pellets result in poor coverage and long cleaning cycles. A poor operating mix is generally the result of improper removal size and high abrasive losses.

Abrasive Removal Size

In a properly operating machine, abrasive removal size will establish operating mix (assuming regular abrasive additions) and effect both cleaning speed and abrasive consumption. The fact, increasing removal size by just .005" can increase consumption by over 50%, points out the importance of proper separator adjustment.

The charts on the last page indicate SAE screen spec's for each abrasive size and recommended removal size.

Other Losses

20 to 30% of abrasive consumed in a reasonably controlled operation may be physical losses, caused by spillage, leakage and carryout, however, it is not uncommon in many installations (particularly foundry operations) where one-half to two-thirds is consumed for these reasons.

These losses must be maintained at normal levels if operating mix is to be balanced and abrasive consumption reasonable.

Routine screen analysis of operating mix, separator discharge, and dust collector discharge is the way to control these losses. Any deviation from an established norm should trigger corrective action.

| | | | | | |
|---------|---------|-----------|-----------|------------|---------|
| | | | | | |
| S-780 | S-660 | S-550 | S-460 | S-390 | S-330 |
| 11,400 | 19,200 | 32,000 | 55,000 | 93,000 | 153,000 |
| | | | | | |
| S-280 | S-230 | S-170 | S-110 | S-70 | |
| 250,000 | 420,000 | 1,200,000 | 3,400,000 | 12,000,000 | |

Pellets
17
148500

SCREEN ANALYSIS - 83,000 Impacts Per Pound

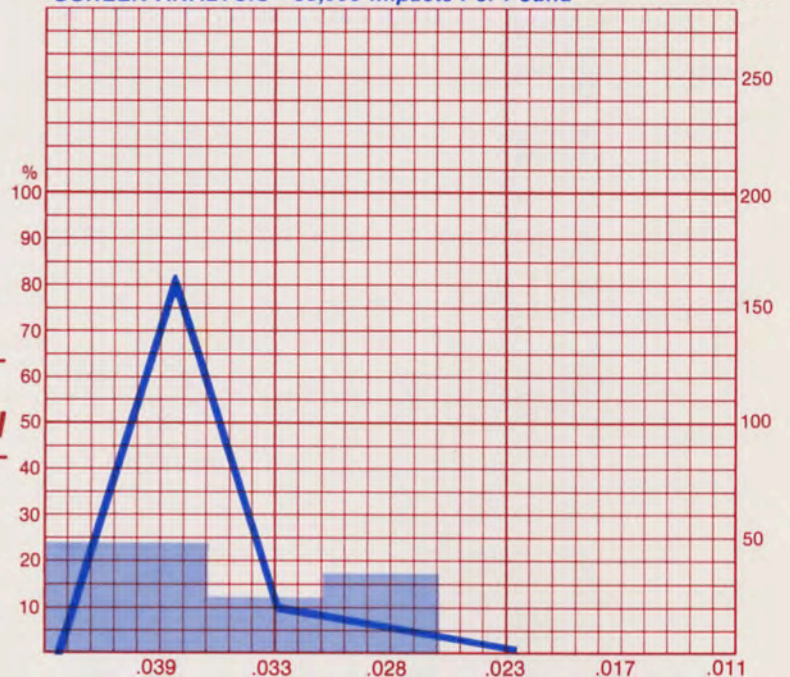


Fig. A Illustrates the size distribution of an S-390 operating mixture composed mainly of full size abrasive. This condition can be caused by a large addition of new abrasive, by heavy carry-out of abrasive, or by the removal of fine abrasive pellets by the separator or dust collector. This mixture would give only 148,500 impacts per pound thrown by the wheel, and would clean very slowly, while giving the parts a coarse finish.

The charts compare the number of impacts per pound between ideal and poor operating mixes of S-390 shot.

Pellets
Pound
400880

SCREEN ANALYSIS - 550,000 Impacts Per Pound

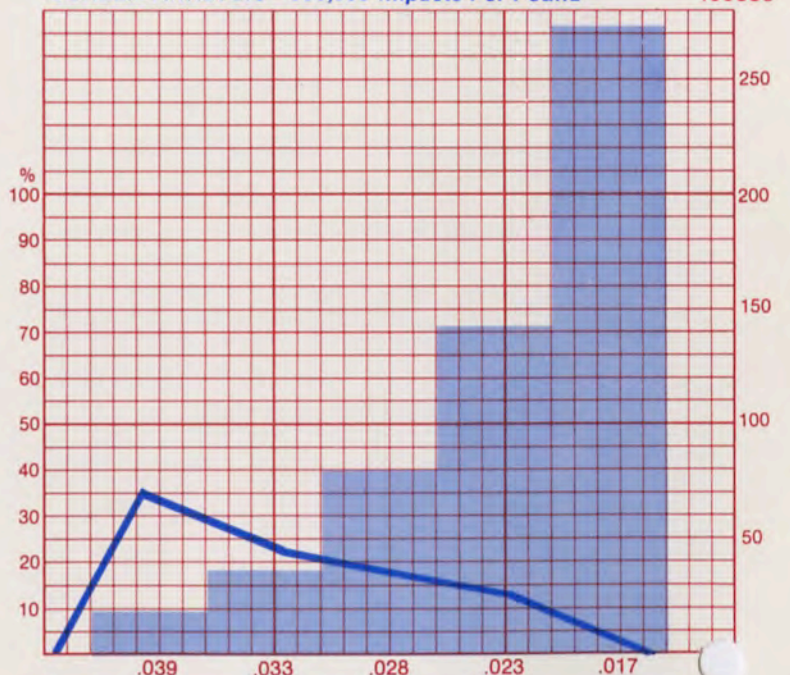


Fig. B Illustrates a good operating mixture of S-390 Shot, in which the breakdown products of the full sized pellets are retained for their full life. This mixture gives over 400,880 impacts per pound of abrasive thrown by the wheel, and would clean rapidly with minimum cost.

U. S. ABRASIVES

TIPPECANOE, INDIANA

INTRODUCING T/Steel

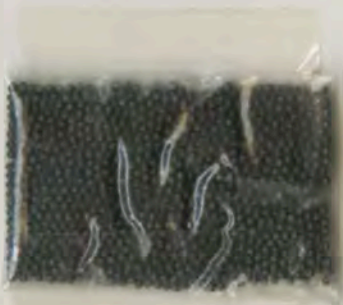
**MANUFACTURED IN ELECTRIC FURNACE
UTILIZING OUR NEWLY DEVELOPED PROCESS**

*** * * PLUS BORON * * ***

The new product "T/Steel" will meet SAE and SFS specifications for hardness and screening. T/Steel is available in all sizes of shot. After many tests in the field and in the laboratory, T/Steel has improved cleaning efficiency and increased life expectancy of 25% plus.

Due to its unique micro-structure and manufacturing technique, T/Steel has been proven in all metal working industries.

This added life, at no extra cost, should put us at the top of your abrasives list. Don't leave your profits out in the dust collector: Let us show you our service and high quality material and what it can do for you! For any application, we can supply all your metallic abrasives needs.



U. S. ABRASIVES

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Telephone 1-800-348-2533



U.S. ABRASIVES

Division Jumbo Manufacturing, Inc.

P. O. BOX 155 • 2900 CENTER STREET
TIPPECANOE, INDIANA • 46570-1055

Telephone: (219) 498-6364

| | <u>AGENT</u> | <u>20 TON</u> | <u>AGENT</u> | <u>10 TO 19 TON</u> | <u>AGENT</u> | <u>1 TO 9 TON</u> |
|--------------|--------------|---------------|--------------|---------------------|--------------|-------------------|
| T/S 1110/930 | (322.20) | 358.00 | (331.20) | 368.00 | (344.70) | 383.00 |
| T/S 780 | (322.20) | 358.00 | (331.20) | 368.00 | (344.70) | 383.00 |
| T/S 660 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 550 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 460 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 390 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 330 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 280 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 230 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 170 | (335.70) | 373.00 | (344.70) | 383.00 | (360.00) | 400.00 |
| T/S 110 | (367.20) | 408.00 | (376.20) | 418.00 | (389.70) | 433.00 |
| T/S 70 | (403.20) | 448.00 | (412.20) | 458.00 | (425.70) | 473.00 |

TERMS: PER TON PRICE QUOTED F.O.B. TIPPECANOE, IN., 30 DAYS NET

PACKAGE: 50# BAGS; 40 BAGS IN CARTON
55 GAL. STEEL DRUMS 2000# PER DRUM

(AGENTS) PRICES ARE 10% FROM FULL LIST. ANY PRICING BELOW LIST WILL BE NEGOTIATED.

ALL PRICES SUBJECT TO STEEL SCRAP SUPPLEMENT IN EFFECT AT TIME OF SHIPMENT. BASIC PRICE OF \$100.00 PER TON WILL BE USED.

LESS THAN ONE TON SHIPMENTS WILL BE PRORATED AT ONE TON PRICE PLUS \$50.00 FOR EXTRA HANDLING.



GREDE FOUNDRIES, INC.

GENERAL OFFICES

P.O. BOX 26499
MILWAUKEE, WISCONSIN 53226-0499
414-257-3600

GRAY IRON

IRON MOUNTAIN FOUNDRY - KINGSFORD, MICHIGAN
ROBERTS FOUNDRY CO., INC. - GREENWOOD, SOUTH CAROLINA
GREDE PERM CAST, INC. - CYNTHIANA, KENTUCKY
GREDE VASSAR, INC. - VASSAR, MICHIGAN

DUCTILE IRON

LIBERTY FOUNDRY - WAUWATOSA, WISCONSIN
REEDSBURG FOUNDRY - REEDSBURG, WISCONSIN
WICHITA FOUNDRY - WICHITA, KANSAS

STEEL

MILWAUKEE STEEL FOUNDRY - MILWAUKEE, WISCONSIN

SPECIAL SERVICES

SHORT RUN SPECIALTY FOUNDRY - MILWAUKEE, WISCONSIN

January 20, 1988

**ATTN: GENERAL MANAGER
U.S. ABRASIVES
2900 CENTER STREET P.O. BOX 155
TIPPECANOE, INDIANA 46570**

Gentlemen:

Continuing to be a leader in the foundry industry necessitates a strong working relationship with our suppliers of goods and services.

Grede Foundries feels this relationship is vital if we are to prosper and remain competitive. We also realize that you are an extension of our manufacturing facilities. You are an important member of our team. If we both supply a high quality product at a competitive price, together we will prosper.

For the period of November 1, 1986 through October 31, 1987, your company received a Quality Rating of:

97.51%

Your previous Quality Rating was:

-35.34%

As shown by the classification listed below, your rating reflects a good effort to supply a quality product.

We appreciate the effort you have put forth and will be happy to work with you in the future to improve or maintain this level of performance.

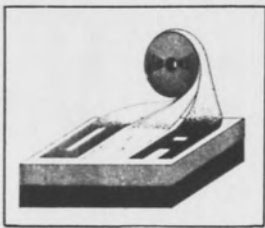
Sincerely,

Grede Foundries, Inc.

**James W. Krueger
Director of Purchasing**

**Todd G. Martin
Quality Technician**

| | |
|----------------|--------------------------|
| RATING | PERFORMANCE LEVEL |
| 98-100% | EXCELLENT |
| 92-98% | GOOD |
| 85-92% | POOR |
| <85% | UNACCEPTABLE |



U.S. ABRASIVES

P. O. BOX 155 • 2900 CENTER STREET

TIPPECANOE, INDIANA • 46570-0155

Telephone: (219) 498-6364

"FOUNDRY BLENDS TO MEET YOUR CLEANING NEEDS"

Custom Blended For Your Specific Cleaning Problems !!!

FAST BLAST
Annealed Shot/Steel Shot

RAPID BLAST
Annealed Grit/Steel Shot

FOUNDRY BLEND
STEEL SHOT MIX
550/460/390/330/280/230

T/Steel Shot is capable of up to 25% longer life when compared to conventional shot. With a mix of 75% T/Steel and 25% annealed iron shot U. S. Abrasives can lower your cleaning costs without sacrificing cleaning time. The Life Cycles of the mix will be the same when compared to conventional shot.

U. S. ABRASIVES

LIFE COMPARISON TEST

ERVIN

FOR AMCAST

| U. S. ABRASIVES MATERIAL | | | | | | COMPETITORS MATERIAL | | | | | |
|--------------------------|---------------|----------------------------|-------------|--------|---------------|----------------------|---------------|------------------------------|-------------|--------|---------------|
| SAMPLE | | SIZE <u>TS-460/550 Mix</u> | | | | Ervin Amasteel | | SAMPLE SIZE <u>S-460-550</u> | | | |
| SCREEN ANALYSIS | CUMUL. PASSES | DISCH. SCREEN | % REMAINING | % LOSS | % CUMUL. LOSS | SCREEN ANALYSIS | CUMUL. PASSES | DISCH. SCREEN | % REMAINING | % LOSS | % CUMUL. LOSS |
| .0787 > T | 500 | .0165 | 93 | 7 | 7 | .10787 > T | 500 | .0165 | 92 | 8 | 8 |
| .0661 > 40.5% | 1,000 | .0165 | 92 | 8 | 15 | .0661 > 51% | 1,000 | .0165 | 83 | 17 | 25 |
| .0555 > 82% | 1,500 | .0165 | 92 | 8 | 23 | .0555 > 78% | 1,500 | .0165 | 81 | 19 | 44 |
| .0469 > 98.9% | 2,000 | .0165 | 86 | 14 | 37 | .0469 > 95% | 2,000 | .0165 | 80 | 20 | 64 |
| .0394 > 100% | 2,500 | .0165 | 83 | 17 | 54 | .0394 > 100% | 2,500 | .0165 | 80 | 20 | 84 |
| | 3,000 | .0165 | 83 | 17 | 71 | .0331 > T | 3,000 | .0165 | 80 | 20 | 104 |
| | 3,500 | .0165 | 83 | 17 | 88 | | 2,900 | .0165 | 83 | 16 | 100 |
| | 4,000 | .0165 | 84 | 16 | 104 | | 4,000 | | | | |
| | 3,950 | .0165 | 87 | 12 | 100 | | | | | | |
| | 4,700 | | | | | | | | | | |
| | 4,900 | | | | | | | | | | |
| | 5,000 | | | | | | | | | | |
| | 5,500 | | | | | | | | | | |

COMMENTS Carbon .165 27% longer life
OVER AMASTEEL OF SAME MIX

COMMENTS Carbon .975

ND



U.S. ABRASIVES

P. O. BOX 155 • 2900 CENTER STREET
TIPPECANOE, INDIANA • 46570-0155

Telephone: (219) 498-6364

November 19, 1987

PRICE SCHEDULE

| ITEM | 20 TON & OVER | | 10 TON TO LESS THAN 20 TONS | | LESS THAN 10 TONS | | LESS THAN 1 TON | |
|----------------------------------|-------------------------|--------|-----------------------------|--------|-------------------|--------|-----------------|--------|
| | AGENT | | AGENT | | AGENT | | AGENT | |
| CHILLED IRON SHOT (ALL SIZES) | (279.00) | 310.00 | (288.00) | 320.00 | (297.00) | 330.00 | (324.00) | 360.00 |
| CHILLED IRON GRIT | | | | | | | | |
| G-10, 12, 14, 16, 18 | (292.50) | 325.00 | (301.50) | 335.00 | (310.50) | 345.00 | (337.50) | 375.00 |
| G-25 | (301.50) | 335.00 | (310.50) | 345.00 | (319.50) | 355.00 | (346.50) | 385.00 |
| G-40, 50 | (328.50) | 365.00 | (337.50) | 375.00 | (346.50) | 385.00 | (373.50) | 415.00 |
| G-80 | (342.00) | 380.00 | (351.00) | 390.00 | (360.00) | 400.00 | (387.00) | 430.00 |
| G-120 & FINER | (346.50) | 385.00 | (355.50) | 395.00 | (364.50) | 405.00 | (391.50) | 435.00 |
| ANNEALED SHOT (ALL SIZES) | (283.50) | 315.00 | (292.50) | 325.00 | (301.50) | 335.00 | (328.50) | 365.00 |
| ANNEALED GRIT | | | | | | | | |
| G-10, 12, 14, 16, 18, | (297.00) | 330.00 | (306.00) | 340.00 | (315.00) | 350.00 | (342.00) | 380.00 |
| G-25 | (306.00) | 340.00 | (315.00) | 350.00 | (324.00) | 360.00 | (351.00) | 390.00 |
| G-40, 50 | (333.00) | 370.00 | (342.00) | 380.00 | (351.00) | 390.00 | (378.00) | 420.00 |
| MINIMUM CHARGE | | 75.00 | | | | | | |
| SPECIAL SCREENING CHARGE | 50.00 TO 100.00 PER TON | | | | | | | |

PACKAGING IS IN 50lb. BAGS, 40 BAGS PER CARTON, BANDED TO DISPOSABLE WOODEN PALLET: OR 55 GALLON DRUM, PALLETIZED CONTAINING 2000lb. OF SHOT, AND THE FOLLOWING QUANTITIES OF GRIT: G-10 THRU G-50 1700lb. PER DRUM, G-80 AND FINER 1500lb. PER DRUM.

TERMS ARE NET THIRTY (30) DAYS. ALL PRICES ARE PER NET TON, F.O.B. TIPPECANOE, INDIANA, NOTIFICATION OF ANY SCRAP SURCHARGE IN EFFECT AT THE TIME OF SHIPMENT WILL BE MADE PRIOR TO SUCH SHIPMENT.



U.S. ABRASIVES

P. O. BOX 155 • 2900 CENTER STREET
TIPPECANOE, INDIANA • 46570-0155

Telephone: (219) 498-6364

LIFE CYCLE COMPARISON, T/STEEL VS THE COMPETITION

| SHOT SIZE | MANUFACTURING FIRM | | | | | | |
|--------------|--------------------|---------------|-------|-------|-------------------|----------|----------|
| | U. S. ABRASIVES | METAL TECH | ALLOY | GLOBE | WHEEL- ABRATOR | PANGBORN | NATIONAL |
| S-660 | 3645 | 3350 | 3150 | 2688 | 2780 | N/A | 2641 |
| S-550 | 3875 | 3410 | 2880 | 2680 | 2985 | N/A | N/A |
| S-460 | 3950 | 3810 | 2985 | N/A | 2820 | 2420 | 2610 |
| S-390 | 3945 | 3715 | 2895 | 2915 | 3290 | 2680 | N/A |
| S-330 | 4725 | 4570 | 3120 | 3710 | 3680 | 3315 | 3418 |
| S-280 | 4715 | 4315 | N/A | N/A | N/A | 3070 | N/A |
| S-230 | 4980 | 4250 | 3285 | 3615 | N/A | 3075 | N/A |

NOTE:

1. Spaces marked N/A indicate material for testing was not available at the time of testing.
2. All materials tested, were screened for accuracy of size, and each tested under very precise laboratory conditions.
3. Tests were run in a life cycle testor in accordance with recommended test procedures for steel shot.



U.S. ABRASIVES

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STEEL SHOT SPECIFICATION DATA

The Steel Shot shall be U. S. Abrasives Type

The shot, is manufactured in an electric furnace. The following is a typical analysis:

CHEMICAL ANALYSIS

| | |
|---------------------|-------|
| (a) Carbon | .17 % |
| (b) Manganese | .62% |
| (c) Silicon | .08 % |
| (d) Phosporus | .022% |
| (e) Sulfur | .019% |
| (f) Boron | .002% |

This material will have an average hardness rating of 40-45 Rockwell-C

Screen analysis conforms to S.A.E. Specifications

Packaging will be in 55 gallon drums or bags 40-50# bags per pallet

MATERIAL SAFETY DATA SHEET

SECTION I

| | | |
|--|--|---|
| PRODUCT NAME OR NUMBER (as it appears on label) Steel Shot | | GM COMMON CODE |
| MANUFACTURER'S NAME U. S. Abrasives | | EMERGENCY TELEPHONE NO. 219-342-0287 |
| ADDRESS (Number, Street, City, State and Zip Code) 2900 Center St PO Box 155 Tippecanoe, IN 46570 | | MANUFACTURER'S D-U-N-S NO. |
| HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) | | |
| ADDITIONAL HAZARD CLASSES (as applicable) | | |
| CHEMICAL FAMILY Low Carbon Steel | FORMULA Typical C.15, Mag. .150, Si .20 99% | |

SECTION II — INGREDIENTS (list all ingredients)

| CAS REGISTRY NO. | %W | %V | CHEMICAL NAME(S) | Listed as a Carcinogen in NTP, IARC or OSHA 1910(z) (specify) |
|------------------|----|-----|------------------|---|
| None | | .15 | Carbon | |
| None | | .15 | Mag. | |
| None | | .20 | Si | |
| None | | 99 | Steel | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SECTION III — PHYSICAL DATA

| | | | |
|--|---|-------------------------|-------------------------------------|
| BOILING POINT 2700F ___ °C | SPECIFIC GRAVITY (H ₂ O = 1) | 7.0 | |
| VAPOR PRESSURE ___ F ___ °C <input type="checkbox"/> mm Hg <input type="checkbox"/> psi | PERCENT VOLATILE BY VOLUME (%) | N/A | PERCENT SOLID BY WEIGHT (%) 100% |
| VAPOR DENSITY (AIR = 1) | N/A | EVAPORATION RATE (= 1) | N/A |
| SOLUBILITY IN WATER | N/A | pH = | N/A |
| APPEARANCE AND ODOR | IS MATERIAL: LIQUID SOLID GAS PASTE POWDER | | |

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

| | | | | |
|--|-------------|------------------|------------|------------|
| FLASH POINT N/A F ___ °C | method used | FLAMMABLE LIMITS | LEL N/A | UEL N/A |
| EXTINGUISHING MEDIA Water - CO 2 - Foam | | | | |
| SPECIAL FIRE FIGHTING PROCEDURES Material not combustible as used | | | | |
| UNUSUAL FIRE AND EXPLOSION HAZARDS Very fine material will burn when exposed to flame or cutting torch. Remove heat and extinguish with water CO 2 or Foam | | | | |

MATERIAL SAFETY DATA SHEET

SECTION I

| | | |
|--|--|---|
| PRODUCT NAME OR NUMBER (as it appears on label) Chilled Iron Shot and Grit | | GM COMMON CODE |
| MANUFACTURER'S NAME U. S. Abrasives | | EMERGENCY TELEPHONE NO. 219-342-0287 |
| ADDRESS (Number, Street, City, State and Zip Code) 2900 Center St. Tippecanoe, IN 46570 | | MANUFACTURER'S D-U-N-S NO. |
| HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) Chilled Iron Shot and Grit | | |
| ADDITIONAL HAZARD CLASSES (as applicable) None | | |
| CHEMICAL FAMILY Cast Iron | FORMULA 94% Fe, 3% C, 1.6 Si, .5 Mg | |

SECTION II — INGREDIENTS (list all ingredients)

| CAS REGISTRY NO. | %W | %V | CHEMICAL NAME(S) | Listed as a Carcinogen in NTP, IARC or OSHA 1910(z) (specify) |
|------------------|-----|-----|------------------|---|
| None | N/A | 3 | Carbon | None |
| None | N/A | 94 | Iron | None |
| None | N/A | 1.6 | Si | None |
| None | N/A | .5 | Mg | None |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

SECTION III — PHYSICAL DATA

| | | | |
|---|--|-------------------------|-------------------------------------|
| BOILING POINT 2700 °F _____ °C | SPECIFIC GRAVITY (H ₂ O = 1) | 7.2 | |
| VAPOR PRESSURE _____ FN/A _____ °C <input type="checkbox"/> mm Hg <input type="checkbox"/> psi | PERCENT VOLATILE BY VOLUME (%) | N/A | PERCENT SOLID BY WEIGHT (%) 100% |
| VAPOR DENSITY (AIR = 1) | N/A | EVAPORATION RATE (= 1) | N/A |
| SOLUBILITY IN WATER | N/A | pH = | N/A |
| APPEARANCE AND ODOR Small particles gray blue oderless | IS MATERIAL: GAS PASTE LIQUID SOLID POWDER | | |

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

| | | | |
|---|------------------|--------------------|--------------------|
| FLASH POINT N/A _F _____ °C method used N/A | FLAMMABLE LIMITS | N/A _{LEL} | N/A _{UEL} |
| EXTINGUISHING MEDIA Water - CP 2 - Foam | | | |
| SPECIAL FIRE FIGHTING PROCEDURES NON Combustible as used | | | |
| UNUSUAL FIRE AND EXPLOSION HAZARDS Fine 325 and down will burn when exposed to flame. Remove heat and extinguish water CO 2 or Foam | | | |

SECTION V-HEALTH HAZARD DATA

| | |
|--|--|
| EFFECTS OF OVEREXPOSURE — Conditions to Avoid Can cause eye infection if imbedded in eye | THRESHOLD LIMIT VALUE <input type="checkbox"/> PERMISSIBLE EXPOSURE LIMIT <input type="checkbox"/> OTHER LIMIT <input type="checkbox"/> None |
| PRIMARY ROUTES OF ENTRY Inhalation <input type="checkbox"/> Skin Contact <input type="checkbox"/> Other (specify) <u>Through skin or eyes</u> | |
| EMERGENCY AND FIRST AID PROCEDURES <u>Eye cover with clean cloth - Consult physician. Skin abrasion - wash wound - disinfect bandage - consult physician if serious</u> | |

SECTION VI-REACTIVITY DATA

| | | | |
|---|----------------|-----|--------------------------------|
| STABILITY | UNSTABLE | | CONDITIONS TO AVOID <u>N/A</u> |
| | STABLE | X | |
| INCOMPATIBILITY (materials to avoid) <u>N/A</u> | | | |
| HAZARDOUS DECOMPOSITION PRODUCTS: <u>Non - oxidizes to iron oxide in contact with moisture</u> | | | |
| HAZARDOUS POLYMERIZATION | MAY OCCUR | N/A | CONDITIONS TO AVOID |
| | WILL NOT OCCUR | N/A | |

SECTION VII-SPILL OR LEAK PROCEDURES

| | |
|---|---|
| STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED <u>Sweep from floor to prevent fall type injuries</u> | |
| WASTE DISPOSAL METHOD <u>Material by itself can be disposed of in land fill. It can be reclaimed by magnet, air separation, or by screening to remove dust and debris.</u> | |
| RCRA HAZARDOUS WASTE NO. (40 CFR 261.33) <u></u> | |
| VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water) <u>N/A</u> | |
| <input type="checkbox"/> Theoretical _____ lb/gal <u>N/A</u> | <input type="checkbox"/> Analytical _____ lb/gal <u>N/A</u> |

SECTION VIII-SPECIAL PROTECTION INFORMATION

| | | |
|--|--|--|
| RESPIRATORY PROTECTION (specify type) <u></u> | | |
| VENTILATION | LOCAL EXHAUST (Specify Rate) <u>Normally not required</u> | SPECIAL |
| | MECHANICAL (General) (Specify Rate) | OTHER |
| PROTECTIVE GLOVES (specify type) <u></u> | | EYE PROTECTION (specify type) <u></u> |
| OTHER PROTECTIVE EQUIPMENT <u>N/A</u> | | |

SECTION IX-SPECIAL PRECAUTIONS

| | |
|--|--|
| PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING <u>No special precautions required. Watch floor loading and stacking.</u> | |
| <u>Extremely heavy per square foot</u> | |
| OTHER PRECAUTIONS <u>N/A</u> | |

Seller agrees not to assert any claim (other than a claim for a patent infringement) against General Motors Corporation for any use or disclosure of any technical data or information disclosed in connection with this questionnaire.

| | |
|--|---|
| PLEASE COMPLETE QUESTIONNAIRE AND RETURN TO: | Name (print) <u>U. S. Abrasives</u> |
| | Signature |
| | Title <u>Alvin Hetzel, President</u> |
| | Date <u>1-25-88</u> |

SECTION V-HEALTH HAZARD DATA

| | |
|--|---|
| EFFECTS OF OVEREXPOSURE — Conditions to Avoid | THRESHOLD LIMIT VALUE <input type="checkbox"/> PERMISSIBLE EXPOSURE LIMIT <input type="checkbox"/> |
| Can cause eye infection if imbedded in eye | OTHER LIMIT <input type="checkbox"/> None |
| PRIMARY ROUTES OF ENTRY <input type="checkbox"/> Inhalation <input type="checkbox"/> Skin Contact <input type="checkbox"/> Other (specify) Through Skin or Eyes | |
| EMERGENCY AND FIRST AID PROCEDURES Eye cover with clean cloth - Consult Physician - Skin abrasion-wash wound- disinfect - bandage - consult phician | |

SECTION VI-REACTIVITY DATA

| | | | |
|---|----------------|-----|---------------------|
| STABILITY | UNSTABLE | | CONDITIONS TO AVOID |
| | STABLE | X | N/A |
| INCOMPATIBILITY (materials to avoid) N/A | | | |
| HAZARDOUS DECOMPOSITION PRODUCTS: None-oxidizes to iron oxide in contact with moisture | | | |
| HAZARDOUS POLYMERIZATION | MAY OCCUR | N/A | CONDITIONS TO AVOID |
| | WILL NOT OCCUR | N/A | |

SECTION VII-SPILL OR LEAK PROCEDURES

| | |
|--|--|
| STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED | |
| Sweep from floor to prevent fall type injuries | |
| WASTE DISPOSAL METHOD Material by itself can be disposed of in land fill. It can be reclaimed by magnet, air separation, or by screening to remove dust and debris. | |
| CERCLA (Superfund) REPORTABLE QUANTITY (in lbs) RCRA HAZARDOUS WASTE NO. (40 CFR 261.33) | |
| VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water) N/A | |
| <input type="checkbox"/> Theoretical _____lb/gal N/A | <input type="checkbox"/> Analytical _____lb/gal N/A |

SECTION VIII-SPECIAL PROTECTION INFORMATION

| | | |
|--|---|-------------------------------|
| RESPIRATORY PROTECTION (specify type) Use single - use respirator when handling grit or grit dust | | |
| VENTILATION | LOCAL EXHAUST (Specify Rate) Normally not required | SPECIAL |
| | MECHANICAL (General) (Specify Rate) | OTHER |
| PROTECTIVE GLOVES (specify type) | | EYE PROTECTION (specify type) |
| OTHER PROTECTIVE EQUIPMENT N/A | | |

SECTION IX-SPECIAL PRECAUTIONS

| | |
|--|--|
| PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING No special precautions required, Watch floor loading and stacking | |
| Extremely heavy per square foot | |
| OTHER PRECAUTIONS N/A | |

Seller agrees not to assert any claim (other than a claim for a patent infringement) against General Motors Corporation for any use or disclosure of any technical data or information disclosed in connection with this questionnaire.

| | |
|--|-------------------------------|
| PLEASE COMPLETE QUESTIONNAIRE AND RETURN TO: | Name (print) Alvin Hetzell |
| | Signature |
| | Title President |
| | Date 2-1-88 |