

MATERIAL CHARACTERISTIC GUIDE

INTRODUCTION

This document is intended to be used as a reference guide in the selection of a point level indicator used to determine the presence or absence of material in a storage vessel at any given mounting location.

Contained within is a list of common materials along with their nominal bulk densities and dielectric constants. Use of this data is for reference only with the clear understanding that actual values may be different than listed.

CAUTION: Significant variances in material properties may occur when a material or compound is manufactured. Sometimes these variances can be a result of nature as is seen with the varying moisture content of grains or as in the case of a material or compound that tends to absorb moisture from its ambient environment. Other variances can be from a result of economic pressures of processing that can influence a manufacturer to alter their manufacturing process procedures. These variances may cause bulk density and dielectric constant values to change from those indicated in the following listing. It is impractical to account for all of these variances in such a document and is also beyond the scope of this document. Consequently, this list should be referenced only as a guide and not as a scientific document containing absolute values.

HOW TO USE THIS GUIDE

The indicated bulk density values aid in the selection of a proper sensing paddle when specifying a complete rotary paddle bin monitor. As bulk densities decrease, larger paddles (larger surface area of the blades) are required to stop rotation of the paddle and ultimately indicate material presence.

The listed dielectric constant values will assist you in determining when an RF Capacitance level monitor can be used. The lower the dielectric constant of the material the more difficult the material will be to detect. RF Capacitance probes can detect material with a minimum dielectric constant of 1.5. Some materials within this reference guide fall below this minimum dielectric constant, so RF Capacitance probes are not recommended for use with such materials. Contact the supplier when working with a low dielectric constant for application assistance.

In addition to dielectric constant, bulk density, and suggested paddle information for each listed material is a column labeled "Special Properties." The coded table is provided to assist you in your assessment of material flow characteristics and/or other material properties that will affect your decision on sensor equipment selection and mounting location.

For example, you are selecting a point level sensor for a high level alarm in a silo that is center filled. The silo contains a material with an angle of repose that exceeds 45 degrees, and your only mounting location option is near the silo wall. Depending upon the diameter of your silo, you will likely need to specify extensions for the sensor in order for material to ever reach the actual sensor switch point and physically indicate material presence when necessary. Extension information is located in the installation and operation bulletin of every applicable point level sensor.

Abrasive and corrosive characteristics will affect product selection regarding things like the type of material used in the construction of a probe's housing or

means of attachment. For example, you would not choose a point level sensor with a mounting surface made of aluminum if the material in the vessel you wish to detect would destroy or deteriorate the aluminum housing or mounting surface.

In the case of an RF capacitance probe, abrasive or corrosive material being sensed can also affect the selection of the insulator material used for construction of the actual probe. Please consult an application engineer if you need assistance with product selection.

Special Properties Column Definitions

- A: Very free flowing, <30° angle of repose
- B: Free Flowing, 30 - 40° angle of repose
- C: Sluggish, >45° angle of repose
- D: Abrasive
- E: Aerates/Deaerates/Compacts readily
- F: Fibrous or Irregular Shape
- G: Gas
- H: Hygroscopic
- L: Liquid
- M: Corrosive

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| MATERIAL | DENSITY lbs/ft³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-------------------------|---------------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|
| ABS resin, pellet | 45 | LVD-800-1VS | LVD-800-3V | 1.5 | BD |
| Acetic acid, liquid | 66 | n/a | n/a | 4.1 | LM |
| Acetone | 49 | n/a | n/a | 21 | L |
| Acrylic resin | 33 | LVD-800-3VL | LVD-800-3V | 2.7 | B |
| Adipic acid, powder | 45 | LVD-800-1VS | LVD-800-3V | | B |
| Air | 0 | n/a | n/a | 1.0 | G |
| Alcohol, ethyl | 56 | n/a | n/a | 24 | L |
| Alcohol, methyl | 49 | n/a | n/a | 33.6 | L |
| Alfalfa, ground | 16 | LVD-800-3VL | LVD-800-3VL | 3 | CEF |
| Almonds, shelled | 30-35 | LVD-800-1VS | LVD-800-3VL | 9 | B |
| Alum powder | 50 | LVD-800-1V | LVD-800-3V | | B |
| Alumina | 60 | LVD-800-1VS | LVD-800-3V | 9-11 | B |
| Aluminum hydrate | 18 | LVD-800-3VL | LVD-800-3VL | | C |
| Aluminum oxide | 60-100 | LVD-800-1V | LVD-800-4V | 6.5 | A |
| Aluminum silicate | 35-45 | LVD-800-1VS | LVD-800-3V | 3 | B |
| Aluminum, powder | 45-80 | LVD-800-1V | LVD-800-3V | 1.6 | B |
| Aluminum, shavings | 7-15 | LVD-800-1VT | LVD-800-1VT | 120 | CF |
| Ammonia | 0 | n/a | n/a | 25 | G |
| Ammonium nitrate, prill | 45-60 | LVD-800-1VS | LVD-800-3V | 14 | B |
| Ammonium sulphate | 40-58 | LVD-800-1VS | LVD-800-3V | | B |
| Apple seed | 32 | LVD-800-3V | LVD-800-3V | 7 | A |
| Asbestos fibers | 20-25 | LVD-800-1VT | LVD-800-1VT | 3 | CF |
| Ash, coal, damp | 45-50 | LVD-800-1VS | LVD-800-3V | 25-80 | CF |
| Ash, coal, dry | 35-45 | LVD-800-1VS | LVD-800-3V | 1.7 | CF |
| Asphalt, liquid | 65 | n/a | n/a | 2.5 | L |
| Aviation fuel (jp-4) | 49 | n/a | n/a | 1.7 | L |
| Bakelite, powder | 30-40 | LVD-800-1VS | LVD-800-3V | 3.5 | C |
| Baking powder | 40-45 | LVD-800-1VS | LVD-800-3V | 3.6 | B |
| Baking soda | 70-80 | LVD-800-1VS | LVD-800-3V | 5.7 | B |
| Ball clay | 25 | LVD-800-1VS | LVD-800-3V | 3 | BE |
| Bark, wood refuse | 10-20 | LVD-800-1VT | LVD-800-1VT | 3-15 | CF |
| Barley, flour | 25-30 | LVD-800-1VS | LVD-800-3V | 2.9 | B |
| Barley, ground | 25-30 | LVD-800-1VS | LVD-800-3V | 4 | B |
| Barley, kernal | 35-40 | LVD-800-1VS | LVD-800-3V | 6.6 | A |
| Barley, malted | 31 | LVD-800-1VS | LVD-800-3V | 7 | B |
| Bauxite, crushed | 75-85 | LVD-800-1V | LVD-800-4V | | B |
| Beans, caster | 36 | LVD-800-1VS | LVD-800-3V | 6 | A |
| Beans, coffee | 22-40 | LVD-800-1VS | LVD-800-3V | 1.9 | A |
| Beans, lima | 45 | LVD-800-1VS | LVD-800-3V | 7 | A |
| Beans, navy | 48 | LVD-800-1VS | LVD-800-3V | 7.7 | A |
| Beans, soy | 45-47 | LVD-800-1VS | LVD-800-3V | 8.1 | AD |
| Bentonite, lump | 25-40 | LVD-800-4V | LVD-800-3V | | C |
| Bentonite, powder | 50-60 | LVD-800-1V | LVD-800-3V | 2.5 | C |

| MATERIAL | DENSITY lbs/ft ³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-------------------------------|--------------------------------|---------------------|----------------------|------------------------|-----------------------|
| Bicarbonate of soda | 41 | LVD-800-1VS | LVD-800-3V | 5.7 | A |
| Biphenyl | | n/a | n/a | 20 | L |
| Blood, dry | 35-45 | LVD-800-1VS | LVD-800-3V | | C |
| Bone meal | 55-60 | LVD-800-1VS | LVD-800-3V | | B |
| Borate of lime | 50-70 | LVD-800-1VS | LVD-800-3V | | B |
| Borax | 50-70 | LVD-800-1VS | LVD-800-3V | | B |
| Boric acid powder | 55 | LVD-800-1VS | LVD-800-3V | | B |
| Bran, oat | 25 | LVD-800-3V | LVD-800-3VL | 3.1 | BF |
| Bran, wheat | 15-20 | LVD-800-3V | LVD-800-3VL | 8 | B |
| Brewers grain | 27 | LVD-800-3V | LVD-800-3VL | 6 | B |
| Brewers grits | 33 | LVD-800-3V | LVD-800-3V | 6.4 | B |
| Bromine | | n/a | n/a | 3.1 | G |
| Bronze chips | 30-50 | LVD-800-1VS | LVD-800-3V | | C |
| Buckwheat | 34-42 | LVD-800-3V | LVD-800-3V | | A |
| Buckwheat flour | 40 | LVD-800-1VS | LVD-800-3V | 3.7 | C |
| Butane | | n/a | n/a | 1.4 | G |
| Butter | 54 | n/a | n/a | | |
| Buttermilk powder | 25-30 | LVD-800-3V | LVD-800-3VL | 1.7 | BE |
| Butyl chloride | | n/a | n/a | 10 | L |
| Cake mix | 30-40 | LVD-800-1VS | LVD-800-3V | 3.2 | B |
| Calcium carbide | 75 | LVD-800-1V | LVD-800-4V | | B |
| Calcium carbonate | 75 | LVD-800-1V | LVD-800-4V | 9.1 | C |
| Calcium fluoride | | n/a | n/a | 7.4 | G |
| Calcium oxide | 27 | LVD-800-3V | LVD-800-3VL | 11.8 | C |
| Carbide powder | 100 | LVD-800-1V | LVD-800-4V | 6 | B |
| Carbon black powder | 4-25 | LVD-800-3V | LVD-800-3VL | 1.4-6 | CE |
| Carbon black, pellet | 20-45 | LVD-800-1VS | LVD-800-3V | 15-25 | B |
| Carbon dioxide | 0 | n/a | n/a | 1.6 | G |
| Carbon disulfide | 0 | n/a | n/a | 2.6 | G |
| Carbon tetrachloride | | n/a | n/a | 2.2 | L |
| Carbon, granulated, activated | 50-60 | LVD-800-1VS | LVD-800-3V | 15 | AE |
| Carbon, graphite | 40 | LVD-800-1VS | LVD-800-3V | 12 | BE |
| Casein powder | 35-40 | LVD-800-1VS | LVD-800-3V | 6 | BH |
| Cashew nuts | 32-37 | LVD-800-1VS | LVD-800-3V | 2.2 | B |
| Caster beans | 36 | LVD-800-1VS | LVD-800-3V | | A |
| Cat food | 20-25 | LVD-800-3V | LVD-800-3V | 4 | BF |
| Cellophane, flocking | 5 | LVD-800-3VL | LVD-800-3VL | 1.4 | CF |
| Cellulose acetate | 10 | LVD-800-3VL | LVD-800-3VL | 3.3 | CF |
| Cellulose, flocking | 1.5-3 | n/a | n/a | 1.4 | CF |
| Cement powder, portland | 85-95 | LVD-800-1VS | LVD-800-3V | 1.5 | BE |
| Cement, clinker | 75-90 | LVD-800-1V | LVD-800-2V* | | CF |
| Cereal flake | 12 | LVD-800-3VL | LVD-800-3VL | 3 | BF |
| Chalk, fine | 70-75 | LVD-800-1V | LVD-800-3V | | C |

| MATERIAL | DENSITY lbs/ft³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|------------------------|---------------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|
| Chalk, lump | 85-90 | LVD-800-1V | LVD-800-4V | | C |
| Charcoal | 15-30 | LVD-800-1VT | LVD-800-3V | 1.5 | C |
| Chlorine | 0 | n/a | n/a | 2 | G |
| Chloroform | 0 | n/a | n/a | 5.5 | G |
| Chromium ore | 135 | LVD-800-1V | LVD-800-2V* | 7.7 | B |
| Cinders, coal | 40-50 | LVD-800-1V | LVD-800-3V | | C |
| Citric acid | 55 | LVD-800-1V | LVD-800-3V | | B |
| Clay, attapulugus | 55 | LVD-800-1V | LVD-800-3V | 2.5 | B |
| Clay, ball | 25 | LVD-800-3VL | | 3 | B |
| Clay, bentonite | 51 | LVD-800-1V | LVD-800-3V | 2.3 | BE |
| Clay, calcined | 80 | LVD-800-1V | LVD-800-4V | 2.2 | BE |
| Clay, dicalite | 20-50 | LVD-800-3V | LVD-800-3VL | 2.5 | BE |
| Clay, kaoline | 20-60 | LVD-800-3V | LVD-800-3VL | 3 | BE |
| Clay, sno-brite | 15-50 | LVD-800-3V | LVD-800-3VL | 3 | BE |
| Clay, whitex | 15-50 | LVD-800-3V | LVD-800-3VL | 3 | BE |
| Clinker, cement | 80 | LVD-800-1V | LVD-800-2V* | | BD |
| Clinker, coal | 80-90 | LVD-800-1V | LVD-800-4V | | BD |
| Coal, ground | 40 | LVD-800-1VS | LVD-800-3V | 4 | B |
| Coal, lump | 45-55 | LVD-800-4V | LVD-800-4V | | CF |
| Coconut, shredded | 20-22 | LVD-800-1VS | LVD-800-3V | 2 | CF |
| Coffee bean, green | 32-45 | LVD-800-1VS | LVD-800-3VL | 3.5 | B |
| Coffee bean, roasted | 22-30 | LVD-800-1VS | LVD-800-3VL | 1.9 | A |
| Coffee, ground | 20 | LVD-800-1VS | LVD-800-3VL | 1.9 | B |
| Coke, calcined, petrol | 35-45 | LVD-800-1VS | LVD-800-3VL | 1.5 | B |
| Copper ore | 135 | LVD-800-1VS | LVD-800-3VL | | BD |
| Copper oxide | 190 | LVD-800-1V | LVD-800-2V* | 18.1 | C |
| Cork, ground | 5-15 | LVD-800-3VL | LVD-800-3VL | 1.5 | CF |
| Corn bran | 13 | LVD-800-3V | LVD-800-3VL | 6 | BF |
| Corn cob, ground | 35 | LVD-800-1VS | LVD-800-3V | 2.3 | BF |
| Corn, cracked | 35-40 | LVD-800-1VS | LVD-800-3V | 7.7 | B |
| Corn, flaked | 6 | LVD-800-3V | LVD-800-3VL | 1.8 | BF |
| Corn, gern | 21 | LVD-800-3V | LVD-800-3VL | 5 | B |
| Corn, gluten | 26-33 | LVD-800-1VS | LVD-800-3V | 2.5 | B |
| Corn, grits | 40-45 | LVD-800-1VS | LVD-800-3V | 6.4 | A |
| Corn, ground | 30-35 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Corn, meal | 32-40 | LVD-800-1VS | LVD-800-3V | 7 | B |
| Corn, starch | 25-35 | LVD-800-1VS | LVD-800-3V | 3.4 | B |
| Corn, sugar, liquid | 88 | n/a | n/a | 115 | L |
| Corn, sugar, powder | 31 | LVD-800-1VS | LVD-800-3V | 2.1 | BH |
| Corn, whole kernel | 45 | LVD-800-1VS | LVD-800-3V | 5 | A |
| Cotton blossoms | 15-25 | n/a | n/a | 1.4 | CF |
| Cottonseed | 22-40 | LVD-800-1VS | LVD-800-3VL | 1.4 | B |
| Cottonseed hulls | 12 | LVD-800-3V | LVD-800-3VL | | CF |

| MATERIAL | DENSITY lbs/ft ³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|--------------------------|--------------------------------|---------------------|----------------------|------------------------|-----------------------|
| Cottonseed meats | 40 | LVD-800-1VS | LVD-800-3V | | B |
| Cottonseed oil | 58 | n/a | n/a | 3.1 | L |
| Cottonseed, meal | 35-40 | LVD-800-1VS | LVD-800-3V | | B |
| Cream powder | 38 | LVD-800-1VS | LVD-800-3V | 2 | BE |
| Creosote | | n/a | n/a | 2 | L |
| Cresol | | n/a | n/a | 5 | L |
| Cullett, glass | 120 | LVD-800-1V | LVD-800-2V* | 3.7 | BF |
| Dextrin | 50-55 | LVD-800-1VS | LVD-800-3V | 2.2 | CF |
| Dextrose | 31 | LVD-800-1VS | LVD-800-3V | 3.1 | CH |
| Diatomaceous earth | 11-14 | LVD-800-3VL | LVD-800-3VL | 2.5 | BE |
| Dicalcium phosphate | 43 | LVD-800-1VS | LVD-800-3V | | C |
| Diesel fuel | 52 | n/a | n/a | 1.8 | L |
| Dirt, dry | 65-80 | LVD-800-1VS | LVD-800-4V | 25-85 | B |
| Distillers grain | 30 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Dog food, IAMS minichunk | 26 | LVD-800-1VS | LVD-800-3V | 4.5 | A |
| Dolomite, lump | 88-99 | LVD-800-1V | LVD-800-4V | | BF |
| Dolomite, powdered | 45 | LVD-800-1VS | LVD-800-3V | 8 | B |
| Down, goose | 1 | n/a | n/a | 1.2 | CF |
| Ebonite, crushed | 65-70 | LVD-800-1V | LVD-800-4V | 2.5 | B |
| Emery, crushed | 95 | LVD-800-1V | LVD-800-4V | 16.5 | B |
| Epsom salt | 40-50 | LVD-800-1VS | LVD-800-3V | | B |
| Ethanol | 56 | n/a | n/a | 24.3 | L |
| Ethyl ether | 44 | n/a | n/a | 4.7 | L |
| Ethyl iodine | | n/a | n/a | 7.8 | L |
| Ethylene glycol | 70 | n/a | n/a | 37 | L |
| Expancel microsphere | 0.8 | n/a | n/a | 1.1 | AE |
| Farina | 44 | LVD-800-1VS | LVD-800-3V | 6.7 | A |
| Feathers, goose | 1 | n/a | n/a | 1.2 | CF |
| Feed pellets, animal | 32-38 | LVD-800-1VS | LVD-800-3V | 4-7 | B |
| Feldspar, ground | 65-70 | LVD-800-1V | LVD-800-4V | | B |
| Ferrous sulphate | 50-75 | LVD-800-1V | LVD-800-3V | 14.2 | B |
| Fertilizer, phosphate | 60 | LVD-800-2V | LVD-800-3V | 14 | B |
| Fish meal | 25-40 | LVD-800-1VS | LVD-800-3V | 8 | B |
| Flax seed | 40-45 | LVD-800-1VS | LVD-800-3V | 18 | A |
| Flour, barley | 25-30 | LVD-800-3V | LVD-800-3V | 15 | B |
| Flour, corn | 30-34 | LVD-800-3V | LVD-800-3V | 2.5 | B |
| Flour, patent | 20 | LVD-800-3V | LVD-800-3VL | 2.5 | B |
| Flour, wheat | 30-35 | LVD-800-3V | LVD-800-3V | 5.0 | B |
| Flourospar | 90 | LVD-800-1V | LVD-800-4V | 6.8 | B |
| Fluff, poly-fim floc | 1.5-2 | n/a | n/a | 1.4 | CF |
| Fly ash | 35-45 | LVD-800-1VS | LVD-800-3V | 1.5 | B |
| Freon | | n/a | n/a | 2.4-3.1 | L |
| Froot loops, kellogs | 8 | LVD-800-3VL | LVD-800-3VL | 1.6 | A |

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|-----------------------|---------------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|
| Fullers earth | 35-45 | LVD-800-1VS | LVD-800-3V | 3 | B |
| Gasoline | 45 | n/a | n/a | 2 | L |
| Gelatine, granulated | 32 | LVD-800-1VS | LVD-800-3V | | B |
| Gilsonite | 37 | LVD-800-1VS | LVD-800-3V | | B |
| Glass bead | 120 | LVD-800-1V | LVD-800-4V | 3.1 | A |
| Glass cullett crushed | 120 | LVD-800-1V | LVD-800-2V* | 3.7 | B |
| Gluten, wheat | 30-35 | LVD-800-1VS | LVD-800-3V | 2.7 | B |
| Glycerine | 78 | n/a | n/a | 47 | L |
| Golf tees | 15 | LVD-800-3V | LVD-800-3V | 1.8 | BF |
| Graphite, ground | 25-30 | LVD-800-1VS | LVD-800-3VL | 12 | B |
| Grass seed | 10-35 | LVD-800-3V | LVD-800-3VL | 3 | = |
| Gravel | 75-85 | LVD-800-1V | LVD-800-2V* | 18 | B |
| Grits, corn | 40-45 | LVD-800-1VS | LVD-800-3V | 6.4 | B |
| Grits, rice | 42-45 | LVD-800-1VS | LVD-800-3V | 5 | B |
| Gun powder | 50 | LVD-800-1VS | LVD-800-3V | 88 | A |
| Gypsum, lump | 90-100 | LVD-800-1V | LVD-800-2V* | 1.8 | B |
| Gypsum, powder | 60-80 | LVD-800-1V | LVD-800-4V | 2.5 | C |
| Hay | 5-24 | LVD-800-3V | LVD-800-3V | 2 | CF |
| HDPE, poethylene | 35-40 | LVD-800-1VS | LVD-800-3V | 1.6 | B |
| Helium | 0 | n/a | n/a | 1 | L |
| Heptane | 0 | n/a | n/a | 1.9 | L |
| Hexane | 0 | n/a | n/a | 1.9 | L |
| Hominey | 37-50 | LVD-800-1VS | LVD-800-3V | 6.4 | B |
| Hops | 35 | LVD-800-1VS | LVD-800-3V | 7 | BF |
| Hops, spent dry | 35 | LVD-800-1VS | LVD-800-3V | 5 | BF |
| Hydrochloric acid | 75 | n/a | n/a | 4 | LM |
| Hydrogen bromide | 0 | n/a | n/a | 3.8 | L |
| Hydrogen cyanide | 0 | n/a | n/a | 95 | L |
| Hydrogen flouride | 0 | n/a | n/a | 84 | G |
| Hydrogen iodide | 0 | n/a | n/a | 2.9 | L |
| Hydrogen peroxide | 0 | n/a | n/a | 84 | L |
| Hydrogen sulfide | 0 | n/a | n/a | 5.8 | L |
| Ice, crushed | 55 | LVD-800-4V | LVD-800-4V | 16 | B |
| Illmenite, ground | 120 | LVD-800-1V | LVD-800-4V | 6 | C |
| Iodine | | n/a | n/a | 11 | L |
| Iron chips | 165 | LVD-800-1V | LVD-800-2V* | | C |
| Iron ore | 150 | LVD-800-1V | LVD-800-2V* | | B |
| Iron oxide | 180 | LVD-800-1V | LVD-800-4V | 14.2 | C |
| Isobutyl alcohol | | n/a | n/a | 19 | L |
| Isopropyl alcohol | | n/a | n/a | 18.3 | L |
| Jet fuel, jp4 | 51 | n/a | n/a | 1.7 | L |
| Kafir | 40-45 | LVD-800-1VS | LVD-800-3V | 6.2 | B |
| Kalsomine, powder | 32 | LVD-800-3V | LVD-800-3VL | | B |

| MATERIAL | DENSITY lbs/ft ³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|----------------------|--------------------------------|---------------------|----------------------|------------------------|-----------------------|
| Kaoline, crushed | 20-22 | LVD-800-3V | LVD-800-3VL | 3 | B |
| Kerosene | 51 | n/a | n/a | 2.8 | L |
| Lactose | 32 | LVD-800-3V | LVD-800-3VL | 2.9 | B |
| LDPE, polyethylene | 35 | LVD-800-1VS | LVD-800-3V | 1.8 | B |
| Lead oxide | 30-150 | LVD-800-1V | LVD-800-4V | 25.9 | B |
| Lignite | 40-55 | LVD-800-1VS | LVD-800-3V | | B |
| Lima beans dry | 45 | LVD-800-1VS | LVD-800-3V | 7 | A |
| Lime, hydreated | 25-30 | LVD-800-1VS | LVD-800-3V | 4.8 | C |
| Lime, pebble | 55-65 | LVD-800-1VS | LVD-800-3V | 12 | B |
| Lime, quicklime | 25-30 | LVD-800-1VS | LVD-800-3V | 4.8 | C |
| Lime, slaked | 32 | LVD-800-1VS | LVD-800-3V | 2.0 | C |
| Limestone, crushed | 85-95 | LVD-800-1V | LVD-800-2V* | 20 | B |
| Limestone, dust | 68 | LVD-800-1V | LVD-800-4V | 20 | C |
| Linseed oil | 58 | n/a | n/a | 3.2 | L |
| Linseed, kernel | 25 | LVD-800-1VS | LVD-800-3V | 14 | A |
| Maize, kernel | 45 | LVD-800-1VS | LVD-800-3V | 6.2 | A |
| Malt sugar | 30-35 | LVD-800-1VS | LVD-800-3V | 3.6 | B |
| Malt, dry, whole | 30-35 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Malt, ground, dry | 20 | LVD-800-3V | LVD-800-3VL | 7 | CF |
| Malt, spent, damp | 55-65 | LVD-800-1VS | LVD-800-3V | 25-50 | BF |
| Malt, spent, dry | 10 | LVD-800-3VL | LVD-800-3VL | 4 | BF |
| Maltodextrin powder | 35 | LVD-800-1VS | LVD-800-3V | 3.4 | AEH |
| Maple syrup | 85 | n/a | n/a | 90 | L |
| Marble, crushed | 85-95 | LVD-800-1V | LVD-800-2V* | 5.8 | B |
| Margarine | | n/a | n/a | 2.8 | L |
| Menthol | 49 | n/a | n/a | 3.9 | L |
| Metal dust | 50-120 | LVD-800-1VS | LVD-800-3V | 5-18 | B |
| Methanol | 49 | n/a | n/a | 33.6 | L |
| Methyl alcohol | 49 | n/a | n/a | 33 | L |
| Mica | 13-30 | LVD-800-3V | LVD-800-3VL | 2.6 | B |
| Milk powder | 15-20 | LVD-800-3V | LVD-800-3VL | 1.7 | CH |
| Milk sugar | 32 | LVD-800-1VS | LVD-800-3V | 2.9 | BH |
| Miller, ground | 35 | LVD-800-1VS | LVD-800-3V | 4.9 | B |
| Millet seed | 48 | LVD-800-1VS | LVD-800-3V | 6.2 | A |
| Mineral oil | 57 | n/a | n/a | 2.1 | L |
| Mineral spirits | 49 | n/a | n/a | 3.7 | L |
| Molybdenum, floc | 10-12 | LVD-800-3VL | LVD-800-3VL | 1.8 | CF |
| Monosodium phosphate | 50 | LVD-800-1VS | LVD-800-3V | | C |
| Muriate of potash | 77 | LVD-800-1V | LVD-800-4V | | C |
| Mustard seed | 45 | LVD-800-1VS | LVD-800-3V | 7 | A |
| Naphthalene | 56 | n/a | n/a | 2.5 | L |
| Napthalene flakes | 45 | LVD-800-1VS | LVD-800-3V | 2.5 | CF |
| Navy beans, dry | 48 | LVD-800-1VS | LVD-800-3V | 7.7 | A |

| MATERIAL | DENSITY lbs/ft ³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-----------------------|--------------------------------|---------------------|----------------------|------------------------|-----------------------|
| Neoprene | | LVD-800-3V | LVD-800-3V | 6 | B |
| Nitrate of soda | 68 | LVD-800-1VS | LVD-800-3V | | A |
| Nitric acid | 94 | n/a | n/a | | LM |
| Nitrobenzene | | n/a | n/a | 26 | L |
| Nitrocellulose | 25 | LVD-800-3VL | LVD-800-3VL | 6.2 | CF |
| Nitroethane | | n/a | n/a | 19.7 | L |
| Nitroglycerin | | n/a | n/a | 19 | L |
| Nitromethane | | n/a | n/a | 22.7 | L |
| Nitrotolune | | n/a | n/a | 25 | L |
| Nitrox oxide | 0 | n/a | n/a | 1.6 | G |
| Nylon | 35-45 | LVD-800-1VS | LVD-800-3V | 4 | B |
| Oat flour | 30-35 | LVD-800-1VS | LVD-800-3V | 2.9 | B |
| Oat hulls | 8-12 | LVD-800-3VL | LVD-800-3VL | 1.5 | BF |
| Oat meal | 35-40 | LVD-800-1VS | LVD-800-3V | 4.3 | B |
| Oat middlings | 35-45 | LVD-800-1VS | LVD-800-3V | 4 | B |
| Oats | 25-35 | LVD-800-3V | LVD-800-3V | 5.8 | A |
| Oats, bran | 25 | LVD-800-3V | LVD-800-3VL | 3 | BF |
| Oats, ground | 25-30 | LVD-800-3V | LVD-800-3V | 3.6 | B |
| Oats, rolled | 24 | LVD-800-3V | LVD-800-3VL | 7 | BF |
| Octane | 45 | n/a | n/a | 2 | L |
| Octyl alcohol | | n/a | n/a | 3.4 | L |
| Oil, almond | | n/a | n/a | 2.8 | L |
| Oil, cottonseed | | n/a | n/a | 3.1 | L |
| Oil, grapeseed | | n/a | n/a | 2.9 | L |
| Oil, lemon | | n/a | n/a | 2.3 | L |
| Oil, linseed | 58 | n/a | n/a | 3.4 | L |
| Oil, olive | 57 | n/a | n/a | 3.1 | L |
| Oil, parafin | | n/a | n/a | 2.2 | L |
| Oil, peanut | | n/a | n/a | 3 | L |
| Oil, petroleum, crude | 53 | n/a | n/a | 2.1 | L |
| Oil, pyranol | | n/a | n/a | 5.3 | L |
| Oil, sesame | | n/a | n/a | 3 | L |
| Oil, sperm whale | 57 | n/a | n/a | 3.2 | L |
| Oil, transformer | 55 | n/a | n/a | 2.2 | L |
| Oil, turpentine | 54 | n/a | n/a | 2.2 | L |
| Oxalic acid, crystals | 60 | LVD-800-1V | LVD-800-4V | | C |
| Oyster shells, ground | 53 | LVD-800-1VS | LVD-800-4V | | B |
| Paint, oil base | | n/a | n/a | 5-8 | L |
| Paper, shreaded | 5-12 | LVD-800-1VT | LVD-800-1VT | 2 | CF |
| Paraffin wax | 45 | LVD-800-1VS | LVD-800-3V | 2.1 | CF |
| Parafin oil | | n/a | n/a | 2.2 | L |
| PC, polycarbonate | 34-36 | LVD-800-1VS | LVD-800-3V | 2.9 | B |
| Peanut shell refuse | 4 | LVD-800-3V | LVD-800-3VL | 1.2 | CF |

| MATERIAL | DENSITY lbs/ft ³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-----------------------------|--------------------------------|---------------------|----------------------|------------------------|-----------------------|
| Peanuts, shelled | 35-45 | LVD-800-1VS | LVD-800-3V | 2 | B |
| Peanuts, unshelled | 15-24 | LVD-800-1VS | LVD-800-3V | 1.5 | B |
| Peas, dry | 45-50 | LVD-800-1VS | LVD-800-3V | 9.8 | A |
| Peat | 25-50 | LVD-800-1VS | LVD-800-4V | 80 | CF |
| Pentane | 0 | n/a | n/a | 1.8 | G |
| Perlite, expanded | 3 | LVD-800-3VL | LVD-800-3VL | 1.3 | C |
| Petroleum oil | 51 | n/a | n/a | 2.1 | L |
| Phosphate rock, crushed | 60-80 | LVD-800-1V | LVD-800-4V | | C |
| Phosphate sand | 90-100 | LVD-800-1V | LVD-800-4V | | B |
| Plaster of Paris | 50-55 | LVD-800-1VS | LVD-800-3V | 2.5 | C |
| Plastic pellet | 34-48 | LVD-800-1VS | LVD-800-3V | 1-3 | B |
| Ployethylene, pellet | 34-36 | LVD-800-1VS | LVD-800-3V | 1.5 | A |
| Ployvinyl chloride, powder | 30 | LVD-800-1VS | LVD-800-3V | 1.4 | B |
| Polycarbonate | | LVD-800-1VS | LVD-800-3V | 2.9 | B |
| Polyester resin | | LVD-800-1VS | LVD-800-3V | 2.8 | B |
| Polyethylene pellet | 35-37 | LVD-800-1VS | LVD-800-3V | 1.6 | A |
| Polypropylene powder | 25 | LVD-800-3V | LVD-800-3VL | 2.2 | B |
| Polypropylene, pellet | 34-36 | LVD-800-1VS | LVD-800-3V | 1.5-1.8 | A |
| Polystyrene, expanded beads | 1.5 | n/a | n/a | 2.2 | BF |
| Polystyrene, pellet | 40 | LVD-800-1VS | LVD-800-3V | 2.2 | A |
| Polyvinyl alcohol | | n/a | n/a | 1.5 | L |
| Polyvinyl chloride, pellet | 48-52 | LVD-800-1VS | LVD-800-3V | 1.8 | A |
| Popcorn, popped | 2-3 | LVD-800-3VL | LVD-800-3VL | 1.2 | BF |
| Popcorn, shelled | 45-50 | LVD-800-1VS | LVD-800-3V | 10.4 | A |
| Potash | 50-60 | LVD-800-1VS | LVD-800-3V | 5.6 | B |
| Potassium chloride | 2-3 | LVD-800-3VL | LVD-800-3VL | 1.2 | B |
| Potassium carbonate | 45-50 | LVD-800-1VS | LVD-800-3V | 10.45.6 | B |
| Potassium chloride | 75 | LVD-800-1VS | LVD-800-3V | 5 | B |
| Potassium nitrate | 76 | LVD-800-1VS | LVD-800-3V | 5 | B |
| Potassium sulphate | 42-48 | LVD-800-1VS | LVD-800-3V | 5.9 | C |
| Potato flake | 12 | LVD-800-3VL | LVD-800-3VL | 2.1 | BF |
| Potato starch | 40 | LVD-800-1VS | LVD-800-3V | 3.4 | CH |
| Propane, liquid | | n/a | n/a | 1.6 | L |
| Pumice | 40-45 | LVD-800-1VS | LVD-800-3V | 3.4 | C |
| PVC polyvinyl chloride | 48-52 | LVD-800-1VS | LVD-800-3V | 1.8 | A |
| Quartz, sand | 80-100 | LVD-800-1V | LVD-800-4V | 4.3 | B |
| Rape seed | 45-50 | LVD-800-1VS | LVD-800-3V | | B |
| Rice | 45-50 | LVD-800-1VS | LVD-800-3V | 3 | A |
| Rice bran | 20 | LVD-800-3V | LVD-800-3VL | 1.4 | B |
| Rice flour | 30 | LVD-800-1VS | LVD-800-3V | 3.2 | B |
| Rice grits | 42-45 | LVD-800-1VS | LVD-800-3V | | B |
| Rubber, ground | 25-50 | LVD-800-3V | LVD-800-3V | 2.1 | C |
| Rye | 44 | LVD-800-1VS | LVD-800-3V | | A |

| MATERIAL | DENSITY lbs/ft³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-------------------------|---------------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|
| Rye, flour | 30 | LVD-800-1VS | LVD-800-3V | 3.2 | B |
| Salt, coarse crushed | 45-55 | LVD-800-1VS | LVD-800-3V | 2.8 | A |
| Salt, granulated | 70-80 | LVD-800-1VS | LVD-800-3V | 5.9 | A |
| Salt peter | 75 | LVD-800-1VS | LVD-800-3V | | A |
| Sand, damp | 100 | LVD-800-1V | LVD-800-4V | 8-18 | C |
| Sand, dry | 80-100 | LVD-800-1V | LVD-800-4V | 2.8 | A |
| Sand, silica | 95 | LVD-800-1V | LVD-800-4V | 2.5 | A |
| Sandstone, crushed | 80-95 | LVD-800-1V | LVD-800-4V | 9 | B |
| Sawdust | 4-12 | LVD-800-3VL | LVD-800-3VL | 1.2 | CF |
| Sea water | 64 | n/a | n/a | 88 | L |
| Semolina | 35-40 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Sesame seed | 27-37 | LVD-800-3V | LVD-800-3V | 1.2 | B |
| Shellac powder | 30-35 | LVD-800-1VS | LVD-800-3V | 2 | B |
| Silica flour | 35-40 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Silica gel | 30-45 | LVD-800-1VS | LVD-800-3V | 8 | A |
| Silica sand | 95 | LVD-800-1V | LVD-800-4V | 2.5 | A |
| Silicone oil | | n/a | n/a | 2.2 | L |
| Silver chloride | | n/a | n/a | 11.2 | L |
| Slag, furnace | 60 | LVD-800-1VS | LVD-800-3V | | B |
| Slakes lime | 32 | LVD-800-3V | LVD-800-3V | 2.0 | C |
| Slate, crushed | 80-90 | LVD-800-1V | LVD-800-4V | 6 | B |
| Soap powder | 20-25 | LVD-800-3V | LVD-800-3VL | 1.4 | B |
| Soda ash | 30-45 | LVD-800-1VS | LVD-800-3V | | B |
| Sodium bicarbonate | 41 | LVD-800-1VS | LVD-800-3V | 5.7 | B |
| Sodium chloride | 70 | LVD-800-1V | LVD-800-4V | 6.1 | A |
| Sodium hydroxide, flake | 47 | LVD-800-1VS | LVD-800-3V | | CF |
| Sodium nitrate | 68-80 | LVD-800-1V | LVD-800-4V | 5.2 | A |
| Sodium sulphate | 80 | LVD-800-1V | LVD-800-4V | 5 | B |
| Sorghum seed | 42-50 | LVD-800-1VS | LVD-800-3V | 6.2 | B |
| Soybean flour | 27-35 | LVD-800-1VS | LVD-800-3V | 3.5 | B |
| Soybean hulls | 6 | LVD-800-3VL | LVD-800-3VL | 1.8 | BF |
| Soybean meal | 36-50 | LVD-800-1VS | LVD-800-3V | 6.5 | B |
| Soybean, flakes | 18-25 | LVD-800-3V | LVD-800-3V | 1.8 | B |
| Soybean, whole | 47 | LVD-800-1VS | LVD-800-3V | 8 | A |
| Soybean, cracked | 35 | LVD-800-1VS | LVD-800-3V | 6.5 | B |
| Spelt flour | 25-30 | LVD-800-1VS | LVD-800-3V | 5.6 | C |
| Starch powder | 25-35 | LVD-800-1VS | LVD-800-3V | 3 | C |
| Steel, chips | 150 | LVD-800-4V | LVD-800-4V | | B |
| Sucrose | 43 | LVD-800-1VS | LVD-800-3V | 3.3 | C |
| Sugar, brown | 45 | LVD-800-1VS | LVD-800-3V | 2.3 | C |
| Sugar, dextrose, powder | 50 | LVD-800-1VS | LVD-800-3V | 2.1 | B |
| Sugar, granulated | 53 | LVD-800-1VS | LVD-800-3V | 1.5 | A |
| Sugar, milk | 32 | LVD-800-1VS | LVD-800-3V | 2.9 | B |

| MATERIAL | DENSITY lbs/ft³ | LOW LEVEL PADDLE | HIGH LEVEL PADDLE | DIELECTRIC CONSTANT | SPECIAL PROPERTIES |
|-------------------------|---------------------------------------|-----------------------------|------------------------------|--------------------------------|-------------------------------|
| Sugar, powdered | 50-60 | LVD-800-1VS | LVD-800-3V | 2.0 | C |
| Sugar, raw | 55-65 | LVD-800-1VS | LVD-800-3V | 3 | B |
| Sulfuric acid | 112 | n/a | n/a | 88 | L |
| Sulphur dioxide | 0 | n/a | n/a | 17.6 | G |
| Sulphur, crushed | 55-70 | LVD-800-1VS | LVD-800-3V | 3.5 | B |
| Sunflower seed | 36 | LVD-800-1VS | LVD-800-3V | 4.1 | A |
| Talcum powder | 46-62 | LVD-800-1VS | LVD-800-3V | | B |
| Tar | 72 | n/a | n/a | 1.8 | L |
| Tea leaves | 12 | LVD-800-3VL | LVD-800-3VL | | BF |
| Teflon, flake | | LVD-800-3VL | LVD-800-3VL | 2 | CF |
| Terephalic acid powder | 45 | LVD-800-1VS | LVD-800-3V | 1.5 | B |
| Timothy seed | 36 | LVD-800-1VS | LVD-800-3V | 5 | A |
| Tin oxide | 100 | LVD-800-1V | LVD-800-2V | | B |
| Titanium dioxide | 40-50 | LVD-800-1VS | LVD-800-3V | 14 | B |
| Tobacco, flake | 2-5 | LVD-800-3VL | LVD-800-3VL | 1.7 | CF |
| Toulene | 54 | n/a | n/a | 2.4 | L |
| Transmission oil | 54 | n/a | n/a | 2.2 | L |
| Trisodium phosphate | 50-60 | LVD-800-1VS | LVD-800-3V | | BM |
| Urea, prill | 34-42 | LVD-800-1VS | LVD-800-3V | 3.5 | BM |
| Urethane | | n/a | n/a | 3.2 | L |
| Vaseline | | n/a | n/a | 2.2 | L |
| Vermiculite ore | 80 | LVD-800-1V | LVD-800-2V | | B |
| Vermiculite, expanded | 17 | LVD-800-3VL | LVD-800-3VL | | CF |
| Walnut meats | 25 | LVD-800-1VS | LVD-800-3V | 2.6 | BF |
| Walnut shells, ground | 40-45 | LVD-800-1VS | LVD-800-3V | 3.7 | B |
| Water | 62 | n/a | n/a | 45-120 | L |
| Wax | 15-20 | n/a | n/a | 7.9 | L |
| Wheat bran | 12 | LVD-800-3V | LVD-800-3VL | 5.8 | BF |
| Wheat gluten | 30-35 | LVD-800-1VS | LVD-800-3V | 2.7 | C |
| Wheat, craked | 35-45 | LVD-800-1VS | LVD-800-3V | 5.2 | B |
| Wheat, flaked | 7-10 | LVD-800-3V | LVD-800-3VL | 1.5 | BF |
| Wheat, flour | 30-35 | LVD-800-1VS | LVD-800-3V | 5 | B |
| Wheat, ground | 40 | LVD-800-1VS | LVD-800-3V | 4.9 | B |
| Wheat, whole kernel | 45-55 | LVD-800-1VS | LVD-800-3V | 7 | A |
| Whey powder | 35-46 | LVD-800-1VS | LVD-800-3V | 1.7 | CH |
| Wood chips | 20-30 | LVD-800-1VT | LVD-800-3V | 1.7 | CF |
| Wood flour | 15-25 | LVD-800-3V | LVD-800-3VL | | C |
| Wood shavings | 3-10 | LVD-800-1VT | LVD-800-1VT | 1.5-2.0 | CF |
| Xanthum gum | 48 | LVD-800-1VS | LVD-800-3V | 6 | B |
| Zinc ore | 125 | LVD-800-1V | LVD-800-4V | | B |
| Zinc oxide | 10-30 | LVD-800-3V | LVD-800-3V | 1.7 | C |
| Zinc, calcined, crushed | 70-90 | LVD-800-1V | LVD-800-4V | | B |

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