

Appendix A – NTEP Technical Policy C. Product Families for Meters 2010 Measuring Sector Meeting Summary

C. Product Categories and Families for Meters

When submitting a meter for evaluation, the manufacturer must specify the product categor(y)(ies) and/or famil(y)(ies) and critical parameters for which the meter is being submitted.

Product Category: A group of products that share similar characteristics.

Note: Under certain Test Requirements, product coverage is indicated by reference to the “Product Category,” while under other Test Requirements, product coverage is indicated by “Product Family.”

Product Family: A group of products, sometimes including multiple Product Categories, which share a common Test Requirement.

Note: Coverage of different products by a certificate may be indicated using references to either “Product Categories” or “Product Families,” as indicated in the Test Requirement for that Product Family.

The product family and the specific product subgroup covered by the Certificate are to be identified on Page 1 of the Certificate of Conformance. More detailed information, including the typical product types found in the subgroup, is to be included in the application section of the Certificate.

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements	Turbine Flow Meter Product Category & Test Requirements
<p>Test B - To cover a range of the following products, test with one product having a low specific gravity and test with a second product having a high specific gravity. The Certificate of Conformance will cover all products in all product categories listed in the table under Test B within the specific gravity range tested.</p> <p>(Test B does not apply to product categories of liquefied gases, compressed liquids, cryogenic liquids or heated products.)</p> <p>Note: Product categories under Test B were formerly referred to collectively as “Normal Liquids.”</p>			<p>Test F – To cover a range of the following products, test with one product having a specified conductivity. The Certificate of Conformance will cover all products with conductivity equal to or above the conductivity of the tested liquid.</p> <p>(Test F does not apply to product categories of potable water, non-potable water and tap water; water mixes of alcohols and glycols; fertilizers; suspension fertilizers; liquid feeds; clear liquid fertilizers; chemicals or crop chemicals A, B, C, or D.)</p> <p>(Test F does not apply to product categories of liquefied gases, or compressed liquids.)</p>			<p>Test C - To cover a range of products within each product category, test with one product having a low viscosity and test with a second product having a high viscosity within each category. The Certificate of Conformance will cover all products in the product category within the viscosity range tested.</p>	<p>Test E – To cover a range of products within each product category, test with one product having a low kinematic viscosity and test with a second product having a high kinematic viscosity within each category. The Certificate of Conformance will cover all products in the product category within the kinematic viscosity range tested.</p> <p>Note: see note 5</p>
Typical Products	Specific Gravity (60 F)	Product Category	Typical Products	Conductivity (micro-Siemens/centimeter)	Product Category	Product Category: Fuels, Lubricants, Industrial and Food Grade Liquid Oils (FL&O)	Product Category: Fuels, Lubricants, Industrial and Food Grade Liquid Oils (FL&O)

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
		FL&O	Gasoline		FL&O	Typical Products	Reference Viscosity (60 F)	Typical Products	Reference Viscosity (60 F)
		FL&O	JP4		FL&O		Centipoise (cP)		Centipoise (cP)
Asphalt		FL&O	Gasoline		FL&O	Gasoline	0.28	Gasoline	0.28
Avgas		FL&O	JP4		FL&O	JP4	1.02	JP4	1.02
Jet A		FL&O	Jet A-1		FL&O	Jet A-1	1.36	Jet A-1	1.36
Jet B		FL&O	JP7 & JP8		FL&O	JP7 & JP8	1.82	JP7 & JP8	1.82
Spindle Oil		FL&O	Kerosene		FL&O	Kerosene	1.94	Kerosene	1.94
Adjuvants	0.7 - 1.2	CC	JP5		FL&O	JP5	1.94	JP5	1.94
Banvel	0.7 - 1.2	CC	Corn Oil		FL&O	Corn Oil	4	Corn Oil	4
Fumigants	0.7 - 1.2	CC	Cooking Oils		FL&O	Cooking Oils	9.93	Cooking Oils	9.93
Fungicides	0.7 - 1.2	CC	Diesel Fuel		FL&O	Diesel Fuel	10	Diesel Fuel	10
Herbicides	0.7 - 1.2	CC	Biodiesel above B20		FL&O	Biodiesel above B20	10.12	Biodiesel above B20	10.12
Insecticides	0.7 - 1.2	CC	Light Oil		FL&O	Light Oil	13.47	Light Oil	13.47
Paraquat	0.7 - 1.2	CC	Sunflower Oil		FL&O	Sunflower Oil	90.1	Sunflower Oil	90.1
Prowl	0.7 - 1.2	CC	Soy Oil	0	FL&O	Soy Oil	90.6	Soy Oil	90.6
Round-up	0.7 - 1.2	CC	Olive Oil		FL&O	Olive Oil	116.8	Olive Oil	116.8
Touchdown	0.7 - 1.2	CC	Vegetable Oil	0	FL&O	Vegetable Oil	133	Vegetable Oil	133
Treflan	0.7 - 1.2	CC	Bunker Oil		FL&O	Bunker Oil	11,200	Bunker Oil	11,200
Ammonia Nitrate	1.16-1.37	Fert	Avgas		FL&O	Avgas	1.5 to 6	Avgas	1.5 to 6
Crude Oil	0.79-0.97	FL&O	Jet A		FL&O	Jet A	1.5 to 6	Jet A	1.5 to 6
Lubricating Oils	0.80-0.90	FL&O	Jet B		FL&O	Jet B	1.5 to 6	Jet B	1.5 to 6
Peanut Oil	0.9-1.0	FL&O	Asphalt		FL&O	Asphalt	100 – 5000	Asphalt	100 – 5000
Hexane	0.66	Sol Gen	Peanut Oil		FL&O	Peanut Oil	11 to 110	Peanut Oil	11 to 110
Diesel Fuel	0.84	FL&O	SAE Grades		FL&O	SAE Grades	192-3626	SAE Grades	192-3626
Gasoline	0.72	FL&O	Lubricating Oils		FL&O	Lubricating Oils	20 to 1000	Lubricating Oils	20 to 1000
Kerosene	0.75	FL&O	Crude Oil		FL&O	Crude Oil	3-1783	Crude Oil	3-1783
Jet A-1	0.76	FL&O	6 Oil (#5, #6)		FL&O	6 Oil (#5, #6)	66-13,000	6 Oil (#5, #6)	66-13,000
JP4	0.76	FL&O	Fuel Oil (#1, #2, #3, #4)	0	FL&O	Fuel Oil (#1, #2, #3, #4)	8 to 88	Fuel Oil (#1, #2, #3, #4)	8 to 88
JP5	0.76	FL&O	Spindle Oil		FL&O	Spindle Oil		Spindle Oil	
JP7 JP8	0.76	FL&O	Acetone	.02	Sol Gen	Acetone		Acetone	
Ethanol	0.79	Alc Gly	Hexane	0	Sol Gen	Hexane		Hexane	

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Isopropyl	0.79	Alc Gly	Acetates		Sol Gen	Test C - Product Category: Solvents General (Sol Gen)		Test E - Product Category: Solvents General (Sol Gen)	
Acetone	0.8	Sol Gen	MEK	0.1	Sol Gen	Typical Products	Reference Viscosity* (60 F)	Typical Products	Reference Viscosity* (60 F)
Methanol	0.80	Alc Gly	Toluene	0	Sol Gen		Centipoise (cP)		Centipoise (cP)
Butanol	0.81	Alc Gly	Xylene	0	Sol Gen	Acetone	0.34	Acetone	0.34
Isobutyl	0.81	Alc Gly	Ethylacetate	0.00001	Sol Gen	Hexane	0.34	Hexane	0.34
MEK	0.81	Sol Gen	Methylene-Chloride		Sol Chl	Acetates	0.44	Acetates	0.44
Biodiesel above B20	0.86	FL&O	Trichloro-Ethylene		Sol Chl	MEK	0.45	MEK	0.45
Light Oil	0.86	FL&O	Carbon Tetra-Chloride		Sol Chl	Toluene	0.62	Toluene	0.62
Toluene	0.87	Sol Gen	Perchloro-Ethylene		Sol Chl	Xylene	0.86	Xylene	0.86
20% Aqua-Ammonia	0.89	Fert	Methanol	0.44	Alc Gly	Ethylacetate	1.36	Ethylacetate	1.36
Xylene	0.89	Sol Gen	Ethanol	0.0013	Alc Gly	Test C - Product Category: Solvents Chlorinated (Sol Chl)		Test E - Product Category: Alcohols, Glycols & Water Mixes Thereof (Alc Gly)	
6 Oil (#5, #6)	0.9	FL&O	Isopropyl	3.5	Alc Gly	Typical Products	Reference Viscosity* (60 F)	Typical Products	Reference Viscosity* (60 F)
Fuel Oil (#1, #2, #3, #4)	0.9	FL&O	Butanol		Alc Gly		Centipoise (cP)		Centipoise (cP)
SAE Grades	0.9	FL&O	Isobutyl	0.02	Alc Gly	Methylene-Chloride	0.46	Methanol	0.64
Corn Oil	0.91	FL&O	Ethylene glycol		Alc Gly	Trichloro-Ethylene	0.6	Ethanol	1.29
Cooking Oils	0.92	FL&O	Propylene glycol		Alc Gly	Carbon Tetra-Chloride	0.99	Isopropyl	2.78
Olive Oil	0.92	FL&O	Demineralized		Water	Perchloro-Ethylene	1	Butanol	3.34

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Vegetable Oil	0.92	FL&O	Deionized		Water	Test C - Product Category: Alcohols, Glycols & Water Mixes Thereof (Alc Gly)		Isobutyl	4.54
Acetates	0.93	Sol Gen	Asphalt		Heated	Typical Products	Reference Viscosity* (60 F)	Ethylene glycol	25.5
Soy Oil	0.93	FL&O	Bunker C		Heated		Centipoise (cP)	Propylene glycol	54
			Test D – To obtain coverage for a product category: Test with one product in the product category. The Certificate of Conformance will cover all products in the category. (Test D does not apply to product categories of pure alcohols and pure glycol, pure water, solvents chlorinated, solvents general, and fuels, lubricants, industrial and food grade liquid oils.)			Methanol	0.64	Test E - Product Category: Compressed liquids, Fuels and Refrigerants, NH ₃	
Sunflower Oil	0.93	FL&O				(Test D does not apply to product categories of liquefied gases, compressed liquids or heated products.)			
Ethylacetate	0.96	Sol Gen				Ethanol	1.29	Propane	0.098
Bunker Oil	0.99	FL&O				Isopropyl	2.78	Anhydrous Ammonia	0.188
Beverages	1.0	Water				Butanol	3.34	Butane	0.19
Deionized	1.0	Water	Tap water	72**	Water	Isobutyl	4.54	Freon 11	0.313
Demineralized	1.0	Water	Potable	72**	Water	Ethylene glycol	25.5	Freon 12	0.359
Juices	1.0	Water	Nonpotable	72**	Water	Propylene glycol	54	Freon 22	1.99
Milk	1.0	Water	Juices		Water	Test C - Product Category: Clear Liquid Fertilizers (Liq Fert)		Test A – The following products must be individually tested and noted on the Certificate of Conformance.	
Nonpotable	1.0	Water	Beverages		Water	Typical Products	Reference Viscosity* (60 F)		
Potable	1.0	Water	Water mixes of alcohols & glycols		Alc Gly		Centipoise (cP)	Typical Products	Product Category
Tap Water	1.0	Water	Urea	5000	Fert	Urea	1	Methylene-Chloride	Sol Chl

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Propylene glycol	1.04	Alc Gly	Ammonia Nitrate		Fert	Ammonia Nitrate	11.22	Trichloro-Ethylene	Sol Chl
Hydrochloric Acid	1.1	Chem	10-34-0		Fert	10-34-0	48	Carbon Tetra-Chloride	Sol Chl
Ethylene glycol	1.19	Alc Gly	20% Aqua-Ammonia		Fert	20% Aqua-Ammonia	1.1 – 1.3	Perchloro-Ethylene	Sol Chl
Liquid Molasses	1.25	Liq Feed	Clear Liquid Fert		Fert	Clear Liquid Fert	31 - 110	Urea	Liq Fert
9-18-9	1.32	Fert	Nitrogen Solution		Fert	Nitrogen Solution	31 - 110	Ammonia Nitrate	Liq Fert
Methylene-Chloride	1.34	Sol Chl	28%, 30% or 32%		Fert	28%, 30% or 32%	31 - 110	10-34-0	Liq Fert
10-34-0	1.39	Fert	N-P-K solutions		Fert	N-P-K solutions		20% Aqua-Ammonia	Liq Fert
Trichloro-Ethylene	1.47	Sol Chl	9-18-0		Fert	9-18-0		Chlear Liquid Fert	Liq Fert
Carbon Tetra-Chloride	1.6	Sol Chl	4-4-27		Sus Fert	Test C - Product Category: Suspension Fertilizers (Sus Fert)		Nitrogen Solution	Liq Fert
Perchloro-Ethylene	1.6	Sol Chl	3-10-30		Sus Fert	Typical Products	Reference Viscosity* (60 F)	28%, 30% or 32%	Liq Fert
Sulfuric Acid	1.83	Chem	Molasses plus Phos Acid and/or Urea (TreaChle)		Liq Feed		Centipoise (cP)	N-P-K solutions	Liq Fert
Phosphoric Acid	1.87	Chem	Liquid Molasses	300	Liq Feed	4-4-27	20 – 215	9-18-0	Liq Fert
Urea	1.89	Fert	Sulfuric Acid	209000	Chem	3-10-30	100 – 1000	4-4-27	Sus Fert
Fungicides	1 – 1.2	CC	Phosphoric Acid	56600	Chem	Test C - Product Category: Liquid Feeds (Liq Feed)		3-10-30	Sus Fert
Micronutrients	1 – 1.2	CC	Hydrochloric Acid	395000	Chem	Typical Products	Reference Viscosity* (60 F)	Molasses plus Phos Acid and/or Urea (TreaChle)	Liq Feed

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements			Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Molasses plus Phos Acid and/or Urea (TreaChle)	1.1 to 1.3	Liq Feed	Herbicides		CC-A		Centipoise (cP)	Liquid Molasses	Liq Feed
3-10-30	0.9 - 1.65	Liq Fert	Round-up		CC-A	Molasses plus Phos Acid and/or Urea (TreaChle)	2882	Asphalt	Heated
4-4-27	0.9 - 1.65	Liq Fert	Touchdown		CC-A	Liquid Molasses	8640	Bunker C	Heated
Micronutrients	0.9 - 1.65	Liq Fert	Banvel		CC-A	Test C - Product Category: Heated Products (Heated)		Sulfuric Acid	Chem
28%, 30% or 32%	1.28 - 1.32	Fert	Treflan		CC-A	Typical Products	Reference Viscosity* (60 F)	Phosphoric Acid	Chem
N-P-K solutions	1.2 - 1.4	Fert	Paraquat		CC-A		Centipoise (cP)	Hydrochloric Acid	Chem
Clear Liquid Fert	1.17 - 1.44	Fert	Prowl		CC-A	Asphalt	100 - 5000	Herbicides	CC-A
Nitrogen Solution	1.17 - 1.44	Fert	Herbicides		CC-A	Bunker C	11,200	Round-up	CC-A
			Fungicides		CC-B	Test C - Product Category: Chemicals (Chem)		Touchdown	CC-A
			Insecticides		CC-B	Typical Products	Reference Viscosity* (60 F)	Treflan	CC-A
Test D - To obtain coverage for each of the following product categories, test with one product in each product category. The Certificate of Conformance will cover the products in the product category in which a product was tested.			Adjuvants		CC-B			Banvel	CC-A
			Fumigants		CC-B	Sulfuric Acid	1.49	Paraquat	CC-A
			Fungicides		CC-C	Phosphoric Acid	161	Prowl	CC-A
Product Category	Typical Products	Specific Gravity² (60 F)	Micronutrients		CC-D	Hydrochloric Acid	0.80 - 1.0	Herbicides	CC-A

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements		Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Comp gas	Compressed Natural Gas (CNG)	0.6 to 0.8 (1=Air)			Test C - Product Category: Crop Chemicals (Type A) (CC-A)		Fungicides	CC-B
Product Category	Typical Products	Specific Gravity² (60 F)			Typical Products	Reference Viscosity* (60 F)	Insecticides	CC-B
Comp liq	Anhydrous Ammonia	0.61				Centipoise (cP)	Adjuvants	CC-B
Comp liq	Butane	0.595			Herbicides	4 – 400	Fumigants	CC-B
Comp liq	Ethane				Round-up	4 – 400	Fungicides	CC-C
Comp liq	Freon 11	1.49			Touchdown	4 – 400	Micronutrients	CC-D
Comp liq	Freon 12	1.33			Banvel	4 – 400	Dual	Flow
Comp liq	Freon 22	1.37			Treflan	4 – 400	Bicep	Flow
					Paraquat	4 – 400	Marksman	Flow
Comp liq	Propane	0.504			Prowl	4 – 400	Broadstrike	Flow
Test D – To obtain coverage for each of the following product categories, test with one product in each product category. The Certificate of Conformance will cover the products in the product category in which a product was tested.								
Product Category	Typical Products	Specific Gravity² (60 F)			Test C - Product Category: Crop Chemicals (Type B) (CC-B)		Doubleplay	Flow
Cryo LNG	Liquefied Natural Gas				Typical Products	Reference Viscosity* (60 F)	Topnotch	Flow
Cryo LNG	Liquefied Oxygen	0.66				Centipoise (cP)	Guardsman	Flow
Cryo LNG	Nitrogen	0.31			Fungicides	0.7 – 100	Harness	Flow
					Insecticides	0.7 – 100	NH ₃	
					Adjuvants	0.7 – 100	Test D – To obtain coverage for a product category: Test with	
					Fumigants	0.7 – 100		

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements		Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
Test D – To obtain coverage for each of the following product categories, test with one product in each product category. The Certificate of Conformance will cover the products in the product category in which a product was tested.					Test C - Product Category: Crop Chemicals (Type C) (CC-C)		one product in the product category. The Certificate of Conformance will cover all products in the category.	
Product Category	Typical Products	Specific Gravity ² (60 F)			Typical Products	Reference Viscosity* (60 F)	Tap Water	Water
Heated Products	Asphalt					Centipoise (cP)	Deionized	Water
Heated Products	Bunker C	1.1			Fungicides	20 – 900	Demineralized	Water
					Test C Product Category: Crop Chemicals (Type D) (CC-D)		Potable	Water
					Typical Products	Reference Viscosity* (60 F)	Nonpotable	Water
						Centipoise (cP)	Juices	Water
					Micronutrients	20 – 1000	Beverages	Water
					Test C - Product Category: Flowables (Flow)		Milk	Water
					Typical Products	Reference Viscosity* (60 F)	Liquefied Oxygen	Cryo LNG
						Centipoise (cP)	Nitrogen	Cryo LNG
					Dual	20 – 900	Liquefied Natural Gas	Cryo LNG
					Bicep	20 – 900		
					Marksman	20 – 900		
					Broadstrike	20 – 900		
					Doubleplay	20 – 900		
					Topnotch	20 – 900		
					Guardsman	20 – 900		
					Harness	20 – 900		

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements		Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
					Test C - Product Category: Compressed Liquids: Fuels and Refrigerants (Comp liq)			
					Typical Products	Reference Viscosity* (60 F)		
						Centipoise (cP)		
					Propane	0.098		
					Anhydrous Ammonia	0.188		
					Butane	0.19		
					Freon 11	0.313		
					Freon 12	0.359		
					Freon 22	1.99		
					Ethane			
					Test D - To obtain coverage for a product category: Test with one product in the product category. The Certificate of Conformance will cover all products in the category.			
					Product Category: All Water (Water)			
					Typical Products	Reference Viscosity* (60 F)		
						Centipoise (cP)		
					Tap Water	1.0		
					Deionized	1.0		
					Demineralized	1.0		
					Potable	1.0		
					Nonpotable	1.0		
					Juices	1.0		
					Beverages	1.0		

Mass Meter Product Category & Test Requirements			Magnetic Flow Meter Product Category & Test Requirements		Positive Displacement Flow Meter Product Category & Test Requirements		Turbine Flow Meter Product Category & Test Requirements	
					Milk	1.0		
					Test A – The following products must be individually tested and noted on the Certificate of Conformance.			
					Product Category: Cryogenic Liquids and Liquefied Natural Gas (Cryo LNG)			
					Typical Products	Reference Viscosity* (60 F)		
						Centipoise (cP)		
					Liquefied Oxygen	0.038		
					Nitrogen	1.07		
					Liquefied Natural Gas			

Product Category Table - Category Abbreviations	
Abbreviation	Product Categories
FL&O	Fuels, Lubricants, Industrial and Food Grade Liquid Oils
Solv Gen	Solvents General
Solv Cl	Solvents Chlorinated
Alc Gly	Alcohols, Glycols & Water Mixes thereof
Water	Water
Fert	Fertilizers
CC-A	Crop Chemicals (Type A)
CC-B	Crop Chemicals (Type B)
CC-C	Crop Chemicals (Type C)
CC-D	Crop Chemicals (Type D)
Flow	Flowables
Sus Fert	Suspension Fertilizers
Liq Feed	Liquid Feeds
Chem	Chemicals
Heated	Heated Products
Comp liq	Compressed Liquids: Fuels and Refrigerants NH ₃
Comp gas	Compressed Gases
Cryo LNG	Cryogenic Liquids and Liquefied Natural Gas

¹Note: The Typical Products listed in this table are not limiting or all-inclusive; there may be other products and product trade names, which fall into a product family. Water and a product such as stoddard solvent or mineral spirits may be used as test products in the fuels, lubricants, industrial, and food- grade liquid oils product family.

²The specific gravity of a liquid is the ratio of its density to that of water at standard conditions, usually 4 °C (or 40 °F) and 1 atm. The density of water at standard conditions is approximately 1000 kg/m³ (or 998 kg/m³)

³ Diesel fuel blends (biodiesel) with up to 20 % vegetable or animal fat/oil.

⁴ Gasoline includes oxygenated fuel blends with up to 15 % oxygenate.

$$\text{Centistokes (m}^2\text{/s)} = \frac{\text{Centipoise (kg/m s)}}{\text{density (kg / m}^3\text{)}}$$

⁵ Kinematic viscosity is measured in centistokes.

Source for some of the viscosity value information is in the Industry Canada - Measurement Canada "Liquid Products Group, Bulletin V-16-E (rev. 1), August 3, 1999."

**** Editor Note: This data point is suspected to be lower than that of normal tap water supplied for residential consumption.**