



Windshield Washer Fluid Concentrate, Ethanol

1 Scope

1.1 Material Description. Windshield washer concentrate for mixing with deionized water used as factory fill solution in the windshield washer reservoir.

The liquid is based on ethanol and should contain either denaturing agents or a dye.

1.2 Symbols. Not applicable.

1.3 Applicability. It only shall be utilized for vehicles built in cold regions or exported to cold regions to provide freezing protection within the vehicle plant and during the transportation to the dealer.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM E70	DIN 19261	DIN 53 171	ISO 1817
ASTM E346	DIN 51 757	EN ISO 12185	

2.2 GM Standards/Specifications.

GMW3059	GMW14334	GMW14701	GMW14743
GMW14270			

2.3 Additional References.

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02 (available at www.gmsupplypower.covisint.com)

3 Requirements

3.1 Requirements of Concentrate at Delivery. The purity of ethanol shall be at least 95% (by volume). The concentrate must contain either denaturing agents or a dye.

3.2 Allowed Denaturing Agents. The following substances can be added as denaturing agents in the mentioned concentrations:

- Methyl Ethyl Ketone (MEK): 0.5% to 2.0% (by volume)
- 2-Propanol (Isopropanol): 4.5% to 5.0% (by volume)
- Methyl Isobutyl Ketone (MIBK): 0.2% to 3.0% (by volume)
- Denatonium Benzoate: < 0.001% (by volume)

3.3 Requirements of Dye. Dye should be colored blue, and the color shall not fade significantly or form precipitates when stored for three (3) months under normal storage conditions.

The dye concentration shall be 0.001% to 0.01% (by mass) with an absorbance between 0.4 and 0.8. Absorbance is measured spectrophotometrically at the wavelength of maximum absorbance of the concentrate solution (600 nm to 650 nm).

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3.4 Physical Requirements of the Concentrate. See Table 1.

Table 1: Requirements for the Concentrate

Properties	Method	Unit	Limits
Density at 20 °C	EN ISO 12185, ASTM E346, or DIN 51 757	kg/m ³	780 to 820
pH	ASTM E70 or DIN 19261	Not applicable	6.8 to 7.2
Boiling Range	DIN 53 171	°C	77 to 79
Distillation Residue	(none)	% (by volume)	≤ 5

4 Manufacturing Process

Note: The liquid windshield washer concentrate shall be mixed with deionized water to guarantee the required freezing protection.

4.1 Mixture Ratio of Concentrate to Water. The following concentrations of ethanol (concentrate, purity ≥ 95%) by volume should be used to achieve freeze protection for the required temperature. See Table 2.

Table 2: Mixture Ratio of Concentrate to Water (% by Volume) to Achieve Freeze Protection at the Required Temperature

Ethanol	Water	Freeze Protection
22%	78%	-10 °C
30%	70%	-15 °C
35%	65%	-20 °C
42%	58%	-25 °C
50%	50%	-30 °C

4.2 Requirements of the Mixture. See Table 3.

**Table 3: Requirements for Mixture with Deionized Water
Ethanol: Water = 50:50 (% by Volume)**

Properties	Method	Unit	Limits
Compatibility with elastomers per GMW14743: Fluid resistance of type A, B, C and D (e.g., EPDM, NR, CR, others). Immersion at 23 °C ± 5 °C for 24 h ± 2 h - Change of hardness - Change of volume	ISO 1817	IRHD % (by volume)	≤ 5 ≤ 5
Compatibility with polymers (e.g., PE, PP, PS, PMMA, ABS, POM, PVC, PA): Immersion at 23 °C ± 5 °C for 60 minutes ± 5 minutes	GMW14334-B	Rating	Rating 1
Compatibility with painted surfaces: - At room temperature/Immersion in fluid at 23 °C ± 5 °C for: 60 minutes ± 5 minutes - High temperature: Drops on surface 95 °C ± 5 °C for 60 minutes ± 5 minutes	GMW14334-B GMW14701	Rating Rating	GMW14334 Rating 2 GMW14334 Rating 2

Note: EPDM = Ethylene Propylene Diene Terpolymer, NR = Natural Rubber, CR = Chloroprene Rubber, IRHD = International Rubber Hardness Degrees, PE = Polyethylene, PP = Polypropylene, PS = Polystyrene, PMMA = Polymethyl Methacrylate, ABS = Acrylonitrile Butadiene Styrene, POM = Polyoxymethylene, PVC = Poly Vinyl Chloride, PA = Polyamide.

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