



This document presents a comprehensive compilation of quality testing parameters, governing standards, and performance criteria followed at Exsan Industries Private Limited in the research and development of automotive lubricants, fluids, adhesives and sealants. Each test listed herein aligns with globally recognized protocols such as ASTM, JIS, MIL, DIN, BS, GOST, AS, ACEA, SAE, API, DOT, ISO, BIS etc. to ensure product reliability, safety, and compliance with international benchmarks. These standards form the foundation of Exsan's commitment to delivering high-performance solutions.

Key Tests and Quality Parameters:

- 1) Viscosity (Kinematic & Dynamic) – ASTM D445 / ASTM D2270 – Measures flow behavior at different temperatures.
- 2) Pour Point Test – ASTM D97 – Lowest temperature at which the fluid will pour.
- 3) Flash Point Test – ASTM D92 - Indicates safety and flammability.
- 4) Fire Point Test – ASTM D92 - Higher than flash point; continued combustion temperature.
- 5) Density / Specific Gravity – ASTM D1298 – Indicates formulation balance and consistency.
- 6) Color & Appearance – ASTM D1500 – Indicator of contamination, batch consistency.
- 7) Foam Test – ASTM D892 – Evaluates tendency to form and dissipate foam.
- 8) pH Value – ASTM D1287 – Ensures corrosion prevention and compatibility.
- 9) Total Acid Number (TAN) – ASTM D664 – Measures oxidation and degradation of lubricant.
- 10) Total Base Number (TBN) – ASTM D2896 – Indicates ability to neutralize acids in engine oil.
- 11) Oxidation Stability Test – ASTM D943 – Assesses oil's resistance to oxidation over time.
- 12) Shear Stability Index (SSI) – ASTM D6278 – Measures how viscosity changes under mechanical stress.
- 13) Noack Volatility Test – ASTM D5800 – Measures evaporation loss at high temperature.
- 14) High-Temperature High-Shear (HTHS) Viscosity – ASTM D4683 – Critical for engine protection under severe conditions.
- 15) Cold Cranking Simulator (CCS) Test – ASTM D5293 – Simulates oil performance during engine start in cold weather.

- 16) Low Temperature Pumpability (MRV TP-1) – ASTM D4684 – Ensures oil flows at low temperature.
- 17) Four Ball Wear Test – ASTM D4172 – Measures wear prevention ability.
- 18) Four Ball EP Test – ASTM D2783 – Evaluates extreme pressure resistance.
- 19) Falex Pin & Vee Block Test – ASTM D3233 - Measures friction and wear resistance.
- 20) Timken EP Test – ASTM D2782 – Evaluates load-carrying capacity.
- 21) HTHS Viscosity – ASTM D4683 – Measures shear resistance under high heat and load.
- 22) TBN / TAN – ASTM D2896 / D664 – Measures base strength and oxidation level.
- 23) Sulfated Ash Content – ASTM D874 – Assesses compatibility with emission systems.
- 24) Corrosion Inhibition Test – ASTM D1384– Measures metal protection in coolants.
- 25) Abrasive Wear / Friction Control – ASTM D5182 – Gear scuffing and wear resistance.
- 26) Water Separation Test – ASTM D1401 – Measures ability to separate from water.
- 27) Demulsibility Test – ASTM D2711 – Measures emulsified water separation performance.
- 28) Detergency Evaluation – ASTM D4951 – Tests cleaning potential of lubricants.
- 29) Corrosion Resistance Test – ASTM D665 – Evaluates rust protection performance.
- 30) Fuel economy - ASTM D8279 - tests to evaluate fuel economy
- 31) Cleanliness Code – ISO 4406 – Particle contamination level in lubricants.
- 32) Coolant Standard (LD) – ASTM D3306 – Coolants for light-duty vehicles.
- 33) Coolant Standard (HD) – ASTM D6210 – Coolants for heavy-duty engines.
- 34) Hydraulic Fluid Standard – DIN 51524 – German standard for hydraulic oils.
- 35) Coolant (Japan) – JIS K2234 – Japanese industrial standard.
- 36) Coolant (UK) – BS 6580 – British standard for antifreeze.
- 37) Boiling Point (Coolants) – ASTM D1120 – Tests high-temp fluid stability.
- 38) Freezing Point – ASTM D1177 – Tests cold-weather performance.
- 39) Reserve Alkalinity – ASTM D1121 – Measures buffering capacity.
- 40) Foaming Test (Coolants) – ASTM D1881 – Evaluates foam tendency in coolant.
- 41) Compatibility with Plastics & Seals – OEM / JIS – Checks effect on components.
- 42) Hard Water Stability – ASTM D1126 – Tests scale/deposit resistance.
- 43) Glycol Content – GC / Refractometer – Measures antifreeze base concentration.
- 44) Dry and Wet Boiling Point (Brake Fluid) – SAE / FMVSS 116 – Assesses high-temp resistance and measures boiling temp after moisture absorption.
- 45) Corrosion Test (on 6 metals) – ASTM D130 – Metal compatibility check.
- 46) Rubber Compatibility – ISO 4925 – Seal swelling and degradation control.
- 47) Water Content – Karl Fischer Titration - ASTM D6304 – Determination of Water in Petroleum Products.
- 48) Copper Strip Corrosion – ASTM D130 – Checks fluid reactivity with copper.
- 49) Friction Characteristics – SAE J1321 – Shift quality and wear control.

- 50) Seal Compatibility – ASTM D471 – Evaluates the effect of fluids on rubber seals by measuring changes in volume, hardness, and tensile strength after immersion.
- 51) Residue/Streaking Test - ASTM D4488 – Visual evaluation of surface finish quality to assess streaking, filming, or residues after product application.
- 52) Biodegradability – OECD 301/302 – Measures environmental breakdown performance.
- 53) Engine Dyno Testing – SAE J304, ASTM D6837 – Simulates real engine performance and deposit formation.
- 54) Sludge Test – ASTM D6593 (Sequence VG) – Evaluates the potential of engine oils to form sludge and varnish under low-temperature, stop-and-go operating conditions.
- 55) FZG Gear Test – DIN 51354 – Tests load-carrying capacity of gear lubricants.
- 56) Corrosiveness Test (on metals) – ASTM D130 – Evaluates corrosion of ferrous and non-ferrous metals.
- 57) Evaporation Rate – ASTM D3539 – Measures how fast a fluid evaporates under standard conditions.
- 58) Streak Resistance and Shine Index – ASTM D523 – Evaluates surface finish and gloss level.
- 59) Batch Homogeneity Test – ASTM D6299 – Applies statistical quality control methods to ensure product consistency and uniformity across production batches.
- 60) Sediment/Particle Count – ASTM D2276 – Quantifies particulate contamination.
- 61) Contamination Checks (Water, Metal, Dust) – ASTM D6304 – Detects unwanted impurities.
- 62) Tank-to-Packaging Consistency – ASTM D5854 – Ensures uniformity between bulk tank samples and packaged products through representative sampling and mixing protocols.
- 63) Label Adhesion and Container Leakage Test – ASTM D3330 – Verifies packaging quality.
- 64) Shelf-Life Simulation – ASTM F1980 – Tests product stability over time.
- 65) Resistance to High Temperatures – ASTM D5481 – Measures thermal endurance.
- 66) Thermal Stability – ASTM D2893 – Assesses oxidation resistance at elevated temperatures.
- 67) Hydraulic Stability – DIN 51524 – Measures resistance to pressure breakdown.
- 68) Oxidation Resistance – ASTM D2272 – Measures aging and degradation of fluids.
- 69) FTIR Analysis – ASTM E2412 – Identifies chemical changes and contamination in fluids.
- 70) Particle Count – ISO 4406 – Measures fluid cleanliness.
- 71) Shear Stability Index – ASTM D6278 – Evaluates viscosity loss under stress.
- 72) Dielectric Strength (EV) – ASTM D924 – Assesses fluid insulation performance.
- 73) Glassware Corrosion Test – ASTM D1384 – Measures coolant corrosion in lab conditions.
- 74) Silicate Dropout Test – ASTM D4340 – Assesses gel formation and silicate stability in coolants under heat-stressed conditions using cast aluminum corrosion and deposit analysis.

- 75) Cavitation Erosion Test – ASTM G32 – Simulates pump impeller erosion from vapor bubbles.
- 76) ELC/OAT Performance Evaluation – ASTM D3306 – Tests long-life coolant performance.
- 77) Sequence IIIH -ASTM D8111 - Measures high-temperature wear, oxidation, and piston deposits.
- 78) Sequence IVB - ASTM - D8350 -Evaluates valvetrain wear in modern gasoline engines.
- 79) Sequence VH - ASTM - D8256 - Measures sludge and varnish formation under low-temperature, stop-and-go conditions.
- 80) Sequence VIE - ASTM D8279 - Evaluates fuel economy retention and viscosity control.
- 81) Cam Wear Test – ASTM D6121 – Tests wear protection in valve trains.
- 82) LSPI / Chain Wear Simulation – ASTM D8352 (LSPI) / CEC L-111-T-16 (Chain Wear) – Measures performance in turbocharged engines.
- 83) EGR Soot Handling Test – ASTM D5967 – Evaluates soot dispersion in diesel oils.
- 84) Brookfield Viscosity at Low Temp – ASTM D2983 – Measures cold flow properties of lubricants.
- 85) Clutch Friction Durability Test – SAE J300 – Tests long-term friction consistency.
- 86) Sonic Shear Stability – ASTM D2603 – Simulates mechanical shear in lubricants.
- 87) Scratch Resistance – ASTM D7027 – Tests coating and surface resistance to abrasion.
- 88) UV Resistance Test – ASTM G154 – Measures degradation due to UV exposure.
- 89) Gloss Level Measurement – ASTM D523 – Evaluates shine and reflectivity of surfaces.
- 90) Slip Test / Coefficient of Friction – ASTM D1894 – Measures surface slipperiness.
- 91) Dielectric Breakdown Voltage (EV) – ASTM D877 – Tests electrical insulation strength.
- 92) Thermal Conductivity – ASTM E1952 – Evaluates heat dissipation in EV fluids.
- 93) Compatibility with Copper, Plastics – ASTM D130 – Assesses interaction with sensitive materials.
- 94) Vehicle Field Trials – SAE J366 - Real-world validation of product performance.
- 95) Storage Stability – ASTM D3451 – Checks product consistency over shelf-life.
- 96) Container Compatibility – ASTM D4991 – Tests packaging material safety.
- 97) Injector Spray Pattern Test – SAE J1832, ISO 15001 – Measures fuel atomization and coverage.
- 98) Combustion Chamber Deposit Test – ASTM D5500 – Evaluates deposit buildup from fuel.
- 99) Octane/Cetane Boost Validation – ASTM D2699, ASTM D613 – Verifies combustion improvement effects.
- 100) Cold Start Performance – ASTM D5293– Simulates engine startup at low temps.
- 101) Carbon Clean Efficacy – ASTM E1131 - Thermogravimetric Analysis – Measures carbon removal effectiveness.
- 102) Sludge Removal Efficiency – ASTM Sequence VG, TEOST 33C – Assesses cleaning power of engine flushes.

- 103) Gel Test (Coolants) – ASTM D7573 – Detects gelling tendencies in coolant blends.
- 104) Refrigeration Compatibility Test – ASTM D7718 – Tests multi-purpose fluid performance in HVACs.
- 105) Drop Point & Cone Penetration – ASTM D2265 – Classifies grease behavior and consistency.
- 106) Timken OK Load / 4 Ball EP Test – ASTM D2783 – Assesses load-bearing capacity.
- 107) Salt Spray Corrosion Test – ASTM B117 – Simulates long-term rust exposure.
- 108) Water Washout Test – ASTM D1264 – Evaluates water resistance of greases.
- 109) Lap Shear Strength – ASTM D1002 – Measures adhesive bond strength.
- 110) Curing Time Measurement – ASTM C957 – Evaluates set time for adhesives and sealants.
- 111) Chemical Resistance Test – ASTM D543 – Assesses fluid resistance to fuels, oils, and solvents.
- 112) Substrate Compatibility Test – ASTM D790 – Checks mechanical integrity of bonded materials.
- 113) Injector Fouling Simulation – ASTM D5598 – Evaluates cleaner impact on deposit-prone injectors.
- 114) Sulphur Neutralization Test – ASTM D1319 – Tests emission control enhancement.
- 115) Lubricity Improvement (HFRR) – ASTM D6079 – Measures friction-reduction performance in fuels.
- 116) FAA Anti-Icing Qualification – SAE AMS1424 – Certifies aircraft de-icing fluid performance.
- 117) Low Temp Viscosity & Residue – ASTM D1177, ASTM D445 – Assesses freezing point and residue formation.
- 118) Runback Performance Test – SAE ARP5718 – Simulates anti-icing fluid movement on aircraft wings.
- 119) ISO 22241 Compliance (DEF) – ISO 22241-1 to -5 – Verifies DEF purity and quality.
- 120) Freezing / Crystallization (DEF) – ISO 22241-3 – Measures DEF performance in cold climates.
- 121) Ash Content / Soot Handling – ASTM D5185 – Evaluates emission system compatibility.