

## Decorative coatings

with Exxsol™ D and Isopar™ fluids

Energy lives here



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without compromising on quality

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## with a competitive edge

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Don't mistake one VOC for another

# Upgrade your coatings

without compromising on quality

## Stay one step ahead

Discover customer and market trends

## Solvents made to withstand future demands

The coatings market is evolving rapidly. Exxsol™ D40 and Exxsol™ D60 dearomatized fluids and Isopar™ L isoparaffinic fluid can help your coatings

meet changing needs and address the latest market trends.

## Users generally prefer low odor and odorless coatings

The trend for low odor paints is increasing worldwide. Consumers, business owners and workers all appreciate products that improve comfort, address health concerns and offer a premium painting experience.



## Exxsol and Isopar fluids have 15 to 85 times lower odor levels than white spirit\*.

Detection threshold (DT) is an estimate of the number of dilutions needed to make the actual odorous air sample "non-detectable"

ASTM E679 and EN13725 test methods

Test method ASTM International standard E679-04 and Comité Européen de Normalisation (CEN) EN13725:2003

<sup>\*</sup> Hydrocarbon solvent containing primarily C9-C11 constituents with a distillation range of approximately 150-200°C and typically containing 15-20% aromatics; example Varsol™ 40.

## Users are concerned about health and safety

Business owners, workers and end consumers worldwide are more aware of the health and safety impact of the products they use.

The coatings marketplace is increasingly

interested in products with lower health and safety concerns.



Exxsol and Isopar fluids can **reduce health risks** associated with inhalation exposure.



Exxsol D60 and Isopar fluids do not require **flammability labeling**.

## Safety, Health and Environmental (SHE) regulations are expanding

The regulatory environment for solvent-based paints is becoming more complex.

The European Union has already tightened legislation on solvents, and similar regulations are taking effect or pending in many markets.

- United Nation's Globally Harmonised System of Classification and Labeling of Chemicals (GHS)
- Workplace safety regulations
- VOC regulations
- Storage regulations

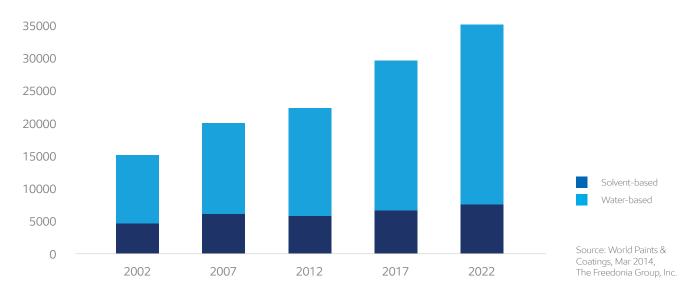


Exxsol and Isopar fluids can help you stay ahead of upcoming standards and regulations with improved SHE compliance, and less classification and labeling.

### Demand for coatings is increasing worldwide

A growing middle class drives global demand for building and refurbishment, and spurs coatings demand. By 2022, the market for solvent-based architectural coatings is forecasted to grow to 7.6 million metric tons.

## World architectural markets for paints and coatings by formulation (thousand metric tons)



Solvent-based coatings are experiencing healthy growth as a result of their high performance in specific applications.

ExxonMobil dearomatized and isoparaffinic fluids are preferred for:

- Improved SHE performance
- Low to virtually no odor
- Cost effectiveness

- Suitability for wood and metal trim, frames, doors and furniture
- Durability: water resistance and barrier against corrosion



Exxsol and Isopar fluids can **capture a significant portion of the market** by delivering improved SHE performance and low odor coatings.

## Expand your business opportunity

Find your competitive edge

Add value with upgraded coatings

How can Exxsol™ and Isopar™ fluids help grow your business profitability?

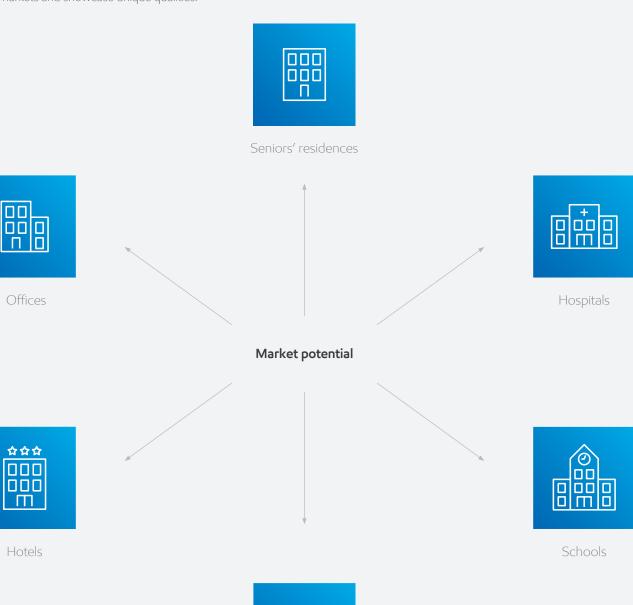


#### Market your products at a premium

Users increasingly demand coatings that improve comfort and protection. Our low odor, low aromatic products respond to this trend. You can market Exxsol and Isopar fluid-based coatings at a premium over white spirit\*-based coatings.

#### Expand your market potential

Exxsol and Isopar fluids can offer differentiated, high value products. Use our products to target new markets and showcase unique qualities.





Homes

<sup>\*</sup> Hydrocarbon solvent containing primarily C9-C11 constituents with a distillation range of approximately 150-200°C and typically containing 15-20% aromatics; example Varsol™ 40.

#### Maximize value with the right solvent

Switching to odorless paints can raise questions, including cost impact. User-friendly solvents can bring significant benefits at minimized overall cost – making reformulation well worth it.

### Value of using Exxsol™ or Isopar™ fluids

### Value of working with ExxonMobil

- Low odor (Exxsol fluid) or virtually odorless (Isopar fluid)
- Durability on wood and metal (resistance against water; barrier against corrosion)
- Quality consistency
- Improved SHE performance
- Lower risk potential for exposure and can reduce associated health risks
- Several grades/viscosities
- Generally compatible with existing resins
- Excellent performance at a good value

- 50 years of experience in solvents
- World-renowned scientific expertise
- SHE and coatings market knowledge
- Reformulation assistance
- Long-term support
- Reliable supply source
- Ease of logistics

Excellent service from a reliable supplier

## Make a difference to the environment

Supporting sustainable practices

## Get an edge on the market with safety, health and environment

Low-aromatic solvents can satisfy the growing demand for safer coatings which meet certain safety, health and environment (SHE) performance requirements. Exxsol™ dearomatized fluids and Isopar™ L isoparaffinic fluid offer lower OEL and VHR risks versus white spirit\*, while delivering excellent product performance. These coatings can be positioned with increased value in a growing segment. Your ExxonMobil expert is prepared to share his or her expertise regarding product specifications, technical aspects and local regulations.

#### Safety in numbers: How do Exxsol and Isopar fluids compare to white spirit?

	Odor <sup>1</sup>	Occupational exposure limit (OEL) <sup>2</sup>	Vapor hazard ratio (VHR) (at 20°C) <sup>3</sup>	Aromatics content (wt) <sup>3</sup>
White spirit/mineral spirit-based <sup>4</sup>	Reference	300 mg/m³	40	≈ 20%
Exxsol D40	Up to 17x lower	1200 mg/m³	6	< 0.01%
Exxsol D60	Up to 19x lower	1200 mg/m³	2	0.01%
Isopar L	Up to 85x lower	1200 mg/m³	3	< 0.01%

<sup>&</sup>lt;sup>1</sup> St Croix Sensory Solvent Odor Comparative Analysis, August 2016

<sup>\*</sup> Hydrocarbon solvent containing primarily C9-C11 constituents with a distillation range of approximately 150-200°C and typically containing 15-20% aromatics; example Varsol™ 40.

<sup>&</sup>lt;sup>2</sup> ExxonMobil recommended OEL using Reciprocal Calculation Procedure. (A method for calculating Occupational Exposure Limits (OELs) for hydrocarbon solvent mixtures based on the concentrations of the hydrocarbons present, and on their individual OELs.)

<sup>&</sup>lt;sup>3</sup> Fluids at a glance 2015 Asia Pacific

<sup>4</sup> Varsol 40

#### Fulfilling the demand for low odor coatings

Exxsol (D40 and D60) or Isopar L fluids are low odor or virtually odorless, respectively, a distinct advantage over white spirit-based coatings. The benefits go beyond improving the comfort of workers and users. Paints based on ExxonMobil fluids can also be promoted as increasing

profitability for end users (faster usage of freshly painted areas, less downtime). As demand for low odor products increases, appropriate solvent selection can tap into this expanding market.

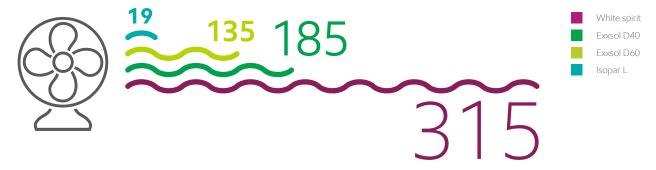
#### Reduced odor detection

Detection threshold (DT) is an estimate of the number of dilutions needed to make the actual odorous air sample "non-detectable"



Test method ASTM International standard E679-04 and Comité Européen de Normalisation (CEN) EN13725:2003

#### Odor intensity



Test method ASTM International standard E544-10

For this method, the odor intensity result is expressed in parts per million (ppm) of n-butanol. A larger value of butanol concentration means a stronger odor. A smaller

value of butanol concentration means a weaker odor. Butanol concentrations are used as a referencing scale for purposes of documentation and communication in a reproducible format.

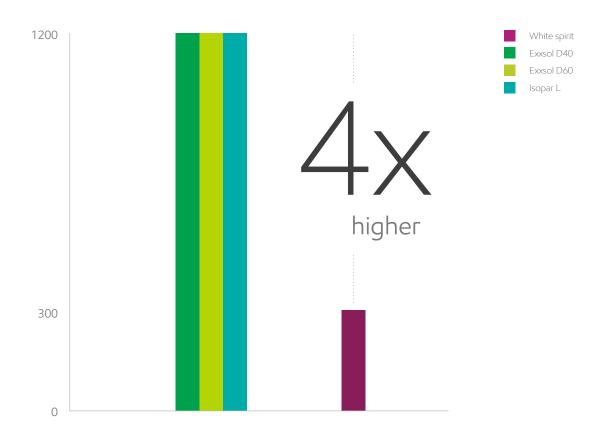
#### Boost worker safety with higher OEL

The Occupational Exposure Limit (OEL) of Exxsol and Isopar L fluids is 4 times higher than white spirit, \* which indicates a significant reduction in risk to workers' health. OEL represents the maximum concentration of a substance in the air that a worker can be exposed to, with no health

impact (based on an 8-hour time weighted average). Additionally, low-aromatic solvents require less protective equipment and less ventilation in the workplace than white spirit-based paints.

#### Human health (OEL)

Occupational Exposure Limits (mg/m³)



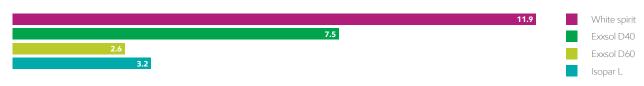
Higher OEL\* > Lower health hazard (inhalation)

<sup>\*</sup> ExxonMobil recommended OEL using Reciprocal Calculation Procedure (A method for calculating Occupational Exposure Limits (OELs) for hydrocarbon solvent mixtures based on the concentrations of the hydrocarbons present, and on their individual OELs.)

#### Reduced VHR, protects user health

The Vapor Hazard Ratio (VHR) is a solvent's ability to evaporate as a ratio to the Occupational Exposure Limit (OEL). Exxsol D40, Exxsol D60 and Isopar L fluids have a low VHR. Our solvents with lower VHR help protect the health of workers and users by reducing the risk of overexposure and inhalation.

#### Human health (VHR)





#### Occupational exposure limit<sup>2</sup> (OEL) in mg/m<sup>3</sup>





#### Vapor hazard ratio (VHR) exposure risk<sup>3</sup>



Lower VHR > Lower likelihood of exceeding the OEL

VHR  $\leq$  3 indicates lower risk of overexposure under conditions of normal ventilation

 $<sup>^{\</sup>rm 1}$  Ability of solvent to evaporate - calculated value in mg/m  $^{\rm 3}$ 

<sup>&</sup>lt;sup>2</sup> ExxonMobil recommended OEL using Reciprocal Calculation Procedure (A method for calculating Occupational Exposure Limits (OELs) for hydrocarbon solvent mixtures based on the concentrations of the hydrocarbons present, and on their individual OELs.)

<sup>&</sup>lt;sup>3</sup> Ratio of the saturated vapor concentration to the occupational exposure limit

Fluids at a glance 2015 Asia Pacific

## Addressing environmental labelling requirements

Decorative paints formulated with Exxsol D40, Exxsol D60 and Isopar L fluids do not require labeling for aquatic toxicity.

#### Access to an extensive toxicology database

ExxonMobil has a comprehensive database of toxicology studies, which evaluate the impact of our products on human health. For each type of toxic effect assessed, we provide qualitative information on the tests performed to help interpret the test results. If you need detailed toxicology data, contact your sales representative to request the relevant data and test outcomes.

### Committed to safety, health and the environment

At ExxonMobil, safety, health and environmental (SHE) considerations are a top priority in the research and development of new and improved products. We have been working for years to develop solvents for coatings that outperform white spirit – especially from a SHE perspective. You can count on our expertise regarding safety, health and environmental requirements for your specific needs, as well as a high level of service.



# Decorative coatings

with a competitive edge

## Challenges? Let's find the right solution together

Work with ExxonMobil

## Get the products and the service you need

When considering the switch to lowaromatic solvents, you want assurances that a replacement product meets your requirements. Exxsol™ dearomatized fluids and Isopar™ isoparaffinic fluids can offer solutions to fulfill these requirements. As Exxsol and Isopar fluids have been on the market for decades, ExxonMobil has built up extensive experience in the decorative coatings market around the world. There is an ExxonMobil solvent expert near you to assist with technical expertise and industry insights, as well as provide input on local regulations. With a commitment to quality and service, ExxonMobil is a trusted supplier for consistently high performing solvents.



#### Tap into our expert resources

By taking advantage of the experience of ExxonMobil technical experts, a formulation upgrade can proceed more smoothly than one might expect. Whether you consult an expert or use the Product Selector, we can help you navigate our product portfolio and

find the appropriate solvent to meet your specific production and technical requirements, performance demands, and local safety, health and environmental (SHE) regulations. In short, we help you find solutions so your business can perform better.

## Preferred supplier ↓ your ExxonMobil solvent expert Preferred product ↓ the right solvent for your coatings

- Science-based product expertise
- Industry and local market knowledge
- 50 years of experience in solvents
- Up-to-date regulations (SHE) guidance
- Long-term support

- Wide-ranging portfolio
- Availability in every region
- Product consistency
- Reliable supply source
- Ease of logistics

#### Get advice from the experts

ExxonMobil solvent experts can provide guidance and expert advice on the following:



If more assistance is needed during the product development process, ExxonMobil solvent experts can provide additional technical support, which can include product performance references, samples for lab tests, guidance during trials, and follow-up evaluation of product quality.

#### Positioned for supply chain continuity

With a global network of manufacturing facilities, technology centers and sales offices, ExxonMobil experts are positioned to meet the specific needs and preferences of the local coatings market.

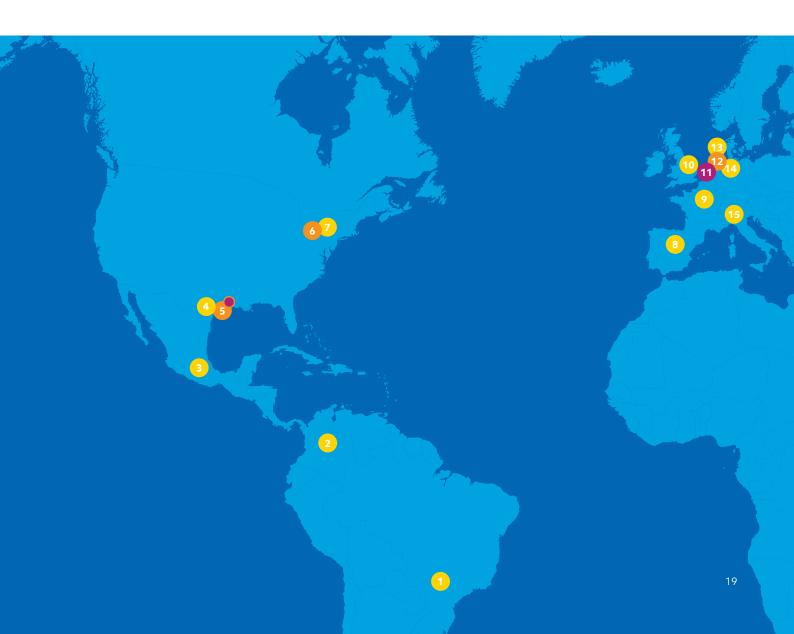
Our globally competitive supply chain enables:

- Excellent product quality consistency
- Secure and reliable product availability
- Quick resolution for product or supply issues
- Ease of logistics: quicker lead times and favorable shipment terms

Our long-term commitment to the fluids market is demonstrated by recent investments in Antwerp, Belgium and Singapore and a revamping of our plant in Baytown, USA.

- Fluids sales offices
- ExxonMobil Chemical Fluids
   Hydrocarbon Manufacturing sites
- ExxonMobil Technology centers

- 1 Sao Paulo, Brazil
- 2 Bogotá, Colombia
- Mexico City, Mexico
- 4 Houston, TX, USA
- Baytown, TX, USA
- 6 Sarnia, Canada
- 7 Toronto, Ontario, Canada
- 8 Madrid, Spain
- 9 Paris, France
- 10 Fawley, UK
- 11 Brussels, Belgium
- 12 Antwerp, Belgium
- Breda, Netherlands
- 14 Cologne, Germany
- 15 Milano, Italy

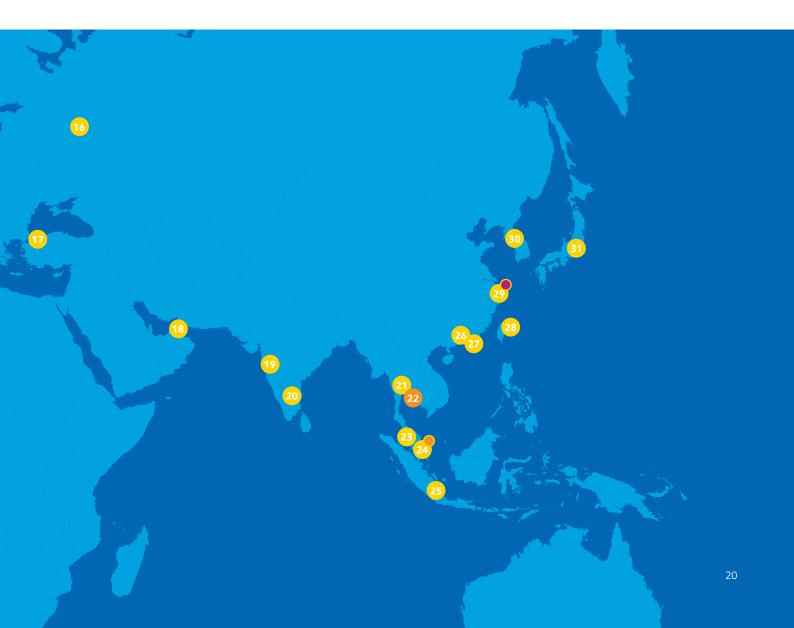


- 16 Moscow, Russia
- 17 Istanbul, Turkey
- 18 Dubai, UIA
- 19 Mumbai, India
- 20 Bangalore, India
- 21 Bangkok, Thailand
- 22 Sriracha, Thailand
- 23 Kuala Lumpur, Malaysia
- 24 Singapore
- 25 Jakarta, Indonesia
- 26 Guangzhou, China
- Hong Kong, Hong Kong SAR
- Taipei, Taiwan
- Shanghai, China
- 30 Seoul, South Korea
- 31 Tokyo, Japan

#### Our commitment, your success

ExxonMobil strives to provide a consistent quality experience and an excellent level of service. Over the years, ExxonMobil has invested in research to continually advance product and SHE (safety, health and environmental) performance. It's our goal to help your business find the best solvent solutions for your coatings products.

ExxonMobil strives to provide a consistent quality experience and an excellent level of service



## Reshape your formulation

Cost efficient reformulation

# Streamline reformulation with the right solvents

With safety, health and environmental (SHE) regulations becoming stricter across the globe, it is prudent to consider an alternative to white spirit\* in decorative coatings.

ExxonMobil's dearomatized fluids (Exxsol™ D40 and Exxsol™ D60) and isoparaffinic fluid (Isopar™ L) can fulfill your market requirements and improve SHE performance. An ExxonMobil expert is ready to help you choose your high-performing solvent and guide you throughout the transition.

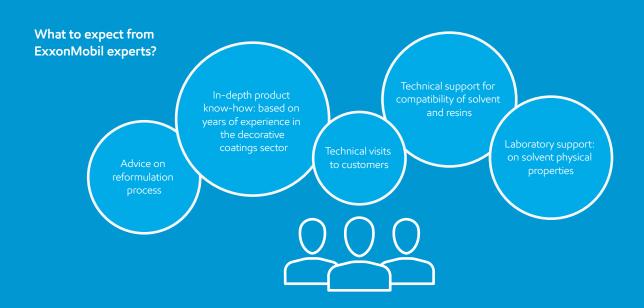


<sup>\*</sup> Hydrocarbon solvent containing primarily C9-C11 constituents with a distillation range of approximately 150-200°C and typically containing 15-20% aromatics; example Varsol™ 40.

#### Smooth transition, guided by experts

ExxonMobil technical experts are ready to guide you through reformulation to achieve lower aromatic content coatings. Our experts are knowledgeable on product requirements,

including resin compatibility. We can help support preparing your product development process, targeting minimal trial and error.

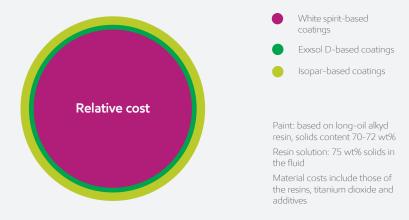


#### Minimize the cost, maximize the return

You might think reformulation is costly and time consuming, but consider the cost-performance ratio of Exxsol and Isopar fluids. Our solvents can be relied on for superior quality. ExxonMobil expertise and technical support can minimize testing costs during reformulation. Furthermore,

the relative cost difference between Exxsol D40 fluid and white spirit is minimal. ExxonMobil Exxsol or Isopar fluids, with their high performance and their reduced aromatic vapors, can provide a desirable return on investment.

Relative material cost increases, related to the replacement of white spirit by more user-friendly fluids in white alkyd gloss paint based on long-oil alkyd resin



#### Get your reformulation solution

ExxonMobil's Exxsol D40 and Exxsol D60 and Isopar L fluids are excellent low-aromatic replacements for white spirit. They can be combined with suitable alkyd and modified alkyd

resins from decorative coatings resin manufacturers around the world. ExxonMobil experts are ready to help you meet your production, technical, and high performance needs with our solvents.

#### Upgrade to Exxsol D40 / Exxsol D60 fluid

#### Step 1:

Select a low odor resin formulated with a dearomatized solvent as a replacement for xylene / white spirit-based resin. A wide range of compatible resins are available on the market.

#### Step 2:

Replace white spirit with Exxsol D40 / Exxsol D60 fluid in the decorative coatings formulation.

#### Step 3:

Consider further potential adjustments of additives to the paint formulation.

#### What is the impact to my formulation if I ...

### decrease solids content up to 1-3%

Affects paint performance, e.g. drying time, less gloss

#### slightly modify the resin (increase alkyd oil length, decrease MW)

Cost flexibility
Selection of raw materials

Recommended

### accept a higher viscosity

Lower paint coverage

### include a higher solvency additive

Cost flexibility
Potentially more odor

### Advantages of Exxsol D40 / Exxsol D60 dearomatized fluids:

- Requires minor changes to the alkyd resin formulation
- Generally provides sufficient solvency to dissolve long-oil alkyd resins
- Maintains high performance paint properties: good brushability, gloss/satin finish, durability
- Reduces odor and improves safety, health and environmental (SHE) performance.

Your ExxonMobil expert can help you achieve the desired resin solubility or paint viscosity.

#### Upgrade to Isopar L fluid

You can upgrade from xylene / white spirit directly to Isopar L isoparaffinic fluid, or from Exxsol D40 / Exxsol D60 fluid to Isopar L fluid. Isopar L fluid can help you achieve the same

high product performance and improved SHE compliance, with virtually no hydrocarbon solvent odor.

## Look beyond the label

Performance products are the best showcase for your business

# Upgrade your coatings without compromising on quality

The decorative coating market is quickly evolving. You must innovate to stay ahead of the competition.

With tightening regulations and growing safety, health and environmental (SHE) concerns, it's the right time to consider an alternative to white spirit\* in your coatings formulations. ExxonMobil's Exxsol™ D40 or Exxsol™ D60 dearomatized hydrocarbon fluid or Isopar™ L synthetic isoparaffin fluid offer reliable and efficient solutions to prepare for regulations without compromising on quality. Our team of experts is ready to share its expertise and help you with reformulating with Exxsol D40, Exxsol D60 or Isopar L fluids.

\* Hydrocarbon solvent containing primarily C9-C11 constituents with a distillation range of approximately 150-200°C and typically containing 15-20% aromatics; example Varsol™ 40.

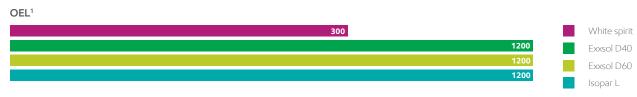


#### Improved user protection

End user health and safety is an increasing concern in the coatings marketplace. Upgrading from white spirit to an ExxonMobil fluid could deliver improved regulatory compliance and lower exposure risk. Additionally, the replacement is relatively easy and cost effective.

### Did you know your choice of solvent can improve the working environment?

By replacing white spirit with Exxsol D60 or Isopar L fluid, the coating's flash point increases considerably. Isopar L and Exxsol D60 fluids are exempt from flammability classification and labeling.



#### Occupational exposure limits (mg/m³)

Higher OEL for lower health hazard



#### Vapor hazard ratio at 20°C

Lower risk of overexposure

VHR  $\leq$  3 indicates lower risk of overexposure under conditions of normal ventilation.

Exxsol D40, Exxsol D60 and Isopar L fluids have 4 times higher Occupational Exposure Limits (OEL1) and 9 to 18 times lower Vapor Hazard

Ratio (VHR). A higher OEL and lower VHR decrease the health hazard through inhalation and the risk of overexposure.

ExxonMobil recommended OEL using Reciprocal Calculation Procedure (A method for calculating Occupational Exposure Limits (OELs) for hydrocarbon solvent mixtures based on the concentrations of the hydrocarbons present, and on their individual OELs.)

<sup>&</sup>lt;sup>2</sup> Calculated - Fluids at a glance 2015 Asia Pacific

#### Reduced odor, improved user experience

As well as improving the user experience, Exxsol D40, Exxsol D60 and Isopar fluids are 15 to 85 times less odorous than other products in their category. Thanks to these low to virtually

odorless coatings, users experience an improved working environment, with people able to return to a newly painted area much sooner.

Did you know your choice of solvent can improve the user experience?



#### Relative odor detection limits

Improved worker experience

\* Detection threshold (DT) is an estimate of the number of dilutions needed to make the actual odorous air sample "non-detectable"

ASTM E679 and EN13725 test methods
Test method ASTM International standard E679-04 and
Comité Européen de Normalisation (CEN) EN13725:2003

Lower odor of Isopar L reduces downtime and allows faster reentry into newly painted areas.

#### Safer handling

Did you know you can choose a solvent which is safer to handle?



#### Flash point in °C

Safer handling and no flammability labeling

Because of their higher flash points, Exxsol D60 and Isopar L fluids can be safer to handle than white spirit and Exxsol D40, as they belong to the GHS category 4 of combustible liquids.

Exxsol D60 and Isopar L fluids are therefore not considered as flammable and do not require any flammability symbol.

<sup>\*</sup> Fluids at a glance 2015 Asia Pasific

#### Meeting performance needs

Product performance is a key differentiator in your end user's decision making process.

- Recommended for wood and metal surfaces
   Coatings for wood and metal surfaces have very specific requirements.
- Maintain excellent brushability
   Provide consistent quality performance.
- Superb gloss / satin finish
   End users who desire glossy or satin finishes
   will generally prefer solvent-based coatings.

· Provides durability

Solvent-based paints have excellent resistance against water and constitute a good barrier against corrosion.

· Easy maintenance

Areas that require a clean and hygienic environment, including hospitals, schools, homes and children's play areas, benefit from the performance of solvent-based coatings.

#### The right product for the right surface

Every surface has specific characteristics and requires a coating developed to meet specific

needs. Solvent-based coatings perform well for a number of demanding surfaces and situations.

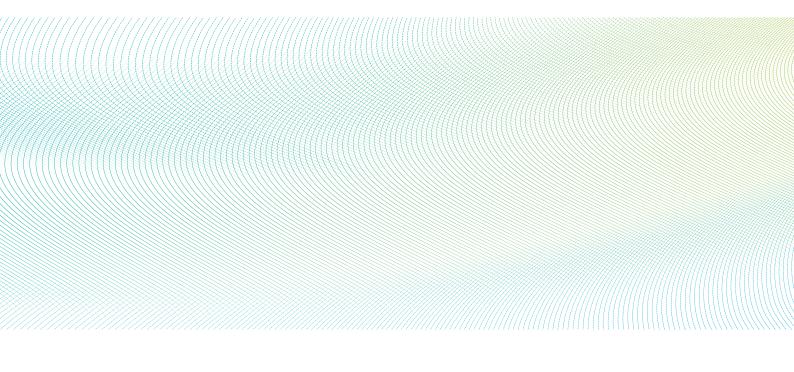
#### Wood Metal Chalking surfaces Requirements: Requirements: Requirements: A coating that clings to wood's natural A protective barrier against water to A coating that clings to chalking prevent rust and corrosion surfaces oily resin A protective barrier against water to A coating that needs glossy effect help prevent mold A coating that needs glossy effect Solvent-based coatings can: Solvent-based coatings can: Solvent-based coatings can: Adhere to wooden surfaces Resist water and offer protection Penetrate and bond to the surface against rust and corrosion powder Provide a barrier that helps prevent water from penetrating the wood's pores, thus helping prevent mold **Applications:** Applications: **Applications:** Masonry, plaster, cement, concrete, Wood trim (doors and frames) Furniture bricks Outdoor metal constructions (fence, Furniture gate, ...) Outdoor constructions (garden shed, fence, ...)

#### Lower environmental impact

Decorative paints formulated with Exxsol D40, Exxsol D60 and Isopar L fluids do not require labeling for aquatic toxicity.

#### Don't mistake one VOC for another

When considering regulations, it's important to understand that not all VOCs are the same. VOCs can vary significantly in how they react with NOx and create ground-level ozone. Paints and coatings formulated to minimize ozone generation could provide air quality improvements versus looking at VOCs alone.



## ExonMobil Energy lives here

Contact us for more information:

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