

Safe Handling and Storage of

Alpha Olefin Waxes

*C20-24, C24-28, C26-28,
C30+ and C30+HA*

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PRODUCT STEWARDSHIP

Chevron Phillips Chemical Company LP ("Chevron Phillips Chemical Company") is committed to being a good Product Steward of the products we produce. We want anyone who comes in contact with one of our products to have access to information that will help them to understand its potential risk and how to use it safely. The thrust of our Product Stewardship program is the implementation of an Operation Excellence Management System (OEMS) initiative, which makes health, safety and environmental protection an integral part of our products. Successful implementation of this system must include a shared responsibility of all those who come in contact with a product throughout its life cycle. Chevron Phillips Chemical Company will continue to work with customers and others to help ensure that all who use and handle our products follow safe and environmentally sound practices.

The information contained in this technical bulletin is not intended to, nor does it amend or replace the Chevron Phillips Chemical Company Material Safety Data Sheet (MSDS) for C20-24 (PE0025), C24-28 (PE0027), C26-28 (7965), C30+ (PE0028), and C30+ HA (CPC00027). The most current MSDS can be obtained from Chevron Phillips Chemical Company by calling (800) 852-5530 and should be carefully examined prior to working with these products.

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INTRODUCTION

Gulf Oil Chemicals Company first commercialized the production of normal alpha olefins (NAOs) in 1965. Today CPChem alpha olefin products are manufactured and marketed by Olefins and Polyolefins Division of Chevron Phillips Chemical Company LP. This brochure covers the safe handling and storage of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+HA. A brief description of typical applications of these products follows.

CPChem's alpha olefins C20-24, C24-28, C26-28, C30+ and C30+HA are utilized in the production of copolymers. These products when reacted with phenol or benzene (and after further processing to sulfonate salts) produce lubricating oil additives.

Specialty chemicals, such as epoxides, are produced using alpha olefins C20-24, C24-28, and C26-28. Epoxides are used to produce epoxy resins and polyether ingredients in polyurethanes. Halogenated olefins can be manufactured from all five olefin cuts via reaction with halogen gases. Chlorinated alpha olefins C20-24 are incorporated as a secondary plasticizer in PVC formulations. Other end product uses of chlorinated and brominated alpha olefins include fire retardant agents in films and stable, high pressure additives in metal working fluids. Derivatives of alpha olefins above C20 find uses in lube oils, transmission fluids and as pour-point depressants in lube and crude oil. These wax fractions can also be chemically modified to make polishes or using their physical properties in candles. These waxes can be emulsified for coating applications such as particleboard coating. Furthermore, the physical properties of alpha olefin C30+ and C30+HA allow them to be used as lubricants in polyvinylchloride (PVC) extrusion. For complete information on the uses of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+HA, contact NAO Business Development at 832-813-4627.

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PART 1

SPECIFICATIONS, TYPICALS AND TEST METHODS

ALPHA OLEFIN C20-24

CHARACTERISTIC	METHOD	SPECIFICATION
Carbon Number, wt. %		
<C ₁₈ , max.	GLC	0.1
C ₁₈ , max.	GLC	3.0
C ₂₀ , min. – max.	GLC	35-55
C ₂₂ , min. – max.	GLC	25-45
C ₂₄ , min. – max.	GLC	10-26
C ₂₆ , max.	GLC	2.0
>C ₂₆ , max.	GLC	0.1
Color, Saybolt ⁽¹⁾	ASTM D 156	+30
Appearance ⁽¹⁾	ASTM D 4176	Clear & Bright
Water, ppm max.	ASTM E 1064	100

ADDITIONAL CHARACTERISTICS	METHOD	TYPICAL VALUE
n-Alpha Olefin, wt. %	GLC	89.3
Vinylidene, wt. %	GLC	8.0
cis and trans 2-Olefin, wt. %	GLC	0.3
Paraffin, wt. %	GLC	0.3
API Gravity at 15.6 °C/15.6 °C (60 °F/60 °F)	ASTM D 287	43.0
Specific Gravity (Solid), 15.6°C/15.6°C (60°F/60°F)	ASTM D 70 (Modified)	0.799
Specific Gravity (Liquid), 71°C/15.6°C (160°F/60°F)	SM 350-4	0.770
Density, lb./gal., 15.6°C (60°F)	---	6.67
Melting Point, °C (°F)	ASTM D 87	35.6 (96)
Flash Point, PM, °C (°F)	ASTM D 93	183 (362)
Viscosity, 99° C (210 °F)		
- Kinematic, cSt	ASTM D 445	2.1
- Saybolt, SUS	ASTM D 2161	33
Penetration, 0.10 mm, 25 °C (77 °F)	ASTM D 1321	150
Color, APHA	APHA	<5
Autoignition Temperature, °C (°F)	(2)	239 (462)
Boiling Point, °C (@ 760mmHg)	(3)	342-390

- (1) Sample is heated to 200 °F prior to testing.
- (2) Experimental results
- (3) Values correspond to the range of initial boiling points and were obtained from TRC Thermodynamic Tables-Hydrocarbon; The Texas A&M University System, College Station, TX 77843-3124.

ALPHA OLEFIN C24-28

CHARACTERISTIC	METHOD	SPECIFICATION
Carbon Number, wt. %		
<C ₂₂ max.	GLC	1.0
C ₂₂ max.	GLC	2.0
C ₂₄ -C ₂₈ min.	GLC	72
C ₃₀₊ max	GLC	28
Color, Saybolt ⁽¹⁾ , min.	ASTM D 156	+25
Appearance ⁽¹⁾	ASTM D 4176	Clear & Bright

ADDITIONAL CHARACTERISTICS	METHOD	TYPICAL VALUE
n-Alpha Olefin, wt. %	NMR	50
Vinylidene, wt. %	NMR	40
cis and trans 2-Olefin, wt. %	NMR	10
Paraffin, wt. %	Calculated	0.8
API Gravity at 15.6 °C/15.6 °C (60 °F/60 °F)	ASTM D 287	40.9
Specific Gravity (Solid), 15.6°C/15.6°C (60°F/60°F)	ASTM D 70 (Modified)	0.819
Specific Gravity (Liquid), 71°C/15.6°C (160°F/60°F)	SM 350-4	0.780
Density, lb./gal., 15.6°C (60°F)	---	6.83
Congealing Point, °C (°F)	ASTM D 938	52.2 (126)
Drop Melt Point, °C (°F)	ASTM D 127	67.8 (154)
Melting Point, °C (°F)	ASTM D 87	61.7 (143)
Flash Point, PM, °C (°F)	ASTM D 93	218 (424)
Viscosity, 99 °C (210 °F)		
- Kinematic, cSt	ASTM D 445	2.5
- Saybolt, SUS	ASTM D 2161	35
Penetration, 0.10 mm, 25 °C (77 °F)	ASTM D 1321	95
Autoignition Temperature, °C (°F)	ASTM E 659	345 (653)
Boiling Point, °C (@ 760 mmHg)	(2)	390-430
Distillation, °C (°F)		
IBP	ASTM D 1160/5mm	87.8 (190)
5%		224.4 (436)
95%		305.6 (582)
EP		320.0 (608), Residue 3%

(1) Sample is heated to 200 °F prior to testing.

(2) Values correspond to the range of initial boiling points and were obtained from TRC Thermodynamic Tables-Hydrocarbon; The Texas A&M University System, College Station, TX 77843-3124.

ALPHA OLEFIN C26-28

CHARACTERISTIC	METHOD	SPECIFICATION
Carbon Number, wt. %		
<C ₂₆	GLC	3.0
C ₂₆	GLC	50-65
C ₂₈	GLC	30-42
C ₃₀₊ max.	GLC	7.0
Color, Saybolt ⁽¹⁾	ASTM D 156	+30
Appearance ⁽¹⁾	ASTM D 4176	Clear & Bright

ADDITIONAL CHARACTERISTICS	METHOD	TYPICAL VALUE
Linear Alpha Olefin, wt. %	NMR	86
Linear Internal Olefins, wt. %	NMR	3
Branched Olefins, wt. %	NMR	11
Paraffin, wt. %	Calculated	0.2
Drop Melt Point, °C (°F)	ASTM D 127	52 (125)
Congealing Point, °C (°F)	ASTM D 938	50 (122)
API Gravity, 15.6 °C/15.6 °C (60 °F/60 °F)	ASTM D 287	41.2
Specific Gravity (Solid), 15.6°C/15.6°C (60°F/60°F)	ASTM D 70 (Modified)	0.82
Density, lb./gal., 15.6°C (60°F)	---	6.84
Flash Point, PM, °C (°F)	ASTM D 93	214 (417)
Flash Point, COC, °C (°F)	ASTM D 92	228 (442)
Viscosity, 99 °C (210 °F)		
- Kinematic, cSt	ASTM D 445	3.27
- Saybolt, SUS	ASTM D 2161	37.1
Oil Content, wt. %	ASTM D 721	4.6
Penetration, 0.10 mm, 25 °C (77 °F)	ASTM D 1321	48
Autoignition Temperature, °C (°F)	ASTM E 659	346 (654.8)

(1) Sample is heated to 200 °F prior to testing.

ALPHA OLEFIN C30+

CHARACTERISTIC	METHOD	SPECIFICATION
Carbon Number, wt. %		
<C ₂₂ , max.	GLC	0.1
C ₂₂ , max.	GLC	1.0
C ₂₄ -C ₂₈ , max.	GLC	18.0
C ₃₀₊ , min.	GLC	82.0
Color, Saybolt ⁽¹⁾ , min.	ASTM D 156	0
Appearance ⁽¹⁾	ASTM D 4176	Clear & Bright
Drop Melt Point, °C (°F), min.	ASTM D 127	73.3 (164)
Viscosity, Kinematic, cSt, 99 °C (210 °F), max.	ASTM D445	10

ADDITIONAL CHARACTERISTICS	METHOD	TYPICAL VALUE
n-Alpha Olefin, wt. %	NMR	55
Vinylidenes, wt. %	NMR	40
Olefins, other than n-Alpha and Vinylidenes, wt. %	NMR	5
Paraffin, wt. %	Calculated	0.6
API Gravity at 15.6 °C/15.6 °C (60 °F/60 °F)	ASTM D 287	38.8
Specific Gravity (Solid), 15.6°C/15.6°C (60°F/60°F)	ASTM D70 (Modified)	0.836
Specific Gravity (Liquid), 85°C/15.6°C (185°F/60°F)	SM 350-4	0.790
Congealing Point, °C (°F)	ASTM D 938	68.3 (155)
Flash Point, PM, °C (°F)	ASTM D 93	252 (485)
Viscosity, Saybolt, SUS	ASTM D 2161	52
Penetration, 0.10 mm		
@ 25 °C (77 °F)	ASTM D 1321	13
@ 37.8 °C (100 °F)		24
@ 43.3 °C (110 °F)		34
Autoignition Temperature, °C (°F)	(2)	368 (694)
Distillation, °C (°F)		
IBP	ASTM D 1160 (5mm)	95.6 (204)
5%		238.3 (461)
95%		339.4 (643)
EP		367.2 (693)

- (1) Sample is heated to 200 °F prior to testing.
(2) Experimental results.

ALPHA OLEFIN C30+ HA

CHARACTERISTIC	METHOD	SPECIFICATION
Carbon Number, wt. %		
<C ₂₄ , max.	GLC	0.1
C ₂₄ -C ₂₈ , max.	GLC	8.0
C ₃₀₊ , min.	GLC	92.0
Color, Saybolt ⁽¹⁾ , min.	ASTM D 156	0
Appearance ⁽¹⁾	ASTM D 4176	Clear & Bright
Drop Melt Point, °C (°F), min.	ASTM D 127	65 (150)

ADDITIONAL CHARACTERISTICS	METHOD	TYPICAL VALUE
Linear Alpha Olefin, wt. %	NMR	83
Linear Internal Olefins, wt. %	NMR	3
Branched Olefins, wt. %	NMR	14
Paraffin, wt. %	Calculated	0.3
API Gravity at 15.6 °C/15.6 °C (60 °F/60 °F)	ASTM D 287	38.4
Specific Gravity (Solid), 15.6°C/15.6°C (60°F/60°F)	ASTM D70 (Modified)	0.83
Congealing Point, °C (°F)	ASTM D 938	68 (155)
Density, lb./gal., 15.6°C (60°F)	---	6.93
Flash Point, PM, °C (°F)	ASTM D 93	222 (432)
Flash Point, COC, °C (°F)	ASTM D 92	280 (536)
Viscosity, Saybolt, SUS	ASTM D 2161	49.6
Oil Content, wt. %	ASTM D 721	1.9
Penetration, 0.10 mm		
@ 25 °C (77 °F)	ASTM D 1321	15.5
@ 37.8 °C (100 °F)		32
@ 43.3 °C (110 °F)		40
Autoignition Temperature, °C (°F)	ASTM E 659	391 (735.8)

(1) Sample is heated to 200 °F prior to testing.

RECOMMENDED TEST METHODS

The following ASTM methods¹ are recommended for the analysis of alpha olefins C20-24, C24-28 C26-28, C30+, and C30+ HA:

1. D 70 Test Method for Specific Gravity and Density of Semi-Solid Bituminous Materials, Vol. 04.03 (This method has been modified.)
2. D 87 Test Method for Melting Point of Petroleum Wax (Cooling Curve), Vol. 05.01
3. D 93 Test Method for Flash Point by Pensky-Martens Closed Cup Tester, Vol. 05.01
4. D 127 Test Method for Drop Melting Point of Petroleum Wax, Including Petrolatum, Vol. 05.01
5. D156 Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method), Vol. 05.01
6. D 287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method), Vol. 05.01
7. D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity), Vol. 05.01
8. D 938 Test Method for Congealing Point of Petroleum Waxes, Including Petrolatum, Vol. 05.01
9. D 1160 Test Method for Distillation of Petroleum Products at Reduced Pressure, Vol. 05.01 (Conducted at 5 mm Hg of Pressure)
10. D 1321 Test Method for Needle Penetration of Petroleum Waxes, Vol. 05.01
11. D 2161 Practice for Conversion of Kinematic Viscosity to Saybolt Universal Viscosity or to Saybolt FuroI Viscosity, Vol. 05.01
12. D 4176 Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures), Vol. 05.02
13. E 659 Test Method for Autoignition Temperature of Liquid Chemicals, Vol. 14.02
14. E 1064 Test Method for Water in Organic Liquids by Coulometric Karl Fischer Titration, Vol. 15.05

Notes:

¹1996 Annual Book of ASTM Standards

PART 2

SAMPLING AND HANDLING

TRAINING

In any workplace, training should be conducted before sampling and handling operations of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA are undertaken. Several commercial websites provide access to Code of Federal Regulations, NIOSH, and OSHA databases which may help in answering questions and setting up safety programs. The training program may include the following:

1. Properties and health hazards of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA.
2. Safe work and good housekeeping practices.
3. The importance of protection from alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA contact; the proper clothing and cleaning requirements to ensure worker protection.
4. Signs and symptoms of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA exposure and action to be taken.
5. The care that must be taken whenever and wherever alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA are used, handled, stored, and transported.
6. Emergency procedures for leaks, spills, and fires, including protective clothing to be worn in such instances. Check the product's MSDS for further information.
7. First aid measures to be used after exposure.
8. The availability of written alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA usage, health hazard, and training program procedures.

It is recommended that this generalized sampling and handling training program should be part of a worker's initial instruction.

Refresher training should be scheduled at least annually thereafter.

A summary of accidental release, fire, and health information is presented in Section 4 of this brochure.

RECOMMENDED PRACTICE FOR SAMPLING

This information is provided for use in establishing sampling and handling procedures. This information should only be utilized in conjunction with an existing health and safety program and cannot be used as a substitute for expert safety and medical advice.

SAMPLING:

Alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA samples are collected in screw top metal containers in lieu of glass bottles. Label the metal containers according to OSHA Regulations (refer to 20 CFR 1910.1200).

Note – Appropriate eye protection and thermally insulated and chemically resistant gloves should be used when sampling heated material. When vapor or fumes from the heated material are not adequately controlled, wear a NIOSH/MSHA approved respirator. See Section 4 for further details.

Emphasis should be placed on cleanliness and dryness. The metal container and its holder must be CLEAN AND DRY. After the sample has been heated, transfer the liquefied sample to another metal container for storage. A pint size, screw cap, metal container is used to store the waxes.

The sampling device should be bonded to the tank manway (e.g., by resting the chain on the lip of the manway) prior to sampling.

REFERENCED DOCUMENTS RELATED TO SAMPLING:

API RP-500A Classification of Locations for Electrical Installations in

ASTM D 4057	Petroleum Refineries Standard Practice for Manual Sampling of Petroleum and Petroleum Products
ASTM D 4177	Standard Practice for Automatic Sampling of Petroleum and Petroleum Products
ASTM E 300	Practice for Sampling Industrial Chemicals

STATIC ELECTRICITY AND GROUNDING

These materials are characterized by high electrical resistivity (low conductivity) which can result in the buildup of excess static charge during transfer operations. These materials are classified as low vapor pressure products under the API RP 2003 Guidelines (i.e., a product with a flash point above 100 °F). If these products are handled at temperatures well below their flash points, flammable vapors will not develop. However, a condition for ignition may exist, if the products are handled at temperatures near their flash points or are contaminated with intermediate or high vapor pressure products. Likewise, in transporting these products, a condition for ignition can exist when the previous load contained a flammable vapor which was not flushed from the storage tank. This type of loading is commonly called "switch loading". Finally, the effects of the elevated temperatures, to maintain liquified product, upon the vapor pressure of any contaminants or previous cargo, must be considered.

Key operations which have the potential of generating a flammable atmosphere and/or static charge include tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing/agitation, and vacuum truck operations. To minimize the hazard of static electricity during these operations, bonding and grounding may be necessary but may not, by themselves, be sufficient. For more information, refer to OSHA Standard 29 CFR 1910.106, "Flammable and Combustible Liquids", National Fire Protection Association (NFPA) 77, "Recommended Practice on Static Electricity" and/or the American Petroleum Institute (API) Recommended Practice 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents".

PRODUCT LOADING/UNLOADING REQUIREMENTS

Loading operations must be performed only by qualified persons. These individuals must be properly instructed in the loading of Alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA. Workers should refer to their site's fire and safety guidelines for personal protective equipment. Though considered noncombustible, use caution to avoid creating any sparks which could ignite the product. As the product is being loaded, static build up can occur. Therefore, a ground cable must be placed on the container to prevent the build up of static electricity. Use only clean, oil- and dirt-free, spark resistant tools and implements.

The importance of a thorough pre-trip/post-trip safety inspection cannot be over emphasized. The physical inspection process of the container is one of the best methods of minimizing human error, the principle cause of transportation incidents.

Take extreme care to prevent spills. In case material is spilled, wash contaminated areas thoroughly with large quantities of water and collect the liquid in the plant chemical waste system. Product at elevated temperatures may be allowed to cool and solidify. Solidified material can be scooped up. Drums and trucks can be used for temporary storage until product can be recycled or disposed of properly. See Section 4 for further information.

WHEN LOADING OR UNLOADING A VESSEL OR BARGE:

The United States Coast Guard classifies these materials as regulated commodities (combustible Grade E cargo under 46 CFR 30.10-15). Vessel/barge owners must comply with 46 CFR Part 30 (Table 30.25-1; cargo name Olefins (C13+, all isomers)).

Plan and control the loading and unloading of Alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA to limit personnel exposure and environmental releases. OSHA and the U.S. Coast Guard (CFR 46) have published regulations applicable to people involved in the handling of bulk chemical materials. Some of the key elements are:

Employee Training
 Personal Protective Equipment
 Warning Signs

These products are heated prior to loading/unloading. During transport by ship, the product is heated. Average product temperatures are as follows:

Product	Melting Point, °C (°F)	Shipping Temperature, °C (°F)
C20-24 NAO	36 (96)	52-82 (126-180)
C24-28 NAO	62 (143)	71-85 (160-185) ⁽¹⁾
C26-28 NAO	--	62-85 (143-185) ⁽¹⁾
C30+ NAO	--	82-85 (180-185) ⁽¹⁾
C30+ HA NAO	--	75-85 (167-185) ⁽¹⁾

⁽¹⁾Many tank linings used by vessels have an upper temperature rating of 185 °F.

Barges are not normally heated during transit and may require steaming prior to unloading. Transfer lines should be insulated and steam-traced. Clean stainless steel, rust-free mild steel tank or suitably washed steel tanks are acceptable for transport of these products. CPChem carefully selects barges to ensure that product quality is not negatively affected during transport. Qualified contractors should be used to inspect, clean and repair barges in which alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA are shipped. The contractor should have facilities to dispose of residual product in an acceptable manner.

WHEN LOADING OR UNLOADING TANK CARS:

General purpose tank cars in the Chevron Phillips Chemical fleet are DOT 111A100W1 and are stenciled accordingly. They are insulated with exterior heating coils and equipped with both top and bottom loading/unloading valves.

The melting point of these products is such that they require a coiled rail car for storage and transportation. Average product temperatures are as follows:

Product	Melting Point, °C (°F)	Shipping Temperature, °C (°F)
C20-24 NAO	36 (96)	52-82(126-180)
C24-28 NAO	62 (143)	71-88 (160-190)
C26-28 NAO	--	62-85 (143-185)
C30+ NAO	--	82-93 (180-200)
C30+ HA NAO	--	75-93 (167-200)

Loading

Set the brakes, chock wheels, turn on warning lights, erect track warning signs, and connect ground cable. Inspect tank car exterior for any damage or flags and verify that all appliances and test dates are in compliance. Loosen dome cover bolts slightly and leave two bolts hand tight. Check tank car for pressure. Open dome carefully and inspect car interior for cleanliness and liquid or wax heel. If a liquid or wax heel exists, removal and cleaning may be required depending upon the previous load. Check dome cover bolts, gaskets, and seating surfaces for a secure condition. Flush load filter and spout, if necessary. Remove bottom cap, open outlet valve, and drain, if necessary. Any material from a previous load should be recycled or disposed of in accordance with federal, state, and local regulations. Close bottom outlet valve and leave bottom cap off. If car is equipped with internal steam coils, remove caps. Open product line to tank car and start pump. Frequently check bottom unload valve for any signs of leakage during loading. If leakage occurs, cease loading. Check steam coils for leakage. Load tank car to proper outage or weight desired.

After loading is completed, shut down pump, close block valves for product, and purge line with nitrogen to clear spout. Remove spout, close and tighten dome (with a wrench), and seal all top appliances/covers. Check to ensure that all plugs and fittings are tight. Secure loading ramp and spout, and remove ground cable. Replace bottom cap and tighten with a wrench. Seal bottom unload valve. Secure heater caps if internally coiled car. Remove ground cable, wheel chocks, and warning signs. Turn off track warning light.

Unloading

Set the brakes, chock wheels, turn on warning lights, erect track warning signs, and connect ground cable. Relieve tank pressure gradually by opening vent valve and loosening dome (manhole cover) at short intervals. Leave dome cover open so air can enter tank while unloading. Operate bottom valve rod handle to see that outlet valve in bottom of tank is seated before removing bottom cap. Loosen bottom cap and allow sufficient time to permit liquid in outlet chamber to escape. Check for leakage from bottom cap. If leakage is absent, remove bottom cap and connect unloading hose (check

gasket in hose). Open bottom valve and start unloading pump (it may be necessary to bleed vapors off pump).

After the tank car is unloaded completely, close all unloading valves tightly and remove unloading hose. Tighten all closures except heater coil inlet and outlet pipes which must be left open for drainage. Close dome cover (check gasket), plug or cap all openings and tighten with wrench. Check gasket, replace bottom cap, and tighten with a wrench. Remove chocks, ground cable, and caution signs. Turn off track warning lights.

The dome may be opened for sampling, gauging, and/or to assure emptiness of the vehicle. Inbound product should be visually inspected. Tank cars should be cleaned and prepared for shipment in accordance with DOT regulations prior to releasing. Shipment of these products requires a coiled and insulated compartment maintained within an appropriate temperature range (see Table on page 11). Liquefaction of a 20 M-gallon tank of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA from ambient temperature requires approximately 1-2 days of heating (see storage tank temperatures listed in Part 3). Rate of liquefaction will vary by heat and application location.

WHEN LOADING OR UNLOADING TANK TRUCKS:

Open dome tank trucks are normally of the MC/DOT 307 or 407 type and are used to transport hazardous materials.

The melting point of these products is such that they require a coiled and insulated vessel for storage and transportation. Care should be exercised depending on the weather conditions and number of days in transit. Use the average product shipping temperatures listed in the "When Loading or Unloading Tank Cars" section.

Arranging for "In Transit Heat" is often appropriate via tank truck. This system utilizes the tractor's radiator heat system as an aid in minimizing temperature loss during transportation.

Loading

Check wheel chocks in front and back of truck's rear wheels allowing $\frac{3}{4}$ " clearance for ease of removal. Connect ground cable. Close bottom valve leaving the cap off to monitor for leakage while loading. Open dome cover and inspect interior for cleanliness. Flush loading spout and filter, if necessary. Purge trailers with nitrogen. Visually inspect trailer exterior for damage and inspection dates.

Open product line and start pump. Check bottom unload valve for leakage. Shut down pump, close product block valves, and nitrogen purge line to clear spout. Remove spout, secure dome lid, and seal dome cover. Check all top openings or valves for tightness. Raise loading ramp and secure spout. Replace bottom unload cap and ensure internal/external valves are in closed position. Seal bottom cap. Remove chocks and ground cables. Apply proper placards to trailer for alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA shipments if the material is kept heated.

Unloading

Check wheel chocks in front and back of truck's rear wheels allowing $\frac{3}{4}$ " clearance. Connect ground cable. Relieve all tank pressure by opening a vent valve or slowly loosening dome cover bolts. Remove dome cover or outlet cap so air can enter the tank during unloading. Check internal and external valves ensuring they are closed and remove unloading valve cap slowly to relieve any pressure. Check gasket in loading hose and connect to unloading valve. Open internal and external valves, and start unloading pump.

After product transfer is completed, shut off unloading pump, close internal and external valves, and remove unloading hose checking for possible product in the line. Close, tighten and cap all fittings. Trailers transporting alpha olefins C24-28, C26-28, C30+, and C30+ HA retain placards and "HOT" markings until cleaned (See Part 5). Remove chocks and ground cables.

SAFETY REFERENCES

The following publications are excellent references for product handling, safety and fire control:

NFPA NO. 10-
Portable Fire Extinguisher

NFPA NO. 11-
Foam Extinguishing Systems

NFPA NO. 70 -
National Electrical Code as adopted by National Fire Protection Association.

NFPA NO. 77 -
Recommended Practice of Static Electricity as adopted by National Fire Protection Association.



PART 3

STORAGE DESIGN RECOMMENDATIONS

STORAGE TANKS

Storage tanks should be of welded steel construction. Underground storage tanks are not recommended because of the difficulty of locating leaks. However, some states require underground storage tanks. Diking, drainage, and tank supports should be designed to conform with local regulations. A rule of thumb commonly used for determining the size of storage facilities suggests that storage facilities be 1½ times the size of shipments received. The secondary containment requirements as well as tank layout and spacing requirements should be in accordance with NFPA 30. Rotating equipment such as pumps should be kept outside of the secondary containment area. Some facilities may require larger inventories, and thus storage facilities, because of seasonal transportation problems.

The storage tank inlet should be located at the bottom of the tank. Should a top inlet be desired, the fill pipe should be extended to a depth no greater than the diameter of the fill pipe from the bottom of the tank to minimize static charge accumulating during filling. The fill pipe should be connected electrically to both the tank flange and the transfer pipeline. The purpose of this electrical connection is to dissipate any static charge which may build up during filling.

A nitrogen blanketing system is necessary for applications where the product is going to be stored for long periods of time and peroxides and/or carbonyls would present a problem in the process. A nitrogen system that maintains positive pressure and adds nitrogen as the product is withdrawn, and as the tank breathes, prevents the introduction of air that can cause peroxide buildup in the product and keeps moisture from condensing in the tank. Free water will settle out in the bottom of the tank and will normally not be seen until the tank is stripped. Dissolved water up to the saturation level may be found in the product. If water is a critical contaminant, an olefin sample should be tested periodically and withdrawn through the sump. When peroxide and carbonyl development is a concern, use a closed handling system that

maintains a nitrogen atmosphere on the product through the loading, unloading and other handling activities to minimize exposure to atmospheric oxygen.

All products require a coiled and insulated tank. Storage tanks must be clean and dry before receiving this product. The product should be maintained within a specified temperature range and circulated once a week while steam is being applied and the tank is static. The corresponding pour points and recommended temperature ranges for each product are:

Product	Pour Point, °C (°F)	Storage Temperature Range, °C (°F)
C20-24 NAO	35.6 (96)	52-82 (126-180)
C24-28 NAO	61.7 (143)	74-88 (165-190)
C26-28 NAO	-	62-85 (143-185)
C30+ NAO	-	82-93 (180-199)
C30+HA NAO	-	75-93 (167-199)

The pour points of alpha olefins C20-24 and C24-28 and the congealing points of alpha olefins C26-28, C30+ and C30+HA require these products to be stored in coiled and insulated tanks. Product lines should be insulated and steam-traced.

All of the lines and valves, as well as the tank, can be carbon steel. However, carbon steel lines will accumulate rust if allowed to remain empty for long periods. In this situation the first few gallons of product moved down the line may have a yellow to orange color and particulates depending on the amount of rust that has accumulated.

Unlined carbon steel tanks may also accumulate rust above the liquid level. This rust, along with the condensate, will settle to bottom of the tank and may not show up until the tank is stripped. Rust can be avoided by having storage tanks lined with a zinc, epoxy, or other coating that is compatible with these products.

Exercise care in selecting the gasket and seal materials to be used. These products can cause rubber to swell and subsequently deteriorate.

Additionally, plastic materials will become brittle and crack or break. Viton® has proven to be compatible with these products.

Specific bulk storage designs must conform to insurance underwriter's codes and local fire and building regulations. Critical design, placement, installation, and maintenance requirements are usually addressed in these codes and regulations and must be followed.

Inspect tanks periodically for leaks and service in accordance with API Standard 653.

Workers should never be permitted to enter an empty tank which has been used for alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA until the requirements of the OSHA confined space standard (29 CFR 1910.146) and the safe entry recommendation of API Standard 2015 have been met, including, but not limited to, required concentrations for oxygen.

API AND ANSI DESIGN REFERENCES

American Petroleum Institute
1220 L Street, N. W.
Washington, DC 20005

Part I – DESIGN:

API RP-520: *Sizing, Selection, and Installation of Pressure Relieving Devices in Refineries*

Part II – INSTALLATION:

API 601: *Metallic Gaskets for Raised-Face Pipe Flanges and Flanged Connections (Double-Jacketed Corrugated and Spiral-Wound)*

API 620: *Recommended Rules for the Design and Construction of Large Welded, Low-Pressure Storage Tanks*

API 650: *Welded Steel Tanks for Oil Storage*

API Standard 653: *Tank Inspection, Repair, Alteration, and Reconstruction*

API RP-2000: *Venting Atmospheric and Low-Pressure Storage Tanks*

API RP-2003: *Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents*

API Standard 2015: *Safe Entry and Cleaning of Petroleum Storage Tanks*

API RP-2028: *Flame Arresters in Piping System*

API RP-2210: *Flame Arresters for Vents of Tanks Storing Petroleum Products*

API RP-2350: *Overfill Protection for Petroleum Storage Tanks*

American National Standards Institute
11 West 42nd Street
New York, NY 10036

ANSI B16.21: *Nonmetallic Flat Gasket for Pipe Flanges*

ANSI B31: *American National Code of Pressure Piping*

PARTICULATE MATTER

CPChem alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA are free of foreign matter when produced. However, some foreign matter may contaminate the product in the course of being transferred, stored or transported.

Foreign matter may be avoided by:

1. Paying careful attention to cleanliness.
2. Filtering product to remove foreign matter before use.

Note: C30+ and C30+HA fractions are heavy cuts and may contain varying amounts of particulates which are solid at operating temperatures.

FILTERS

Since small amounts of foreign matter may enter storage tanks and transport vessels from various sources, a filter in the transfer piping between the storage tank and processing equipment is recommended. This can be accomplished by inserting a corrugated cellulose filter paper (5 µm) inside a woven polyester fiber (10 µm mesh) cartridge-type filter. The cellulose paper filter has a rating of 375 °F before scorching is expected, and paper breakdown begins at 425 °F. Other types of product compatible filters might be used also. Insulate and steam trace the filter housing. Flow rates and pressures should be used to determine the proper filter for specific situations. Contact Chevron Phillips

Chemical Company's Technical Services Group at (800) 852-5531 for recommendations. Inspect and renew filter cartridges periodically.

HOSES

Hard piping is preferred to the use of hoses where possible and practical. If hoses are needed for loading or unloading operations, they should be inspected and pressure tested at the intervals required by the various regulations. A satisfactory type hose is SW-309 PETRO-VAC 150 Tank Truck Hose (seamless nitrile tube with multiple plies of polyester with helix wire and a one piece nitrile blend cover) or a SP-483 modified X-link chemical hose (seamless X-link polyethylene tube with multiple plies of polyester which is supported by a PVC rod helix and a 1 piece blue synthetic cover). Teflon[®] is also recommended. U.S. Coast Guard regulation 33 CFR Part 154.500 applies to hoses used for bulk transfers to and from tank vessels.

PUMPS

Liquid products can be transferred by pump or vacuum. For most product handling, centrifugal pumps with mechanical seals perform satisfactorily. The pump manufacturer can recommend the proper type of pump if the following parameters are known: 1) flow in gallons per minute, 2) the size and length of suction and discharge lines, 3) the suction and discharge pressures, and 4) the range of product temperatures during transfer. A drain valve should be installed at the lowest point in the system so that the pump and all piping can be completely drained and washed before any maintenance work is done. Totally enclosed fan cooled (TEFC) motors are recommended. However, local fire and insurance codes should be consulted to determine if an explosion-proof motor must be used. Pump seals must be capable of meeting EPA emission standards - this requires tandem or double seals. Tandem seals enhance safety when pumping these products (at elevated temperatures). Demisting systems should be used to keep pump bearings lubed.

The following practices are recommended to minimize the possibility of pump leakage:

1. Mechanical seals in conformance with API 682, 1st edition.
2. Pumps in conformance with API 610, 8th edition are recommended.

3. The pump should be designed so that pump bearings will be able to carry thrust at no flow. Consider selecting non-metallic (PEEK) wear rings to minimize damage if the pump runs dry.
4. The pump shaft should be highly polished.
5. Pumps should not be subjected to forces beyond specified pump tolerances.
6. Vibration monitoring with automatic pump shutdown may be applicable in certain situations.

VALVES

Full-bore ball valves are preferred for pigged pipelines. Gate valves, butterfly valves, or ball valves may be used for pipelines that are not pigged. These valves should be made of cast iron, case steel, or other recommended materials. Valves should be packed with the following graphite materials:

- Garlock[®] EVSP Simplified (#9000/98)⁽¹⁾
- Garlock[®] 70# / 98 (-400 to 1200 °F; 10,000 psi)⁽²⁾
- Garlock[®] 1303 (good for steam)⁽²⁾
- Slade[®] 3300G (-400 to 1200 °F; 10,000 psi)⁽²⁾

⁽¹⁾Most efficient packing is the flexible die-form rings with flexible braided end-rings.

⁽²⁾Used for field repacking.

PIPELINES

The following are recommended practices in engineering pipelines for alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA:

1. A minimum of flanged connections should be used to avoid potential leaks.
2. Lines should not be buried because of the difficulty of checking for leakage.
3. All lines should be sloped with drain valves at appropriate locations so that they can be completely drained for maintenance.
4. All newly installed pipelines should be pressure-tested by an approved method before use.

5. Bellow valves for 2 inch and smaller lines are recommended to eliminate emissions from packing glands.

HEAT TRACING AND INSULATION

Heat-traced lines, valves, and pumps are necessary to prevent alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA from freezing during handling. It is recommended that the temperature of these products be kept within the specified range during transfer operations. These temperature ranges are listed near the beginning of this section.

Lines can be traced either by steam or electrical tracing. Steam tracing frequently involves tracing lines with tubing covered by insulation adequate for worst-case weather conditions. Three-eighths inch copper tubing has been found to be effective. Electrical tracing of lines with appropriate insulation may also be used; however, lines heat up more rapidly when traced with steam. The extent of pipe damage due to corrosion caused by steam heating should be monitored on a periodic basis. Remove the insulation to facilitate ease of inspection.

Horizontal pipes are traced by running the tracing along the bottom of the pipe. Vertical lines are traced by running the tracing line with the pipe. If steam tracing is being used, a minimum of one steam trap should be used for each tracer and every 150 feet of tracing. Adjust steam pressures used in tracing to take into account the melting point of the specific alpha olefins fraction. Traced pipes should be effectively insulated.

Proper thermal pressure relief must be provided. Care should be taken in design to avoid the possibility of overheating and boiling isolated sections of piping. Thermal reliefs should be sized for fire conditions. Steam trace the safety valve discharge and suction to prevent cold points in the piping which would result in plugging of the valve.



PART 4

HEALTH, ENVIRONMENT, FIRE AND ACCIDENTAL RELEASE INFORMATION

CPChem alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA have a low order of toxicity and if handled properly should not present a health hazard. These materials will burn but they are not considered a flammability or combustibility hazard.

MSDSs for these products are available from CPChem to help customers satisfy their own safe handling and disposal needs, and OSHA Hazard Communication Standard requirements. Such information should be requested and studied prior to working with this product. Please call Chevron Phillips Chemical Company at (800) 852-5530 to request the MSDS for either product.

NOTE: THIS BOOKLET DOES NOT SUBSTITUTE FOR THE MSDS.

HEALTH HAZARDS AND FIRST AID

INHALATION: Neither alpha olefins C20-24, C24-28, C26-28, C30+, nor C30+ HA is expected to be harmful if inhaled. If any of the materials are heated, fumes may be unpleasant and produce nausea and irritation of the upper respiratory tract. **First Aid:** If a person is exposed to excessive levels of either material in the air, move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

EYES: Neither alpha olefins C20-24, C24-28, C26-28, C30+, nor C30+ HA is expected to cause prolonged or significant eye irritation. If the material is heated, thermal burns may result from eye contact. **First Aid:** No first aid procedures are required for the materials at room temperature. As a precaution, remove contact lenses, if worn, and flush eyes with water. If heated material should splash into the eyes, flush eyes immediately with fresh water for 15 minutes while holding the eyelids open.

Remove contact lenses, if worn. Get immediate medical attention.

SKIN: Contact of alpha olefin C20-24, C24-28, C26-28, C30+, and/or C30+ HA with the skin is not expected to cause prolonged or significant irritation. Based on results of animal testing with other alpha olefins, these materials are not expected to cause allergic skin responses. If absorbed through the skin, these materials are considered practically non-toxic to internal organs. Thermal burns may result from skin contact, if this material is heated. **First Aid:** Wash or clean contaminated clothing and shoes before reuse. If the hot material of alpha olefin C20-24, C24-28, C26-28, C30+, and/or C30+ HA gets on the skin, quickly cool in water. See a doctor for extensive burns. Do not try to peel the solidified material from the skin or use solvents or thinners to dissolve it. The use of vegetable oil or mineral oil is recommended for removal of this material from the skin.

INGESTION: The waxes are not expected to be harmful if swallowed. **First Aid:** No specific first aid measures are required for the waxes because these materials are not expected to be harmful if swallowed.

This information is not intended to, nor does it, amend or replace the MSDS for alpha olefin C20-24, C24-28, C26-28, C30+, or C30+ HA. The most current MSDS should be carefully examined prior to working with these products.

ECOTOXICITY/ENVIRONMENTAL FATE

ECOTOXICITY: These materials are not expected to be harmful to aquatic organisms. The 96-hour LC50 for rainbow trout (*Oncorhynchus mykiss*) is >1000 mg/l for alpha olefin C20-24. The 48-hour EC50 for daphnia (*Daphnia magna*) is 140 mg/l for alpha olefin C20-24. The 72-hour EC50 for green algae (*Selenastrum capricornutum*) is >1000 mg/l for alpha olefin C20-24.

ENVIRONMENTAL FATE: These materials are considered ultimately, but not readily, biodegradable. The result of a 28-day ready biodegradability test (% degraded) for alpha olefin C20-24 was 31% at 28 days.

FIRE INFORMATION

FLAMMABILITY PROPERTIES:

<u>Critical Properties:</u>	<u>C20-24</u>	<u>C24-28</u>
Flash Point (PM), °C (°F):	183 (362)	218 (424)
Autoignition Temperature, °C (°F):	239 (462)	249 (480)
NFPA Fire Hazard Rating:	1	1

<u>Critical Properties:</u>	<u>C26-28</u>	<u>C30 +</u>
Flash Point (PM), °C (°F):	214 (417)	252 (485)
Autoignition Temperature, °C (°F):	346 (654.8)	368 (694)
NFPA Fire Hazard Rating:	1	1

<u>Critical Properties:</u>	<u>C30 + HA</u>
Flash Point (PM), °C (°F):	222 (432)
Autoignition Temperature, °C (°F):	391 (735.8)
NFPA Fire Hazard Rating:	1

FIRE HAZARDS:

CPChem alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA can burn but are not considered flammability or combustibility hazards.

FIRE FIGHTING INSTRUCTIONS AND COMBUSTION PRODUCTS:

For fires involving either material, do not enter any enclosed or confined fire space without proper protective equipment. This may include self-contained breathing apparatus to protect against the hazardous effects of normal products of combustion or oxygen deficiency. Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

Extinguish with foam, dry chemical, or carbon dioxide. Use water in flooding quantities as fog; solid streams of water may be ineffective. Cool exposed containers with water.

Drainage and runoff should be controlled and collected in a remote location for recovery. Minimize spread to reduce clean up cost.

PERSONAL PROTECTIVE EQUIPMENT & OCCUPATIONAL EXPOSURE LIMITS

PERSONAL PROTECTIVE EQUIPMENT:

No special eye protection is usually necessary for the cooled solids. Thermal burns may result from contact with the hot material. However, eye contact can be prevented by wearing chemical goggles. No special skin protection is usually necessary for the cooled material. However, if operating conditions create high airborne concentrations of fumes from the heated material, the use of an approved respirator is recommended.

ANSI REFERENCES:

- ANSI Z38.1 Emergency Eye Wash and Showers Equipment
- ANSI Z41.1 Safety for Footwear
- ANSI Z87.1 Practice for Occupational and Educational Eye and Face Protection
- ANSI Z88.2 Practices for Respiratory Protection
- ANSI Z89.1 Protective Headwear for Industrial Workers

OCCUPATIONAL EXPOSURE LIMITS:

	<u>C20-24</u>	<u>C24-28</u>
OSHA Permissible Exposure Limit:		
8-Hour Time Weighted Average (TWA):	none established	none established
ACGIH Threshold Limit Value:		
8-Hour Time Weighted Average (TWA):	none established	none established

	<u>C26-28</u>	<u>C30 +</u>
OSHA Permissible Exposure Limit:		
8-Hour Time Weighted Average (TWA):	none established	none established
ACGIH Threshold Limit Value:		
8-Hour Time Weighted Average (TWA):	none established	none established

C30 + HA

OSHA Permissible Exposure Limit:	
8-Hour Time Weighted Average (TWA):	none established
ACGIH Threshold Limit Value:	
8-Hour Time Weighted Average (TWA):	none established

ACCIDENTAL RELEASE MEASURES

If a transportation incident involving either alpha olefin C20-24, C24-28, C26-28, C30+, or C30+ HA does occur, contact the Chemical Transportation Emergency Center (CHEMTREC) for immediate assistance. CHEMTREC is a public service organization established by the Chemical Manufacturers Association to provide assistance in chemical material incidents. **FOR A CHEMICAL EMERGENCY, CALL CHEMTREC AT (800) 424-9300 Toll Free in the United States, Canada, Puerto Rico, and the Virgin Islands. For emergency calls outside the United States call (703) 527-3887.**

CHEMTREC will provide the caller preliminary emergency assistance in the form of Material Safety Data Sheet (MSDS) information. In all cases once CHEMTREC determines the incident involves a Chevron Phillips Chemical material, CHEMTREC will immediately contact the on-call Chevron Phillips Chemical Company Crisis Management Team (CMT) member at 1-866-4HAZMAT (442-9628). The contacted Chevron Phillips Chemical CMT member will then be responsible for coordinating an

appropriate response to the transportation incident. In addition, if the CMT member determines that the incident involves exposure or potential health effects, the on-call Chevron Phillips Chemical toxicologist will also be contacted.

In the case of alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA, if liquid material is spilled, allow it to cool and solidify before proceeding with the disposal methods.

There is no Reportable Quantity (RQ) for alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA under CERCLA section 302.4.

DISPOSAL

All disposal procedures are to be carried out in strict conformance to state and local regulations.

Recovered liquid or solid product from a spill, or contaminated product may be reprocessed. However, if the product can not be reprocessed, it must be disposed of in a legally acceptable manner. Recovered material may be incinerated in a properly designed furnace or disposed of in a landfill. Please contact Chevron Phillips Chemical Company's Technical Service Group at (800) 852-5531 if additional assistance is required.

PART 5

TRANSPORTATION INFORMATION AND REGULATORY PROFILE

TRANSPORTATION INFORMATION

LABELING OF ALPHA OLEFINS C24-C28, C26-C28, C30+, AND C30+ HA SHIPPING CONTAINERS:

Containers should be labeled in accordance with applicable OSHA and DOT requirements.

CPChem alpha olefins C24-28, C26-28, C30+, and C30+ HA are regulated as a Class 9 hazardous material by DOT when offered for transportation at an elevated temperature (212 °F or higher) in bulk packaging (i.e., tank truck). Placards must be deployed on each side and each end of the truck container.

DOT marking, labeling, and placarding requirements are explained in detail in 49 CFR 172 Subparts D, E, and F respectively. Subparts E and F show illustrations of labels and placards. Figures 1 and 2 show the Class 9 placard and the HOT marking, respectively, applicable to alpha olefins C24-28, C26-28, C30+, and C30+ HA. Bulk truck containers may remain placarded when emptied. **Requirements for OSHA labels are presented in 29 CFR 1910.1200.** OSHA regulations define the alpha olefins C20-24, C24-28, C26-28, C30+, and C30+ HA as nonhazardous.

Note: The preceding information is subject to frequent change. Consult DOT and OSHA regulations for current requirements.



Figure 1: Example of Class 9 DOT placard

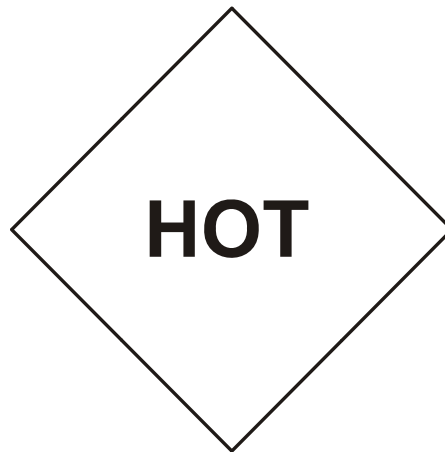


Figure 2: Example of DOT "HOT" marking

BILL OF LADING DESCRIPTION (DOT):

	<u>C20-C24</u>	<u>C24-C28</u>
Bulk Truck Bill of Lading Description	Petroleum Wax, NEC	Elevated Temperature Liquid, N.O.S., 9, UN3257, III
Bulk Rail Bill of Lading Description	Petroleum Wax, NEC, STCC = 2911990	Petroleum Wax, NEC, STCC = 2911990
Package Bill of Lading Description	Petroleum Wax, NEC	Petroleum Wax, NEC

	<u>C26-C28</u>	<u>C30 +</u>	<u>C30 + HA</u>
Bulk Truck Bill of Lading Description	Elevated Temperature Liquid, N.O.S., 9, UN3257, III	Elevated Temperature Liquid, N.O.S., 9, UN3257, III	Elevated Temperature Liquid, N.O.S., 9, UN3257, III
Bulk Rail Bill of Lading Description	Petroleum Wax, NEC, STCC = 2911990	Petroleum Wax, NEC, STCC = 2911990	Petroleum Wax, NEC, STCC = 2911990
Package Bill of Lading Description	Petroleum Wax, NEC	Petroleum Wax, NEC	Petroleum Wax, NEC

Note: The preceding descriptions are subject to frequent changes. Consult current DOT regulations and other appropriate sources to verify proper bill of lading descriptions.

CHEMICAL DESIGNATIONS:

	<u>C20-C24</u>	<u>C24-C28</u>
1. CG Compatibility Class:	Olefin	Olefin
2. Formula:	C ₁₈ H ₃₆ (1-octadecene) C ₂₀ H ₄₀ (1-eicosene) C ₂₂ H ₄₄ (1-docosene) C ₂₄ H ₄₈ (1-tetracosene) C ₂₆ H ₅₂ (1-hexacosene)	C ₂₄ H ₄₈ (1-tetracosene) C ₂₆ H ₅₂ (1-hexacosene) C ₂₈ H ₅₆ (1-octacosene) C ₃₀ H ₆₀ (1-triacontene) C ₂₆ H ₅₂ (2-ethyl-1-tetracosene)
3. Product CAS Registry No.:	93924-10-8 (Alpha Olefin Fraction, C20-C24 Cut)	93924-11-9 (Alpha Olefin Fraction, C24-28 Cut)

CHEMICAL DESIGNATIONS: (cont.)

	<u>C26-C28</u>	<u>C30 +</u>
1. CG Compatibility Class:	Olefin	Olefin
2. Formula:	C ₂₄ H ₄₈ (1-tetracosene) C ₂₆ H ₅₂ (1-hexacosene) C ₂₈ H ₅₆ (1-octacosene) C ₃₀ H ₆₀ (1-triacontene)	C ₂₆ H ₅₂ (1-hexacosene) C ₂₈ H ₅₆ (1-octacosene) C ₃₀ H ₆₀ (1-triacontene) C ₃₂ H ₆₄ (1-dotriacontene) C ₃₄ H ₆₈ (1-tetratriacontene)
3. Product CAS Registry No.:	18835-33-1 + 18835-34-2 (Alpha Olefin, C26-28)	131459-42-2 (Alkenes, C24-54, Branched and Linear, Alpha)

	<u>C30 + HA</u>
1. CG Compatibility Class:	Olefin
2. Formula:	C ₂₆ H ₅₂ (1-hexacosene) C ₂₈ H ₅₆ (1-octacosene) C ₃₀ H ₆₀ (1-triacontene) C ₃₂ H ₆₄ (1-dotriacontene) C ₃₄ H ₆₈ (1-tetratriacontene)
3. Product CAS Registry No.:	260255-62-7 (Alkenes, C30+)

INTERNATIONAL MARITIME ORGANIZATION (IMO):

	<u>C20-C24</u>	<u>C24-C28</u>	<u>C26-C28</u>	<u>C30+</u>	<u>C30+HA</u>
Pollution Category:	III	III	III	III	III

SHIPPING INFORMATION⁽¹⁾:

	<u>C20-C24</u>	<u>C24-C28</u>	<u>C26-C28</u>	<u>C30+</u>	<u>C30+HA</u>
Grades of Purity (n-Alpha Olefin, wt%):	>89 ⁽¹⁾	>45 ⁽¹⁾	>86 ⁽¹⁾	>50 ⁽¹⁾	>83 ⁽¹⁾
Storage Temperature Range:	126-180 °F	165-185 °F ⁽²⁾	143-185 °F ⁽²⁾	180-185 °F ⁽²⁾	167-185 °F ⁽²⁾
Inert Atmosphere:	No requirement	No Requirement	No Requirement	No Requirement	No Requirement

⁽¹⁾ The following data are for informational purposes only.

⁽²⁾ Many tank linings used by vessels have an upper temperature rating of 185 °F.

HAZARD CLASSIFICATIONS

NFPA Hazard Classification:

	<u>C20-C24</u>	<u>C24-C28</u>	<u>C26-C28</u>	<u>C30+</u>	<u>C30+HA</u>
<u>Category</u>	Classification	Classification	Classification	Classification	Classification
Health Hazard (Blue)	0	0	0	0	0
Flammability (Red)	1	1	1	1	1
Reactivity (Yellow)	0	0	0	0	0

Various restrictions apply to the preceding classifications. Please refer to the specific regulation for details concerning classification requirements. 46 CFR Part 30 should also be referenced for information about Coast Guard regulations governing the transport of these products.



REGULATORY PROFILE

ALPHA OLEFIN C20-24:

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?
Part:

707	Export Notification (12b)	NO
712	Chemical Information Reporting (8a)	NO
716	Health & Safety Data Reporting (8d)	NO
721	Significant New Use (5e)	NO
723.50	Low Volume Exemption	NO
720.36	R&D Exemption	NO
720.38	Test Marketing Exemption	NO
723.25	Polymer Exemption	NO
790	Health and/or Environmental Effects Testing (4e)	NO

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**
Have there been any Section 8(e) submissions for this material? **NO**

INTERNATIONAL REGISTRATION: Are all components of this material listed on the following international inventories?:

TSCA	(United States)	YES	(CAS No. 93924-10-8)
DSL	(Canada)	YES	(As 1-eicosene, 1-docosene & 1-tetracosene)
EINECS	(Europe)	YES	(EINECS No. 300-202-1)
METI	(Japan)	YES	(METI # (2)-27)
AICS	(Australia)	YES	(As 1-eicosene, 1-docosene & 1-tetracosene)
ECL	(Korea)	YES	(KMOE No. KE-00606)
Philippines		YES	
China		NO	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**
INDIRECT: **NO**

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects: **NO**
2. Delayed (Chronic) Health Effects: **NO**
3. Fire Hazard: **NO**
4. Sudden Release of Pressure Hazard: **NO**
5. Reactivity Hazard: **NO**

ADDITIONAL REGULATORY INFORMATION: See Chevron Phillips MSDS PE0025, section 15 for additional regulatory information.

ALPHA OLEFIN C24-28:

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:

707	(Export Notification) (12b)	NO
712	(Chemical Information Reporting) (8a)	NO
716	(Health & Safety Data Reporting) (8d)	NO
721	(Significant New Use) (5e)	NO
723.50	(Low Volume Exemption)	NO
720.36	(R&D Exemption)	NO
720.38	(Test Marketing Exemption)	NO
723.25	(Polymer Exemption)	NO
790	(Health and/or Environmental Effects Testing) (4e)	NO

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

INTERNATIONAL REGISTRATION: Are all components of this material listed on the following international inventories?:

TSCA	(United States)	YES	(CAS No. 93924-11-9)
DSL	(Canada)	NO	(This material is on the NDSL)
EINECS	(Europe)	YES	(EINECS No. 300-203-7)
METI	(Japan)	YES	
AICS	(Australia)	NO	
ECL	(Korea)	YES	(KMOE reg. no. KE-00607)
Philippines		YES	
China		YES	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**
INDIRECT: **NO**

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects: **NO**
2. Delayed (Chronic) Health Effects: **NO**
3. Fire Hazard: **NO**
4. Sudden Release of Pressure Hazard: **NO**
5. Reactivity Hazard: **NO**

ADDITIONAL REGULATORY INFORMATION: See Chevron Phillips MSDS PE0027, section 15 for additional regulatory information.

ALPHA OLEFIN C26-28:

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:

707	(Export Notification) (12b)	NO
712	(Chemical Information Reporting) (8a)	NO
716	(Health & Safety Data Reporting) (8d)	NO
721	(Significant New Use) (5e)	NO
723.50	(Low Volume Exemption)	NO
720.36	(R&D Exemption)	NO
720.38	(Test Marketing Exemption)	NO
723.25	(Polymer Exemption)	NO
790	(Health and/or Environmental Effects Testing) (4e)	NO

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

INTERNATIONAL REGISTRATION: Are all components of this material listed on the following international inventories?:

TSCA	(United States)	YES	(mixture of 1-hexacosene and 1-octacosene)
DSL	(Canada)	YES	(mixture of 1-hexacosene and 1-octacosene)
EINECS	(Europe)	YES	(mixture of 1-hexacosene and 1-octacosene)
METI	(Japan)	YES	(mixture of 1-hexacosene and 1-octacosene)
AICS	(Australia)	NO	
ECL	(Korea)	YES	(mixture of 1-hexacosene and 1-octacosene)
Philippines		YES	(mixture of 1-hexacosene and 1-octacosene)
China		NO	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**
INDIRECT: **NO**

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

SARA 311 CATEGORIES:

6. Immediate (Acute) Health Effects:	NO
7. Delayed (Chronic) Health Effects:	NO
8. Fire Hazard:	NO
9. Sudden Release of Pressure Hazard:	NO
10. Reactivity Hazard:	NO

ADDITIONAL REGULATORY INFORMATION: See Chevron Phillips MSDS 7965, section 15 for additional regulatory information.

ALPHA OLEFIN C30+:

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:

707	(Export Notification) (12b)	NO
712	(Chemical Information Reporting) (8a)	NO
716	(Health & Safety Data Reporting) (8d)	NO
721	(Significant New Use) (5e)	NO
723.50	(Low Volume Exemption)	NO
720.36	(R&D Exemption)	NO
720.38	(Test Marketing Exemption)	NO
723.25	(Polymer Exemption)	NO
790	(Health and/or Environmental Effects Testing) (4e)	NO

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

INTERNATIONAL REGISTRATION: Are all components of this material listed on the following international inventories?:

TSCA	(United States)	YES	(CAS No. 131459-42-2)
DSL	(Canada)	NO	(This material is on the NDSL)
EINECS	(Europe)	NO	("polymer" exemption)
METI	(Japan)	YES	(METI # (6)-996)
AICS	(Australia)	NO	
ECL	(Korea)	YES	(KMOE No. KE-00611)
Philippines		YES	
China		YES	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**

INDIRECT: **YES (in coatings as per Regulation 21 CFR 176.170(a)(5))**

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

SARA 311 CATEGORIES:

1. Immediate (Acute) Health Effects: **NO**
2. Delayed (Chronic) Health Effects: **NO**
3. Fire Hazard: **NO**
4. Sudden Release of Pressure Hazard: **NO**
5. Reactivity Hazard: **NO**

ADDITIONAL REGULATORY INFORMATION: See Chevron Phillips MSDS PE0028, section 15 for additional regulatory information.

ALPHA OLEFIN C30+ HA:

ODCs: Contains Class 1 or Class 2 Ozone Depleting Chemicals (ODCs)?: **NO**

TSCA: Is this product or its components subject to any of the following TSCA requirements of 40 CFR?

Part:

707	(Export Notification) (12b)	NO
712	(Chemical Information Reporting) (8a)	NO
716	(Health & Safety Data Reporting) (8d)	NO
721	(Significant New Use) (5e)	NO
723.50	(Low Volume Exemption)	NO
720.36	(R&D Exemption)	NO
720.38	(Test Marketing Exemption)	NO
723.25	(Polymer Exemption)	NO
790	(Health and/or Environmental Effects Testing) (4e)	NO

Is this material distribution under limitations of a 5(e) or 5(f) Consent Order? **NO**

Have there been any Section 8(e) submissions for this material? **NO**

INTERNATIONAL REGISTRATION: Are all components of this material listed on the following international inventories?:

TSCA	(United States)	YES	(CAS No. 260255-62-7)
DSL	(Canada)	YES	
EINECS	(Europe)	NO	("polymer" exemption)
METI	(Japan)	YES	(METI # (6)-996)
AICS	(Australia)	NO	
ECL	(Korea)	NO	
Philippines		NO	
China		NO	

FDA: Do FDA regulations permit use of this material as a direct or indirect food additive?

DIRECT: **NO**

INDIRECT: **YES (in coatings as per Regulation 21 CFR 176.170(a)(5))**

HAZARDOUS METALS: Does the sum of the concentration levels of lead, cadmium, mercury, and hexavalent chromium present in this material exceed 100 ppm by weight? **NO**

SARA 311 CATEGORIES:

6. Immediate (Acute) Health Effects:	NO
7. Delayed (Chronic) Health Effects:	NO
8. Fire Hazard:	NO
9. Sudden Release of Pressure Hazard:	NO
10. Reactivity Hazard:	NO

ADDITIONAL REGULATORY INFORMATION: See Chevron Phillips MSDS CPC00027, section 15 for additional regulatory information.

PART 6

APPENDIX

A-Z TERMS, ABBREVIATIONS AND ORGANIZATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AIAG	Automotive Industry Action Group
AIHA	American Industrial Hygienists Association
AALA	American Association for Laboratory Accreditation
ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	American Society of Mechanical Engineers
ASQC	American Society for Quality Control
ASTM	American Society for Testing and Materials
BABT	British Approvals Board of Communication
BACT	Best Available Control Technology
Bonding	The connection of two or more conductive objects by means of a conductor (most commonly a wire or metal plate).
BSI	British Standards Institute
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CAD	Computer-Aided Design
CANUTEC	Canadian Transport Emergency Centre
Carbonyls	Compounds containing the C=O functional group. They can occur as impurities in many organic compounds forming from peroxide contaminants.
CE mark	Conformity European Union Mark (The CE-mark is the official marking required by the European Community.)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations

CG	Coast Guard
CHEMTREC	Chemical Transportation Emergency Center
CMA	Chemical Manufacturers Association
Confined Space	An area that by design has limited openings for entry and exit. A confined space has unfavorable natural ventilation and is not intended for continuous worker occupancy.
CPC	Chemical Protective Clothing
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESD	Electro static discharge
EU	European Union
FDA	Food & Drug Administration
Flashpoint	The minimum temperature at which a liquid gives off vapor in sufficient concentrations to form an ignitable mixture with air near the surface of a liquid.
FMEA	Failure Mode Effect Analysis
GLP	Good Laboratory Practices
Grounding	The connection of one or more conductive objects to the ground: a specific form of bonding. Grounding is also referred to as earthing.
HAP	Hazardous Air Pollutant
HazWOpER	Hazardous Waste Operations and Emergency Response
HON	Hazardous Organic NESHAP
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
IDLH	Immediately Dangerous to Life and Health: the airborne concentration of a toxic material from which one could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects.
IEEE	Institute of Electrical and Electronics Engineers
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IQA	Institute of Quality Assurance
ISGOT	International Safety Guide for Oil Tanker and Terminals
ISO	International Organization of Standardization

LFL	Lower Flammability Limit
MACT	Maximum Achievable Control Technology
MIL	Military
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NACCB	National Accreditation Council for Certification Board
NDE	Nondestructive Evaluation
NDT	Nondestructive Testing
NEC	National Electrical Code
NESHAP	National Emission Standard for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
OEM	Original Equipment Manufacture
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit; An occupational exposure limit established under OSHA's regulatory authority. It may be a time-weighted average (TWA) concentration or a maximum concentration never to be exceeded either instantaneously (CEILING) or during any 15-minute period (STEL).
Peroxides	Compounds containing the -O-O- linkage. They occur as impurities in many organic compounds, where they have been slowly formed by the action of oxygen.
PM	Preventative Maintenance
PPE	Personal Protective Equipment
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
QMI	Quality Management Institute
RAB	Registrar Accreditation Board
RCRA	Resource Conservation and Recovery Act
RQ	Reportable Quantity

SARA	Superfund Amendment and Reauthorization Act
SCC	Standards Council of Canada
SPC	Statistical Process Control
SQC	Statistical Quality Control
STEL	Short Term Exposure Limit
TLV	Threshold Limit Value; the TLV is a copyrighted exposure standard developed by the ACGIH, that refers to the airborne concentration of a substance under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. TLVs are expressed in four ways: (1) TLV-C; (2) TLV-STEL; (3) TLV-Skin; (4) TLV-TWA.
TLV-C	Threshold Limit Value - Ceiling Exposure Limit; the concentration that should not be exceeded during any part of the working exposure.
TLV-Skin	The "skin" notation after the TLV indicates that there is a potential for the cutaneous route (mucous membranes, eyes, skin) to significantly contribute to the overall exposure. Vehicles present in solutions or mixtures can also significantly enhance potential skin absorption. The skin designation is an alert that air sampling alone is insufficient to accurately quantitate exposure and that measures to prevent significant cutaneous absorption may be required.
TLV-STEL	Threshold Limit Value - Short Term Exposure Limit; the concentration to which it is believed that workers can be exposed continuously for a short period of time without suffering from 1) irritation, 2) chronic or irreversible tissue damage, or 3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue or materially reduce work efficiency, and provided that the daily TLV-TWA is not exceeded. A STEL is a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposures above the TLV-TWA up to the STEL should not be longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range.
TLV-TWA	Threshold Limit Value - Time Weighted Average; the time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.
TOC	Total Organic Carbon
TPQ	Threshold planning quantity - under the Superfund Amendments Reauthorization Act (SARA Title III) Section 302, 304, 4311/312, a chemical specific quantity, in pounds, that triggers certain reporting requirements.
TQC	Total Quality Control
TQM	Total Quality Management
TWA	Time-Weighted Average
UL	Underwriters Laboratory

Ullage	Amount by which a packaging falls short of being liquid full
UN	United Nations
USCG	United States Coast Guard
cC	
Vapor Pressure	The pressure exerted by a volatile liquid while under defined equilibrium conditions. Vapor pressure is usually measured in millimeters of mercury (mm Hg).
VOC	Volatile Organic Compound