



## FOAM CONCENTRATE CATALOGUE

## CATÁLOGO ESPUMÓGENO

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**SABO** española  
[www.sabo-esp.com](http://www.sabo-esp.com)

### **Proteínico / Protein**

FOAMIN P3

FOAMIN P6

### **Fluoroproteínico / Fluoroprotein**

APIROL FX3 C

APIROL FX6 C

UNIVEX 3-3M

### **Sintético / Synthetic**

PLUREX M

PLUREX TF3

### **AFFF / AFFF-AR**

HYDRAL 3C

HYDRAL 3S

HYDRAL 6C

HYDRAL 6S

HYDRAL 1S

HYDRAL 3 CEX

HYDRAL 3 FP

HYDRAL 6 CEX

HYDRAL AR 3-3S+

HYDRAL AR 1-1 FP

HYDRAL 6 ICAO C

HYDRAL 3 ICAO C

HYDRAL 3M

HYDRAL 1C

HYDRAL 1M

HYDRAL AR 3-6 S

HYDRAL AR 3-3 XS

HYDRAL AR 3-3 C

HYDRAL AR 1-3 S



### Protein foam concentrate at 3% for hydrocarbons fires

#### Description

**FOAMIN P3** Protein Foam Concentrate is formulated from hydrolysed protein, foam stabilizers (metal salts), bactericide, corrosion inhibitors, freezing point depressants and solvents. It is transported and stored as a concentrate to provide ease of use and considerable savings in weight and space.

It is intended for use as a 3% proportioned solution either in fresh, salt or hard water. The correct proportioning ratio is 3 parts of concentrate to 97 parts of water.

Two fire extinguishing mechanisms are in effect when using **FOAMIN P3**. First, a foam blanket is formed which works to prevent the release of fuel vapour. Second, the water content of the foam provides a cooling effect.

#### Performance

**FOAMIN P3** is measured against specifications and standards such as Underwriters Laboratories Standard UL 162, latest edition.

When used with fresh or salt water or water of any hardness at the correct dilution and with most conventional foam making equipment, the expansion ratio will vary depending on the performance characteristics of the equipment. Air aspirating discharge devices produce expansion ratios from 8 to 1 to 12 to 1 depending primarily on type and flow rate. In general, the higher the flow rate the higher the expansion ratio. Thus, monitors and foam chambers normally produce higher expansion ratios than foam water sprinkler heads and hand held type nozzles.

Typical expansion ratios for foam chambers are in the range of 5 to 1 to 7 to 1, and for foam water sprinkler heads in the range of 3 to 1 to 6 to 1.

#### Application

**FOAMIN P3** Protein Foam Concentrate is intended for use on Class B hydrocarbon fuels having low water solubility such as various crude oils, gasoline, diesel fuels, aviation fuels, etc. It is not suitable for use on fuels having appreciable water solubility (polar solvents), i.e., methyl and ethyl alcohol, acetone and methyl ethyl ketone. This concentrate can be used only with air aspirating type discharge devices.

It can also be used with foam compatible dry chemical extinguishing agents without regard to the order of application, to provide even greater fire protection capability.

**FOAMIN P3** can be used by most conventional foam equipment such as:

- Balance pressure pump proportioning equipment
- Bladder tank and related proportioners
- Around-the-pump proportioners
- Fixed and portable In-line venturi type inductor
- Fixed or handline nozzles or monitors with fixed induction/pick up tubes

#### Approvals

El **FOAMIN P3** is approved or listed according to:

- UL-162
- IMO Msc Circ. 582



#### Storage and shelf life

**FOAMIN P3** Protein foam has an operational temperature range of -10°C and +60°C. Limited exposure to temperatures above +60°C does not affect the firefighting performance.

When stored in the packaging supplied (polyethylene drums or pails) within the temperature limits specified, or in equipment recommended by the manufacturer as part of the foam system, the shelf life of **FOAMIN P3** Protein Foam Concentrate is generally in excess of 10 years.

If the product is frozen during storage or transportation, thawing will render the product completely usable.

The factors affecting shelf life and stability for SABOFOAM agents are discussed in detail in our Technical Bulletin 11B for storage recommendation.

## Safety and handling

See our corresponding "Material Safety data sheet" .

## Compatibility

There are no specifications or standards which address the subject of compatibility of different manufacturer' s brands of protein foam concentrates. In an emergency or if the manufacturer has supporting test data to substantiate that the mixture meets the same requirements as the individual component concentrates, they may be mixed together in the same storage vessel.

Different types of foam concentrates, i.e., AFFF and Protein base should not be mixed under any circumstances.

## Quality insurance

FOAMIN P3 - as with all SABO Products - is subject to very stringent quality controls throughout all stages of production, from incoming raw to the complete product and is anufactured in an ISO 9001:2008 controlled facility. Quality assurance is therefore guaranteed.

## Propiedades típicas

FOAMIN P3	P 3%
Fire Classes	A y B
Shape and color	Brown, clear liquid
Smell	Characteristic, Protein
Density (20°C)	1,16 ± 0,02 [g/ml]
pH (concentrate, 20°C)	6.0 – 8.0
Viscosity 20°C	8.0 ± 4,0 [mm <sup>2</sup> /s]
Sediment (EN 1568)	≤ 0,25 [%]
Admixing ratio	3 [% Vol.]
Expansion ratio (EN 1568-3)	≥ 7,0
Drain time 25% (20°C, EN 1568-3)	≥ 5:00
Drain time 50% (20°C, EN 1568-3)	≥ 9:00
Expansion	Low, (Medium)
Freezing point	≤ -15 [°C]
Pour point	≤ -12 [°C]
Reccomended storage / usage temperature	-10 a +60 [°C]

## Ordering information

FOAMIN P3 can be supplied in cans, drums, totes or Bulk (contact us for Bulk delivery details).

F603321C1 25 Litre can  
 F603321D1 200 Litre drum  
 F603321T1 1000 Litre tote  
 F603321B1 Bulk (Litre)

[www.sabo-esp.com](http://www.sabo-esp.com)

**Regular protein foam concentrate  
at 6% for hydrocarbons fires**

**Description**

FOAMIN P6 Protein Foam Concentrate is formulated from hydrolysed protein, foam stabilizers (metal salts), bactericide, corrosion inhibitors, freezing point depressants and solvents. It is transported and stored as a concentrate to provide ease of use and considerable savings in weight and space.

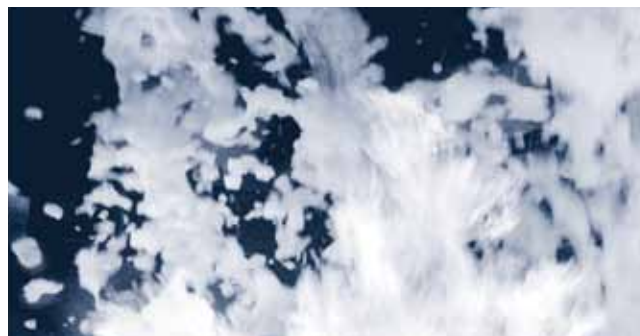
It is intended for use as a 6% proportioned solution either in fresh, salt or hard water. The correct proportioning ratio is 6 parts of concentrate to 94 parts of water.

Two fire extinguishing mechanisms are in effect when using FOAMIN P6. First, a foam blanket is formed which works to prevent the release of fuel vapour. Second, the water content of the foam provides a cooling effect.

**Performance**

When used with fresh or salt water or water of any hardness at the correct dilution and with most conventional foam making equipment, the expansion ratio will vary depending on the performance characteristics of the equipment. Air aspirating discharge devices produce expansion ratios from 8 to 1 to 12 to 1 depending primarily on type and flow rate. In general, the higher the flow rate the higher the expansion ratio. Therefore, monitors and foam chambers normally produce higher expansion ratios than foam water sprinkler heads and hand held type nozzles.

Typical expansion ratios for foam chambers are in the range of 5 to 1 to 7 to 1, and for foam water sprinkler heads in the range of 3 to 1 to 6 to 1.



**Application**

FOAMIN P6 Protein Foam Concentrate is intended for use on Class B hydrocarbon fuels having low water solubility such as various crude oils, gasoline, diesel fuels, etc. It is not suitable for use on fuels having appreciable water solubility (polar solvents), i.e., methyl and ethyl alcohol, acetone and methyl ethyl ketone. This concentrate can be used only with air aspirating type discharge devices.

It can also be used with foam compatible dry chemical extinguishing agents without regard to the order of application, to provide even greater fire protection capability.

FOAMIN P6 can be used by most conventional foam equipment such as:

- Balance pressure pump proportioning equipment
- Bladder tank and related proportioners
- Around-the-pump proportioners
- Fixed and portable In-line venturi type inductor
- Fixed or handline nozzles or monitors with fixed induction/pick up tubes

**Approvals**

FOAMIN P6 is approved or listed according to:

- IMO MSC Circ. 582
- UNI 9493 by Ministry of Interior Italy



## Storage and Shelf Life

FOAMIN P6 Protein foam has an operational temperature range of -10°C and +60°C. Limited exposure to temperatures above +60°C does not affect the firefighting performance.

When stored in the packaging supplied (polyethylene drums or pails) within the temperature limits specified, or in equipment recommended by the manufacturer as part of the foam system, the shelf life of FOAMIN P6 Protein foam concentrate is generally in excess of 10 years.

If the product is frozen during storage or transportation, thawing will render the product completely usable.

The factors affecting shelf life and stability for SABOFOAM agents are discussed in detail in our Technical Bulletin 11B for storage recommendation.

For more specific information, please email at: Comercial@SABO-esp.com

## Safety and Handling

See our corresponding "Material Safety data sheet".

## Compatibility

There are no specifications or standards which address the subject of compatibility of different manufacturer's brands of protein foam concentrates. In an emergency or if the manufacturer has supporting test data to substantiate that the mixture meets the same requirements as the individual component concentrates, they may be mixed together in the same storage vessel.

Different types of foam concentrates, i.e., AFFF and protein base should not be mixed under any circumstances.

## Quality Assurance

FOAMIN P6 – as with all SABO Products – is subject to very stringent quality controls throughout all stages of production, from incoming raw to the complete product and is manufactured in an ISO 9001:2008 controlled facility. Quality assurance is therefore guaranteed.

## Typical Properties

■ FOAMIN P6	P 6%
■ Fire Classes	A and B
■ Shape and colour	Brown, clear liquid
■ Smell	Characteristic, Protein
■ Density (20°C)	1.16 ±0.02 [g/ml]
■ pH (concentrate, 20°C)	6.0 - 8.0
■ Viscosity 20°C	6.0 ±4.0 [mm²/s]
■ Sediment (EN 1568)	≤ 0.25 [%]
■ Admixing ratio	6 [% Vol.]
■ Expansion Ratio (EN 1568-3)	≥ 7.0
■ Drain Time 25%, (20°C, EN 1568-3)	≥ 5:00
■ Drain Time 50%, (20°C, EN 1568-3)	≥ 9:00
■ Expansion	Low, (Medium)
■ Freezing Point	≤ -15 [°C]
■ Pour Point	≤ -12 [°C]
■ Recommended storage/ Usage temperature	-10 to +60 [°C]

## Ordering Information

FOAMIN P6 can be supplied in cans, drums, totes or Bulk (contact us for Bulk delivery details).

<u>Part No.</u>	<u>Description</u>
■ F606322C1	25 Litre can
■ F606322D1	200 Litre drum
■ F606322T1	1000 Litre tote
■ F606322B1	

### Description

APIROL FX3 C 3% Fluoroprotein Foam Concentrate combines hydrolyzed protein with fluorochemical surfactants, foam stabilizers (metal salts), bactericide, corrosion inhibitors, freeze point depressants and solvents to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This protein-based foam concentrate is intended for forceful or gentle firefighting applications at 3% solution in fresh, salt, or hard water.

APIROL FX3 C foam solution utilizes two suppression mechanisms:

- The foam blanket blocks oxygen supply to the fuel and suppresses fuel vapor. Protein based foam agents produce a foam blanket with very good heat stability and burn-back resistance.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Clear brown liquid
Density	1.12 ± 0.02 g/ml
pH	6.0 - 8.0
Refractive Index	1.3950 minimum
Viscosity*	6.0 ± 4.0 cSt
Sediment**	≤ 0.1%
Pour Point	≤ -12 °C
Freeze Point	≤ -15 °C

\*Cannon-Fenske viscometer

\*\*EN1568:2008 protocol

The environmentally-mindful APIROL FX3 C 3% Fluoroprotein Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings, and Standards

APIROL FX3 C 3% Fluoroprotein Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates
- EN 1568:2008
  - Parts 1, 3
- IMO MSC.1/Circ.1312
- MED Modules B and D



### Application

APIROL FX3 C 3% Fluoroprotein Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance. This concentrate can be used only with air aspirating type discharge devices.

APIROL FX3 C 3% Fluoroprotein Concentrate can be ideal for fixed, semi-fixed, and emergency response firefighting applications such as:

- Hydrocarbon fuel storage tanks
- Hydrocarbon fuel industrial/processing facilities
- Flammable liquid containment areas
- Docks and on-board marine systems
- Low temperature operations



## Foaming Properties

APIROL FX3 C 3% Fluoroprotein Concentrate may be effectively applied using most conventional air aspirating foam discharge equipment at a 3% dilution with fresh, salt, or hard water.

The expansion ratio will vary depending on the performance characteristics of the equipment. Air aspirating discharge devices produce expansion ratios from 6:1 to 12:1, depending on the type of device and flow rate. Typical expansion ratios for foam chambers are in range of 5:1 to 7:1.

### TYPICAL FOAM CHARACTERISTICS (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥7.0
25% Drain Time (min:sec)	≥5:00
50% Drain Time (min:sec)	≥9:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for APIROL FX3 C 3% Fluoroprotein Concentrate is -10 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with a fixed eductor/pick-up tubes

## Storage and Handling

APIROL FX3 C 3% Fluoroprotein Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Española Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of APIROL FX3 C Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing APIROL FX3 C Concentrate with other fluoroprotein foam concentrates for long-term storage is not recommended. Different types of foam concentrates (i.e. AFFFs and fluoroproteins) should not be mixed together under any circumstances. Use in conjunction with comparable 3% fluoroprotein firefighting foam products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted APIROL FX3 C 3% Fluoroprotein Concentrate. Certain materials such as black iron piping are also not recommended for use due to the corrosiveness and solids content of protein-based agents. Please refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

APIROL FX3 C 3% Fluoroprotein Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

APIROL FX3 C 3% Fluoroprotein Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

APIROL FX3 C 3% Concentrate is available in pails, drums, totes, or bulk shipment.

<u>Part No.</u>	<u>Description</u>	<u>Shipping Weight</u>	<u>Container Volume</u>
F503378C1	25 L Pail	27.45 kg	0.0329 m <sup>3</sup>
F503378D1	200 L Drum	218.5 kg	0.2477 m <sup>3</sup>
F503378T1	1000 L Tote	1100 kg	1.398 m <sup>3</sup>



## Concentrado de espuma UNIVEX 3-3 M FPAR

### Descripción

El concentrado de espuma UNIVEX 3-3 M FPAR (fluoroproteínico resistente al alcohol) combina tecnologías de proteínas hidrolizadas y de tensioactivos fluoroquímicos que contienen eficazmente el fuego y el vapor en incendios de combustibles tipo hidrocarburos y disolventes polares de clase B. Este concentrado de espuma de base proteínica produce una capa de espuma con buena estabilidad al calor y resistencia a la combustión interna en solución de agua dulce, salada o dura. Está indicado en aplicaciones de control de incendios contundentes o moderadas en solución al 3 % para combustibles tipo hidrocarburos y en aplicaciones de control de incendios moderadas en solución al 3 % para combustibles disolventes polares.

La solución de espuma UNIVEX 3-3 M utiliza tres mecanismos de supresión:

- La capa de espuma bloquea el suministro de oxígeno al combustible.
- El líquido se escurre de la capa de espuma y forma una membrana polimérica en un fuego de disolvente polar que abate el vapor y sella la superficie del combustible.
- El contenido acuoso de la solución de espuma produce un efecto refrigerante que favorece el abatimiento del fuego.

### PROPIEDADES FISICOQUÍMICAS TÍPICAS A 20 °C

Aspecto	Líquido marrón transparente
Densidad	1,14 ± 0,02 g/ml
pH	6,0 – 8,0
Índice de refracción	mínimo 1,3950
Viscosidad*	10,0 ± 2,0 cSt
Sedimento**	≤ 0,25 %
Punto de fluidez	≤ -15 °C
Punto de congelación	≤ -18 °C
Intervalo de funcionamiento y almacenamiento**	-13 °C a 60 °C

\*Cannon-Fenske Viscometer

\*\*Protocolo EN 1568:2008

La formulación del concentrado UNIVEX 3-3 M FPAR, respetuosa con el medio ambiente, contiene productos químicos fluorados C-6 de cadena corta fabricados mediante un proceso de base telomérica. El proceso telomérico no produce ácido perfluorooctano-sulfónico (PFOS) y estos materiales C-6 no se descomponen para producir ácido perfluorooctanoico (PFOA). Los productos químicos fluorados que se utilizan en el concentrado cumplen con los objetivos del Programa de supervisión del PFOA 2010/15 de la Agencia de Protección Medioambiental de los EE. UU. y la directiva (EU) 2017/1000 de la Agencia Europea de Sustancias y Mezclas Químicas (ECHA).



### Aprobaciones, homologaciones y normativas

El concentrado UNIVEX 3-3 M FPAR está aprobado, homologado y cualificado según (o cumple los requisitos de) las siguientes especificaciones y normativas:

- EN 1568:2008
  - Partes 1,3,4
- IMO MSC.1/ Circ. 1312
- MED Módulos B y D
- ICAO
  - Nivel B



### Aplicación

El concentrado UNIVEX 3-3 M FPAR solo debe aplicarse con dispositivos de descarga del tipo aspirante de aire y está indicado para ambos tipos de fuego de Clase B: combustibles tipo hidrocarburos de baja solubilidad en agua (como crudos, gasolinas, combustibles diésel y combustibles de aviación) y combustibles disolventes polares de considerable solubilidad en agua (como alcohol metílico y etílico, acetona y metiletilcetona). Este concentrado también puede utilizarse con agentes químicos secos para incrementar aún más el abatimiento del fuego.

El concentrado UNIVEX 3-3 M puede ser ideal para aplicaciones en control de incendios fijas, semifijas y de respuesta a emergencias, como:

- Muelles, sistemas para plataforma de helipuerto y a bordo de embarcaciones
- Instalaciones industriales de procesamiento de productos químicos y petróleo
- Tanques de almacenamiento de combustibles o de productos químicos
- Instalaciones de carga y descarga de camiones/trenes
- Zonas de confinamiento de líquidos inflamables
- Equipos móviles

**Nota:** La versión oficial de este documento es la versión inglesa. Si este documento es traducido a otro idioma distinto del inglés y hubiera discrepancias entre la versión inglesa y la versión traducida, prevalecerá la versión inglesa sobre la versión traducida.

## Propiedades espumantes

El concentrado UNIVEX 3-3 M FPAR puede aplicarse eficazmente utilizando la mayoría de los equipos de descarga de espuma convencionales con aspiración de aire en una disolución al 3 % con agua dulce, salada o dura. Para optimizar el rendimiento, la dureza del agua no debe superar 500 ppm expresadas como calcio y magnesio.

El coeficiente de expansión variará en función de las características de rendimiento del equipo. Los dispositivos de descarga con aspiración de aire producen coeficientes de expansión de 6:1 a 12:1, según el tipo de dispositivo y el caudal. Los coeficientes de expansión habituales para cámaras de espuma oscilan entre 5:1 y 7:1.

### CARACTERÍSTICAS ESPUMANTES NORMALES\* (agua dulce y salada)

Tasa de dosificación	3 %
Coeficiente de expansión	≥ 7,0
25 % del tiempo de drenaje (min:seg)	≥ 5:00
50 % del tiempo de drenaje (min:seg)	≥ 9:00

\*Según el protocolo EN 1568-3, 2008

## Dosificación

El intervalo de temperaturas de funcionamiento recomendado para el concentrado UNIVEX 3-3 M FPAR es de -13 °C a 60 °C según EN 1568. Este concentrado de espuma puede necesitar equipos de dosificación especiales. Puede dosificarse correctamente con equipos de dosificación en línea convencionales bien calibrados, tales como:

- Dosificadores por bomba de presión equilibrados y equilibrados en línea
- Controladores de flujo de presión y tanques de membrana equilibrados a presión
- Dosificadores para mezcla con toda el agua de la bomba
- Dosificadores en línea fijos o portátiles tipo venturi
- Boquillas a baja presión con tubos eductores/de recogida fijos

## Compatibilidad con los materiales de construcción

Para ayudar a evitar la corrosión, los conectores y las tuberías galvanizadas nunca deben utilizarse en contacto con el concentrado UNIVEX 3-3 M FPAR sin diluir. Tampoco se recomienda utilizar determinados materiales, como las tuberías de hierro negro, debido al carácter corrosivo y al contenido sólido de los agentes proteicos. Para obtener recomendaciones y guías técnicas en relación a la compatibilidad de los concentrados espumígenos con materiales comunes de construcción en la industria de espumas extintoras, consulte el boletín técnico "Materiales de construcción aceptables" de SABO Española.

## Almacenamiento y manipulación

El concentrado UNIVEX 3-3 M FPAR debe almacenarse en el envase original suministrado (contenedores de HDPE, bidones o garrafas) o en el equipo de sistema de espuma recomendado, tal como se indica en el boletín técnico "Almacenamiento de los concentrados de espuma" de SABO Española. El producto debe conservarse dentro del intervalo de temperaturas recomendado. Si el concentrado se congela durante el transporte o almacenamiento, puede restablecerse totalmente su capacidad de servicio tras la descongelación mezclándolo de nuevo suavemente.

Los factores que afectan la efectividad a largo plazo del concentrado incluyen los ciclos y exposición a temperatura, almacenamiento, características del recipiente, exposición al aire, evaporación, disolución y contaminación. La vida útil del concentrado UNIVEX 3-3 M puede maximizarse mediante condiciones de almacenamiento óptimas y una manipulación adecuada. Los concentrados SABO FOAM han demostrado su eficacia en la extinción de incendios con productos almacenados en el envase original y en condiciones adecuadas durante más de 10 años.

No se recomienda un almacenamiento a largo plazo de las mezclas de concentrados UNIVEX 3-3 M con otros concentrados espumígenos fluoroproteínicos. En ningún caso deberán mezclarse tipos diferentes de concentrados de espuma (es decir, espuma formadora de película acuosa [AFFP] y de fluoroproteínas). Es adecuado el uso junto con productos espumígenos fluoroproteínicos 3X3 similares de control de incendios para una respuesta inmediata ante una emergencia.

## Inspección

El concentrado UNIVEX 3-3 M FPAR debe inspeccionarse periódicamente según la NFPA 11, EN 13565-2, u otra normativa aplicable. Debe enviarse una muestra representativa del concentrado a los Servicios de análisis de espumas de SABO Española o a otro laboratorio cualificado para analizar la calidad según la normativa aplicable. Normalmente es suficiente con una inspección y análisis de muestras anuales, a no ser que el producto haya sido expuesto a condiciones inusuales.

## Aseguramiento de la calidad

El concentrado UNIVEX 3-3 M FPAR está sujeto a estrictos controles de calidad durante su producción, desde la inspección a la llegada de las materias primas hasta la comprobación del producto terminado, y se fabrica en una instalación certificada ISO 9001:2008.

## Información para pedidos

El concentrado UNIVEX 3-3 M FPAR se comercializa en garrafas, bidones, contenedores o a granel.

Referencia	Descripción	Peso al embarque
F513385C1	Garrafa de 25 l	27,45 kg
F513385D1	Bidón de 200 l	218,5 kg
F513385T1	Contenedor de 1000 l	1110 kg



### Multi-purpose high expansion foam concentrate at 3% on hydrocarbons

#### Description

**PLUREX M** High Expansion Foam Concentrate is a synthetic based formulation comprised of hydrocarbon surfactants, solvents, and stabilizers for use with low, medium and high expansion foam generators.

**PLUREX M** High Expansion Foam Concentrate can be used to produce foam with expansion ratios ranging from 50:1 to 1000:1 depending upon the type of generator and its operating pressure. When used with high expansion generators, recommended proportioning is at 3% (3 Litres **PLUREX M** concentrate with 97 litre water).

#### Performance

**PLUREX M** is measured against the latest specifications of the European Standard EN1568:2008 edition and marine IMO standard Msc 670. Testing on both standards has allowed rigorous testing with both fresh and salt water to meet the required performances.

The performance of **PLUREX M** foam concentrate when used at High-Expansion will vary depending upon the performance characteristics of the equipment. Expansion ratios through high expansion generators typically are between 200:1 and 1000:1. For this reason, it is important for the proper design of a high expansion system that the **PLUREX M** foam Concentrate be specifically tested with the foam generators. Medium expansion foam generators typically deliver expansion ratios between 50:1 and 200:1.

**PLUREX M** can be used by most conventional foam equipment such as:

- Balance pressure pump proportioning equipment
- Bladder tank and related proportioners
- Around-the-pump proportioners
- Fixed and portable In-line venturi type inductors
- Fixed or handline nozzles with fixed induction/pick up tubes

#### Application

**PLUREX M** High Expansion Foam Concentrate is a tremendously flexible firefighting agent, used in fighting Class A, Class B, and LNG fires both indoors and outdoors. It is used only with air aspirating foam discharge devices except when used as a wetting agent on Class A fuels.

**PLUREX M** High Expansion Foam Concentrate, when used with high expansion generators, is capable of totally flooding large rooms and enclosures allowing it to effectively extinguish horizontal and vertical (three-dimensional) fires. High expansion foam is also effective in reducing vapour concentrations downwind from un-ignited LNG and other hazardous low boiling point gaseous products such as ammonia spills.

When used with medium expansion foam equipment, **PLUREX M** forms a foam blanket which prevents the release of fuel vapor and also provides additional cooling due to the higher water content. Medium expansion foam has benefits in outdoor applications because the foam is less affected by wind conditions.

**PLUREX M** is ideal for fixed high expansion systems such as warehouse total flooding protection pump rooms, LNG pits, Fire Brigades daily applications, and aircraft hangars.

The foam produced by **PLUREX M** extinguishes hydrocarbon fires best when applied gently by gentle application.

#### Approvals

**PLUREX M** is approved or listed according to:

- EN 1568:2008 Part. 2
- IMO MSC Circ. 670
- GOST-R (Russian)



## Storage and shelf life

**PLUREX M** has an operational temperature range of -8°C and +60°C. Limited exposure to temperatures above +60°C does not affect the firefighting performance.

When stored in the packaging supplied (polyethylene drums or cans) or in equipment recommended by the manufacturer as part of the foam system and within the temperature limits specified, the shelf life of **PLUREX M** concentrate is about 20-25 years.

The factors affecting shelf life and stability for **PLUREX** agents are discussed in detail in our Technical Bulletin 11B for storage recommendation.

If the product is frozen during storage or transportation, the concentrate should be thawed and used without any degeneration of the performance.

## Eco-Toxicology and Disposal

**PLUREX M** is environmentally safe and rapidly biodegradable.

**PLUREX M** does not contain any fluorosurfactant and is therefore considered as a fluorine free foam.

## Safety and handling

See our corresponding "Material Safety data sheet".

## Inspection

As with any fire extinguishing agent, **PLUREX M** should be inspected periodically. NFPA 11 or EN 13565-2 requires that foam concentrate samples be submitted to the manufacturer or other qualified laboratory for quality condition testing at least annually. Contact us for further information on annual inspection.

For more specific information, please email at : [comercial@sabo-esp.com](mailto:comercial@sabo-esp.com)

## Quality insurance

**PLUREX M** - as with all SABO ESPAÑOLA Products - is subject to very stringent quality controls throughout all stages of production, from incoming raw to the complete product and is manufactured in an ISO 9001:2008 controlled facility. Quality assurance is therefore guaranteed.

## Typical properties

PLUIREX M	Multi-purpose Hi-ex foam 3%		
Fire Classes	A and B		
Shape and color	Clear liquid, brown		
Smell	Characteristic, surfactant-alike		
Density (20°C)	1,06 ± 0,02 [g/ml]		
pH (concentrate, 20°C)	7.0 ± 1,0		
Viscosity 20°C	7.0 ± 2,0 [mm <sup>2</sup> /s]		
Sediment (EN 1568)	m0,1 [%]		
Admixing ratio	3 [% Vol.]		
Expansion	Medium Exp	High Exp	Low Exp
As per standard	EN 1568:1	EN 1568:2 IMO 670	EN 1568:3 IMO 1312
Expansion Ratio (EN 1568-3)	- 120:1	- 800:1	- 9:1
Drain Time 25%, (20°C) [min:s]	- 10:00	- 10:00	- 8:00
Drain time 50%, (20°C) [min:s]	NA	NA	- 15:00
Freezing Point	m-13 [°C]		
Pour Point	m-10 [°C]		
Recommended storage/ Usage temperature	-8 a +60 [°C]		

## Ordering information

**PLUREX M** can be supplied in cans, drums, totes or Bulk (contact us for Bulk delivery details).

- F203358C1 25 Litre drum
- F203358D1 200 Litre tote
- F203358T1 1000 Litre drum
- F203358B1 Bulk (Litre)

[www.sabo-esp.com](http://www.sabo-esp.com)



## Training Foam 3 or 6%

### Description

PLUREX TF3 TRAINING Foam has been carefully formulated to allow firefighters the ability to conduct training with their own foam proportioning and generating equipment, while minimizing the effects of such training on the environment. It has foam expansion and drainage characteristics very similar to conventional 3% or 6% AFFF products. This is in contrast to other training foams on the market that simulate the expansion but have drain times far quicker than real firefighting foam. Using SABO Training Foam allows the user to determine both how much foam will be generated and how long the foam blanket will likely remain.

The product has been formulated with surfactants and other chemicals commonly found in household products such as shampoo and dish washing detergents. It is safe to handle, is readily biodegradable and has low orders of aquatic toxicity. PLUREX TF3 Training Foam contains no fluorochemicals or fluorosurfactants. None of the components are reportable under current European regulations. Please check with local authority regarding use of this product and discharge to the environment.

### Application

PLUREX TF3 Training Foam is not intended for live fire training or for actual firefighting operations. See your SABO FOAM professional if you require live fire training. It may be used with all conventional proportioning and discharge devices as well as specialized products such as Compressed Air Foam generating equipment or systems (CAFS). As stated earlier, the foam characteristics, in terms of expansion ratio and foam drainage rates, will be very similar to conventional 3% or 6% AFFF products. This allows users to conduct operational training with regard to equipment set up, application techniques, and foam containment. It also allows users to determine the foam quality and range of different types of discharge devices at different operating pressures.

### Compatibility

PLUREX TF3 Training Foam SHOULD NOT be mixed, stored, or used with any other type of foam concentrate. Proportioning and application equipment should be flushed clean after use and before using different foam concentrate types.



### Typical Properties

PLUREX TF3	Training Foam
Shape and color	Light yellow to Amber liq
Density (25°C)	1.015 ±0.015 [g/ml]
pH (concentrate, 25°C)	7.0 - 8.5
Viscosity 20°C	1.4 [mm²/s]
Refractive index	1.3433 ±0.0020
Admixing ratio	3 or 6 [% Vol.]
Surface tension @6%	27 [dynes/cm]
Surface tension @3%	28 [dynes/cm]
Recommended storage/Usage temperature	2 to +50 [°C]

### Storage and Shelf Life

PLUREX TF3 Concentrate should be stored and used within a temperature range 2°C to 50 °C. Storage in the original polyethylene shipping containers or other containers approved by SABO FOAM that minimize evaporation should result in a shelf life of 10 or more years. Containers should be kept tightly closed until use to both prevent evaporation and to minimize any contamination that might promote natural biodegradation of the product (PLUREX TF3 is readily biodegradable). If the product is frozen during storage or transportation, thawing will render the product completely useable. Mixing after freeze/thaw cycling is recommended.

For more information on shelf life and materials of construction when using or storing training foam concentrate, ask your SABO FOAM supplier for related technical bulletins.

### Quality assurance

PLUREX TF3 – as with all SABO Products – is subject to a very stringent quality controls throughout all stages of production, from incoming raw to the complete product and is manufactured in an ISO 9001:2008 controlled facility. Quality assurance is therefore guaranteed.

## Environmental Information

**Aquatic Toxicity** – PLUREX TF3 Training Foam has been formulated to minimize the impact of AFFF discharges to an aquatic ecosystem. The levels of toxicity to both fish and lower organisms on the aquatic food chain are very low. Evaluations were conducted on the concentrate on both fingerling Rainbow Trout (a very sensitive fish species) and Daphnia magna (a water flea low on the aquatic food chain). Results of these tests are given as LC50 values (lethal concentration to 50% of the test population over a given time frame). It is common practice to conduct fish toxicity tests over a 96 hour exposure period and to conduct Daphnia tests over a 48 hour exposure period. The results of the testing are given below:

- 96 Hour LC50 Value for 1.78 g/L  
Fingerling Rainbow Trout (1,780 ppm)
- 48 Hour LC50 Value for 1.9 g/L  
Daphnia magna (1,900 ppm)

The above data are for the concentrate. Since it is rare for the concentrate to be released directly to the environment, we can estimate the aquatic toxicity of the three percent or six percent working solution by using a dilution factor of 33 for 3% and 16.7 for 6%.

### 3% WORKING SOLUTION

96 Hour LC50 Value for 58.7 g/L  
Fingerling Rainbow Trout (58,700 ppm)

48 Hour LC50 Value 62.7 g/L  
for Daphnia magna (62,700 ppm)

### 6% WORKING SOLUTION

96 Hour LC50 Value for 29.7 g/L  
Fingerling Rainbow Trout (29,700 ppm)

48 Hour LC50 Value for 31.7 g/L  
Daphnia magna (31,700 ppm)

The end result is that the working solutions of PLUREX TF3 can be considered practically non-toxic in aquatic ecosystems.

**Biodegradability** – Biodegradability of a chemical is a measure of how readily that chemical is broken down in the environment (typically by bacteria and fungi) into carbon dioxide and water or other components that are "generally regarded as safe" (GRAS). In determining the biodegradability potential of a chemical or mixture of chemicals, industries often times look at and compare two related analytical tests.

The first test, Chemical Oxygen Demand (COD), is a measure of how much oxygen would be required to convert the chemicals to their most oxidized state. The second test, Biochemical Oxygen Demand (BOD), is a measure of how much oxygen will be used up by bacteria and other microorganisms over a given time period (usually 5 to 30 days).

food source, which also consumes dissolved oxygen in the water as part of their metabolic process.

The ratio of BOD to COD determines the theoretical biodegradability of a chemical or chemical mixture. If the BOD/COD ratio is greater than 0.50 (50%), the chemical or chemical mixture is considered to be readily biodegradable. PLUREX TF3 Training Foam has BOD/COD ratios well above the 50% value. BOD and COD values for the concentrate and 3% and 6% working solutions are listed below. The subscript after the BOD represents the time frame in number of days over which the test was conducted. Longer times give the bacteria and other microorganisms more time to breakdown the chemicals and result in higher uses of the dissolved oxygen.

### **PLUREX TF3 TRAINING FOAM CONCENTRATE**

Test	Results	Ratio (BOD/COD)
COD	146,400 ppm	
BOD <sub>5</sub>	64,971 ppm	0.444
BOD <sub>10</sub>	108,039 ppm	0.738
BOD <sub>20</sub>	155,416 ppm	1.062

### **6% WORKING SOLUTION**

Test	Results	Ratio (BOD/COD)
COD	8,300 ppm	
BOD <sub>5</sub>	4,611 ppm	0.555
BOD <sub>10</sub>	5,623 ppm	0.677
BOD <sub>20</sub>	11,756 ppm	0.416

### **3% WORKING SOLUTION**

Test	Results	Ratio (BOD/COD)
COD	3,900 ppm	
BOD <sub>5</sub>	2,507 ppm	0.643
BOD <sub>10</sub>	2,632 ppm	0.675
BOD <sub>20</sub>	3,331 ppm	0.854

**Nutrient Loading** – PLUREX TF3 Training Foam contains no nitrogen or phosphorous compounds. As such, it will not contribute to nutrient loading in either an aquatic or terrestrial ecosystem.

**Disposal** – PLUREX TF3 contains no ingredients that are reportable under European regulations. Care should be taken to prevent discharges of foam solutions or the concentrate into waterways wherever possible. After checking with the proper authorities at the treatment plant, it is often permissible to discharge to a waste treatment works. It may be necessary to meter the discharge at a rate that is acceptable to the plant operators in order to prevent excessive foaming that could upset the normal operation of the plant.

## Ordering Information

PLUREX TF3 Training Foam can be supplied in cans, drums or totes.

Part No. F203368C1	25 Liter can
Part No. F203368D1	200 Liter drum
Part No. F203368T1	1000 Liter tote



### Description

SABOFOAM HYDRAL 3 C 3% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro and hydrocarbon-surfactant technologies to provide effective fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3 C 3% AFFF foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Yellow Liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 – 8.0
Refractive Index	1.3550 minimum
Viscosity*	2.0 ± 0.5 cSt
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Sediment**	≤ 0.25 %
Pour Point	-5 °C
Freeze Point	-8 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 3 C 3% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings and Standards

The concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- EN 1568:2008  
– Parts 1,3



### Application

HYDRAL 3 C 3% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3 C 3% AFFF Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 3 C 3% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3 C 3% AFFF Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 8
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3 C 3% AFFF Concentrate is 0 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 3% pre-mix solution.

For delayed use: Consult Sabo Española Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 3 C 3% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended by Sabo Española Technical Services. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3 C 3% AFFF Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 3 C 3% AFFF Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3 C 3% AFFF Concentrate. Please contact Sabo Española Technical Services for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 3 C 3% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to Sabo Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 3 C 3% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 3 C 3% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

<u>Part Number</u>	<u>Description</u>	<u>Shipping Weight</u>	<u>Container Volume</u>
F103369C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F103369D1	200 L Drum	218.5 kg (481 lb)	0.2477m <sup>3</sup> (8.74 ft <sup>3</sup> )
F103369T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

### Description

SABOFOAM HYDRAL 3S 3% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3S foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burn-back resistance:

- The foam blanket blocks oxygen supply to the fuel
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20° C

Appearance	Pale Yellow Liquid
Density	1.01 ± 0.02 g/ml
pH	7.0 - 8.5
Refractive Index	1.3480 minimum
Viscosity*	2 ± 1 cSt
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Sediment**	≤ 0.25 %
Pour Point	-2 °C
Freeze Point	-4 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 3S 3% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings and Standards

HYDRAL 3S 3% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates



### Application

HYDRAL 3S 3% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3S Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 3S 3% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3S Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 7
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:30

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3S 3% AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 3% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 3S 3% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3S Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 3S Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3S 3% AFFF Concentrate. Please refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 3S 3% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 3S 3% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 3S 3% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F103374C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F103374D1	200 L Drum	218.5 kg (481 lb)	0.2477m <sup>3</sup> (8.74 ft <sup>3</sup> )
F103374T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

### Description

SABOFOAM HYDRAL 6 C 6% AFFF (Aqueous Film-Forming Foam Concentrate) combines fluoro and hydrocarbon-surfactant technologies to provide effective fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 6% solution in fresh, salt, or hard water.

HYDRAL 6 C 6% AFFF foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale Yellow Liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 - 8.0
Refractive Index	1.3530 minimum
Viscosity*	1.8 ± 0.5 cSt
Spreading Coefficient	3 dynes/cm minimum at 6% dilution
Sediment**	≤ 0.25 %
Pour Point	-5 °C
Freeze Point	-8 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 6 C 6% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings and Standards

The concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- EN: 1568:2008
  - Parts 1,3
- ICAO
  - Level B



### Application

HYDRAL 6 C 6% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 6 C 6% AFFF Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars



## Foaming Properties

HYDRAL 6 C 6% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 6% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 6 C 6% AFFF Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	6%
Expansion Ratio	≥ 8
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 6 C 6% AFFF Concentrate is 0 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 6% pre-mix solution.

For delayed use: Consult Sabo Española Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 6 C 6% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended by Sabo Española Technical Services. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 6 C 6% AFFF Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 6 C 6% AFFF Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 6% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 6 C 6% AFFF Concentrate. Please contact Sabo Española Technical Services for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 6 C 6% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to Sabo Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 6 C 6% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 6 C 6% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F106371C2	20 L Pail	22.1 kg (48.7 lb)	0.0285 m <sup>3</sup> (1.00 ft <sup>3</sup> )
F106371C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F106371D1	200 L Drum	218.5 kg (481 lb)	0.2477m <sup>3</sup> (8.74 ft <sup>3</sup> )
F106371T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.

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### Description

SABOFOAM HYDRAL 6S 6% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 6% solution in fresh, salt, or hard water.

HYDRAL 6S foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burn-back resistance:

- The foam blanket blocks oxygen supply to the fuel
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20° C

Appearance	Pale Yellow Liquid
Density	1.01 ± 0.02 g/ml
pH	7.0 - 8.5
Refractive Index	1.3360 minimum
Viscosity*	2 ± 1 cSt
Spreading Coefficient	3 dynes/cm minimum at 6% dilution
Sediment**	≤ 0.25 %
Pour Point	-1 °C
Freeze Point	-3 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 6S 6% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings and Standards

HYDRAL 6S 6% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates



### Application

HYDRAL 6S 6% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 6S Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 6S 6% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 6% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 6S Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	6%
Expansion Ratio	≥ 7
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:30

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 6S 6% AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 6% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 6S 6% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 6S Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 6S Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 6% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 6S 6% AFFF Concentrate. Please refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 6S 6% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 6S 6% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 6S 6% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F106376C2	20 L Pail	22.1 kg (48.7 lb)	0.0285 m <sup>3</sup> (1.00 ft <sup>3</sup> )
F106376C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F106376D1	200 L Drum	218.5 kg (481 lb)	0.2477 m <sup>3</sup> (8.74 ft <sup>3</sup> )
F106376T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

For bulk orders consult Account Representative

Safety Data Sheet (SDS) available at [www.TFPPEMEA.com](http://www.TFPPEMEA.com)

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect actual measurement.

SABOFOAM, HYDRAL and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

## Description

SABOFOAM HYDRAL 1S 1% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 1% solution in fresh, salt, or hard water.

HYDRAL 1S foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burn-back resistance:

- The foam blanket blocks oxygen supply to the fuel
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20° C

Appearance	Pale Yellow Liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 - 8.5
Refractive Index	1.3700 minimum
Viscosity*	5 ± 2 cSt
Spreading Coefficient	3 dynes/cm minimum at 1% dilution
Sediment**	≤ 0.25 %
Pour Point	-4 °C
Freeze Point	-6 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 1S 1% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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## Approvals, Listings and Standards

HYDRAL 1S 1% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates



## Application

HYDRAL 1S 1% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 1S Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 1S 1% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 1% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 1S Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	1%
Expansion Ratio	≥ 7
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:30

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 1S 1% AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 1% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 1S 1% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 1S Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 1S Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 1% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 1S 1% AFFF Concentrate. Please refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 1S 1% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 1S 1% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 1S 1% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F101373C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F101373D1	200 L Drum	218.5 kg (481 lb)	0.2477m <sup>3</sup> (8.74 ft <sup>3</sup> )
F101373T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

### Description

SABOFOAM HYDRAL 3 CEX 3% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro and hydrocarbon-surfactant technologies to provide cost-effective fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3 CEX 3% AFFF foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Yellow Liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 – 8.0
Refractive Index	1.3550 minimum
Viscosity*	2.0 ± 0.5 cSt
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Sediment**	≤ 0.25 %
Pour Point	-5 °C
Freeze Point	-8 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 3 CEX 3% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not break-down to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Application

HYDRAL 3 CEX 3% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3 CEX 3% AFFF Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars



## Foaming Properties

HYDRAL 3 CEX 3% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3 CEX 3% AFFF Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 8
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3 CEX 3% AFFF Concentrate is -2 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 3% pre-mix solution.

For delayed use: Consult SABO Española Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 3 CEX 3% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended by SABO Española Technical Services. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3 CEX 3% AFFF Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 3 CEX 3% AFFF Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3 CEX 3% AFFF Concentrate. Please contact SABO Española Services for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 3 CEX 3% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 3 CEX 3% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 3 CEX 3% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F103370C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F103370D1	200 L Drum	218.5 kg (481 lb)	0.2477m <sup>3</sup> (8.74 ft <sup>3</sup> )
F103370T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.

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### Description

SABO FOAM HYDRAL 3 FP 3% AFFF (Aqueous Film-Forming Foam) Freeze-Protected Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3 FP foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale yellow liquid
Density	1.05 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3850 minimum
Viscosity*	5 ± 1 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	≤ -35 °C
Freeze Point	≤ -36 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN1568:2008 protocol

The environmentally-mindful HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings, and Standards

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates
- EN 1568:2008
  - Part 3
- ICAO
  - Level B



### Application

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3 FP Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Docks and on-board marine systems
- Mobile equipment

## Foaming Properties

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3 FP Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1 depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 7.0
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:30

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate is -29 °C to 49 °C per UL-162. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with a fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 3% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Española Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3 FP Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years. Mixing HYDRAL 3 FP Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate. Refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Ordering Information

HYDRAL 3 FP 3% AFFF Freeze-Protected Concentrate is available in pails, drums, totes or bulk shipment.

Part No.	Description	Shipping Weight	Container Volume
F103375C1	25 L Pail	27.5 kg	0.0329 m³
F103375D1	200 L Drum	218.5 kg	0.2477 m³
F103375T1	1000 L Tote	1100 kg	1.398 m³

### Description

SABOFOAM HYDRAL 6 CEX 6% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro and hydrocarbon-surfactant technologies to provide cost-effective fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 6% solution in fresh, salt, or hard water.

HYDRAL 6 CEX 6% AFFF foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale Yellow Liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 - 8.0
Refractive Index	1.3530 minimum
Viscosity*	1.8 ± 0.5 cSt
Spreading Coefficient	3 dynes/cm minimum at 6% dilution
Sediment**	≤ 0.25 %
Pour Point	-5 °C
Freeze Point	-8 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 6 CEX 6% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Application

HYDRAL 6 CEX 6% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires having low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels having appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 6 CEX 6% AFFF Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 6 CEX 6% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 6% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 6 CEX 6% AFFF Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	6%
Expansion Ratio	≥ 8
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 6 CEX 6% AFFF Concentrate is -2 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 6% pre-mix solution.

For delayed use: Consult SABO Española Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 6 CEX 6% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended by SABO Española Technical Services. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 6 CEX 6% AFFF Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 6 CEX 6% AFFF Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 6% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 6 CEX 6% AFFF Concentrate. Please contact SABO Española Technical Services for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 6 CEX 6% AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 6 CEX 6% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 6 CEX 6% AFFF Concentrate is available in pails, drums, totes or bulk shipment.

<u>Part Number</u>	<u>Description</u>	<u>Shipping Weight</u>	<u>Container Volume</u>
F106372C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F106372D1	200 L Drum	218.5 kg (481 lb)	0.2477 m <sup>3</sup> (8.74 ft <sup>3</sup> )
F106372T1	1000 L Tote	1100 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.

SABOFOAM, HYDRAL and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

### Description

SABOFOAM HYDRAL AR 3-3 S+ AR-AFFF (Alcohol Resistant Aqueous Film-Forming Foam) Low Viscosity Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B, polar solvent and hydrocarbon fuel fires. The low viscosity of this concentrate enables ease of proportioning in a wide range of equipment such as in-line eductors, balanced pressure systems, built-in systems aboard ARFF (Aircraft Rescue and Fire Fighting) and other emergency response vehicles. This synthetic foam concentrate is intended for forceful or gentle firefighting application at 3% solution for hydrocarbon fuels and gentle firefighting application at 3% solution for polar solvent fuels in fresh, salt, or hard water.

HYDRAL AR 3-3 S+ foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms either:
  - An aqueous film on a hydrocarbon fire, or
  - A polymeric membrane on a polar solvent fire which suppresses the vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Yellow Gelled Liquid
Density	1.03 ± 0.02 g/ml
pH	7.0-8.5
Refractive Index	1.3600 minimum
Viscosity*	1000 ± 300 cPs
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	-12 °C
Freeze Point	-14 °C

\*Brookfield Viscometer Spindle #4, speed 60 rpm

\*\*EN 1568:2008 protocol

HYDRAL AR 3-3 S+ Concentrate is a non-Newtonian fluid that is both pseudoplastic and thixotropic. Due to these properties, dynamic viscosity will decrease as shear increases.

The environmentally-mindful HYDRAL AR 3-3 S+ AR-AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings, and Standards

HYDRAL AR 3-3 S+ AR-AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrate
  - UL listed for use with an extensive array of proportioning and discharge equipment, including sprinklers as required by NFPA 16.
- EN 1568:2008
  - Parts 3, 4



### Application

HYDRAL AR 3-3 S+ AR-AFFF Concentrate is intended for use on both types of Class B fires: hydrocarbon fuels with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels; and polar solvent fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL AR 3-3 S+ Concentrate can be ideal for emergency response and semi-fixed firefighting applications such as:

- Industrial chemical and petroleum processing facilities
- Fuel or chemical storage tanks
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment



## Foaming Properties

HYDRAL AR 3-3 S+ AR-AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at the correct dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL AR 3-3 S+ Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 7
25% Drain Time (min:sec)	≥ 8:00
50% Drain Time (min:sec)	≥ 15:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL AR 3-3 S+ AR-AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be premixed with fresh or salt water to 3% solution for hydrocarbon fuel fires or a 3% solution for polar solvent fuel fires.

For delayed use: Consult Technical Services for guidance regarding suitability of a pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL AR 3-3 S+ AR-AFFF Concentrate. Please refer to SABO Española Protection Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL AR 3-3 S+ AR-AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Protection Products Technical Bulletin "Storage of Foam Concentrates". A thin layer up to 6 mm thick of appropriate-grade mineral oil may be applied to the surface of the foam concentrate stored in a fixed, atmospheric storage container to help minimize evaporation. Please consult SABO Española Products for further guidance regarding the use of mineral oil to help seal the surface of AR-AFFF concentrates.

The concentrate should be maintained within the recommended operational temperature range. Freezing of the product should be avoided. If, however, the product freezes during transport or storage, it must be thawed and inspected

for signs of separation. If separation has occurred, or is suspected, the HYDRAL AR 3-3 S+ Concentrate should be mechanically mixed until homogeneous, and additional testing may be required after mixing to verify product quality.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL AR 3-3 S+ Concentrate can be maximized through optimal storage conditions and proper handling. SABO Española concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL AR 3-3 S+ Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3x3 AR-AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL AR 3-3 S+ AR-AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL AR 3-3 S+ AR-AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL AR 3-3 S+ AR-AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F113380C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F113380D2	200 L Drum	218.5 kg (481 lb)	0.2477 m <sup>3</sup> (8.74 ft <sup>3</sup> )
F113380T1	1000 L Tote	1110 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

For bulk orders consult Account Representative.

Note: The converted values provided in this document are for dimensional reference only and do not reflect an actual measurement. HYDRAL and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.



## Description

SABOFOAM HYDRAL AR 1-1 FP Freeze-Protected AR-AFFF (Alcohol Resistant Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B, polar solvent and hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting application at 1% solution for hydrocarbon fuels and gentle firefighting application at 1% solution for polar solvent fuels in fresh, salt, or hard water. A dual 1% solution level for HYDRAL AR 1-1 FP minimizes the product required to protect against both hydrocarbon and polar solvent fire hazards.

HYDRAL AR 1-1 FP foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms either:
  - An aqueous film on a hydrocarbon fire, or
  - A polymeric membrane on a polar solvent fire which suppresses the vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale Yellow Liquid
Density	1.09 ± 0.02 g/ml
pH	7.0-8.5
Refractive Index	1.3950 minimum
Viscosity*	50 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 1% dilution
Pour Point	-30°C
Freeze Point	-32 °C

\*Cannon-Fenske viscometer at 20 °C

\*\*EN 1568:2008 protocol

Unlike most conventional pseudoplastic AR-AFFF products, HYDRAL AR 1-1 FP Concentrate has Newtonian fluid properties similar to traditional AFFF concentrates.

The environmentally-mindful HYDRAL AR 1-1 FP AR-AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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## Approvals, Listings, and Standards

HYDRAL AR 1-1 FP AR-AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrate
- EN 1568:2008
  - Parts 3, 4



## Application

HYDRAL AR 1-1 FP AR-AFFF Concentrate is intended for use on both types of Class B fires: hydrocarbon fuels with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels; and polar solvent fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL AR 1-1 FP Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Docks and on-board marine systems
- Mobile equipment
- Off-shore platforms
- Low temperature operations

## Foaming Properties

HYDRAL AR 1-1 FP AR-AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at the correct dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL AR 1-1 FP Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

	Hydrocarbon	Polar Solvent
Proportioning Rate	1%	1%
Expansion Ratio	≥ 5	≥ 5
25% Drain Time (min:sec)	≥ 2:00	≥ 2:00
50% Drain Time (min:sec)	≥ 3:30	≥ 3:30

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL AR 1-1 FP AR-AFFF Concentrate is -17.8 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be premixed with fresh or salt water to 1% solution for hydrocarbon fuel fires or a 1% solution for polar solvent fuel fires.

For delayed use: Consult Technical Services for guidance regarding suitability of a pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL AR 1-1 FP AR-AFFF Concentrate. Please refer to SABO Española Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL AR 1-1 FP AR-AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Products Technical Bulletin "Storage of Foam Concentrates". A thin layer up to 6 mm thick of appropriate-grade mineral oil may be applied to the surface of the foam concentrate stored in a fixed, atmospheric storage container to help minimize evaporation. Please consult SABO Española Products for further guidance regarding the use of mineral oil to help seal the surface of AR-AFFF concentrates.

The concentrate should be maintained within the recommended operational temperature range. Freezing of the product should be avoided. If, however, the product freezes

during transport or storage, it must be thawed and inspected for signs of separation. If separation has occurred, or is suspected, the HYDRAL AR 1-1 FP Concentrate should be mechanically mixed until homogeneous, and additional testing may be required after mixing to verify product quality.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL AR 1-1 FP Concentrate can be maximized through optimal storage conditions and proper handling. SABOFOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL AR 1-1 FP Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 1x1 AR-AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL AR 1-1 FP AR-AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL AR 1-1 FP AR-AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL AR 1-1 FP AR-AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F111357C1	25 L Pail	27.5 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F111357D1	200 L Drum	218.5 kg (481 lb)	0.2477 m <sup>3</sup> (8.74 ft <sup>3</sup> )
F111357T1	1000 L Tote	1110 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

## Description

HYDRAL 6 ICAO C 6% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 6% solution in fresh, salt, or hard water.

HYDRAL 6 ICAO C foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale yellow liquid
Density	1.03 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3600 ± 0.0020
Viscosity*	2.5 ± 1.5 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 6% dilution
Pour Point	–6 °C
Freeze Point	–6 °C

\* Cannon-Fenske viscometer at 20 °C

\*\* EN1568:2008 protocol

The environmentally-mindful HYDRAL 6 ICAO C 6% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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## Approvals, Listings, and Standards

HYDRAL 6 ICAO C 6% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- ICAO
  - Level C



## Application

HYDRAL 6 ICAO C 6% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. The concentrate also has excellent wetting properties that can effectively combat Class A fires and may be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 6 ICAO C Concentrate is specifically designed for aviation applications requiring exceptional firefighting performance, per the International Civil Aviation Organization (ICAO) standard. Ideal applications include:

- Aircraft Rescue and Fire Fighting (ARFF) vehicles
- Aircraft hangars, helidecks, and terminals
- Mobile emergency response equipment
- Flammable liquid containment areas

## Foaming Properties

HYDRAL 6 ICAO C 6% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 6% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 6 ICAO C Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1 depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles, or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	6%
Expansion Ratio	≥ 9.1
25% Drain Time (min:sec)	≥ 3:45
50% Drain Time (min:sec)	≥ 6:10

\*\* per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 6 ICAO C 6% AFFF Concentrate is -2 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 6% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 6 ICAO C 6% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Fire Protection Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product service-ability can be restored upon thaw with gentle re-mixing. Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 6 ICAO C Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years. Mixing HYDRAL 6 ICAO C Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 6% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 6 ICAO C 6% AFFF Concentrate. Refer to SABO Fire Protection Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 6 ICAO C 6% AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Fire Protection Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 6 ICAO C 6% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 6 ICAO C 6% AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight	Container Volume
			3
F106382C1	25 L Pail	27.45 kg	0.0329 m <sup>3</sup>
F106382D1	200 L Drum	218.5 kg	0.2477 m <sup>3</sup>
F106382T1	1000 L Tote	1100 kg	1.398 m <sup>3</sup>

For bulk orders, consult an account representative.

## Description

HYDRAL 3 ICAO C 3% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3 ICAO C foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Pale yellow liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3655 ± 0.0020
Viscosity*	3.25 ± 1.5 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	–3 °C
Freeze Point	–3 °C

\* Cannon-Fenske viscometer at 20 °C

\*\* EN1568:2008 protocol

The environmentally-mindful HYDRAL 3 ICAO C 3% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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## Approvals, Listings, and Standards

HYDRAL 3 ICAO C 3% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- ICAO
  - Level C



## Application

HYDRAL 3 ICAO C 3% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. The concentrate also has excellent wetting properties that can effectively combat Class A fires and may be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3 ICAO C Concentrate is specifically designed for aviation applications requiring exceptional firefighting performance, per the International Civil Aviation Organization (ICAO) standard. Ideal applications include:

- Aircraft Rescue and Fire Fighting (ARFF) vehicles
- Aircraft hangars, helidecks, and terminals
- Mobile emergency response equipment
- Flammable liquid containment areas



## Foaming Properties

HYDRAL 3 ICAO C 3% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3 ICAO C Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles, or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 9.5
25% Drain Time (min:sec)	≥ 3:30
50% Drain Time (min:sec)	≥ 5:45

\*\* per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3 ICAO C 3% AFFF Concentrate is -2 °C to 60 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or salt water to a 3% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Storage and Handling

HYDRAL 3 ICAO C 3% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Fire Protection Products Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product service-ability can be restored upon thaw with gentle re-mixing. Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3 ICAO C Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years. Mixing HYDRAL 3 ICAO C Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3 ICAO C 3% AFFF Concentrate. Refer to SABO Fire Protection Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL 3 ICAO C 3% AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Fire Protection Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 3 ICAO C 3% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 3 ICAO C 3% AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight	Container Volume
			3
F103381C1	25 L Pail	27.45 kg	0.0329 m <sup>3</sup>
F103381D1	200 L Drum	218.5 kg	0.2477 m <sup>3</sup>
F103381T1	1000 L Tote	1100 kg	1.398 m <sup>3</sup>

For bulk orders, consult an account representative.

## Description

HYDRAL 3 M 3% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 3% solution in fresh, salt, or hard water.

HYDRAL 3 M foam solution utilizes three suppression mechanisms for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Clear amber liquid
Density	1.06 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3650 minimum
Viscosity*	3.0 ± 1.0 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	≤ -18 °C
Freeze Point	≤ -21 °C
Storage and Operating Range**	-17 °C to 60 °C

\*Cannon-Fenske viscometer

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 3 M 3% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not break-down to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program and the current ECHA Directive (EU) 2017/1000.



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## Approvals, Listings, and Standards

HYDRAL 3 M 3% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- ICAO
  - Level B
- IMO MSC.1/Circ. 1312
- MED Modules B and D



## Application

HYDRAL 3 M 3% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. It may be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 3 M Concentrate can be ideal for fixed, semi-fixed, and emergency response firefighting applications such as:

- Docks, on-board marine, and helipad systems
- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas

## Foaming Properties

HYDRAL 3 M 3% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 3 M Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Aspirating low-expansion discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\* (Fresh and Salt Water)

Proportioning Rate	3%
Expansion Ratio	≥ 7.0
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 3 M 3% AFFF Concentrate is -17 °C to 60 °C per EN 1568 protocol. However, the diluted solution will freeze at 0 °C. This foam concentrate can require special proportioning equipment. It can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may be diluted with fresh or sea water to a 3% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 3 M 3% AFFF Concentrate. Refer to SABO Technical Bulletin *Acceptable Materials of Construction* for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL 3 M 3% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Technical Bulletin *Storage of Foam Concentrates*. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 3 M Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 3 M Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3% AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL 3 M 3% AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 3 M 3% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 3 M 3% AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight
<b>Pails</b>		
F103387C1	25 L	27.45 kg
<b>Drums</b>		
F103387D1	200 L	218.5 kg
<b>Totes</b>		
F103387T1	1,000 L	1,110 kg

## HYDRAL 1 C 1% AFFF Concentrate Description

HYDRAL 1 C 1% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 1% solution in fresh, salt, or hard water.

HYDRAL 1 C foam solution utilizes three suppression mechanisms for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Clear amber liquid
Density	1.05 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3750 minimum
Viscosity*	6.0 ± 2.0 cSt
Sediment**	≤ 0.1%
Spreading Coefficient	3 dynes/cm minimum at 1% dilution
Pour Point	≤ -17 °C
Freeze Point	≤ -20 °C
Storage and Operating Range**	-15 °C to 60 °C

\*Cannon-Fenske viscometer

\*\*EN 1568: 2008 protocol

The environmentally-mindful HYDRAL 1 C 1% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program and the current ECHA Directive (EU) 2017/1000.



## Approvals, Listings, and Standards

HYDRAL 1 C 1% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- EN 1568: 2008
  - Parts 1, 3
- ICAO
  - Level B



## Application

HYDRAL 1 C 1% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate has excellent wetting properties that can effectively combat Class A fires as well. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 1 C Concentrate can be ideal for fixed, semi-fixed, and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment
- Aircraft hangars

## Foaming Properties

HYDRAL 1 C 1% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 1% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 1 C Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Aspirating low-expansion discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### Typical Foaming Characteristics\* (Fresh and Sea Water)

Proportioning Rate	1%
Expansion Ratio	≥ 7.0
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 1 C 1% AFFF Concentrate is -15 °C to 60 °C per EN 1568. However, the diluted solution will freeze at 0 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be diluted with fresh or sea water to 1% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 1 C 1% AFFF Concentrate. Refer to SABO Technical Bulletin “Acceptable Materials of Construction” for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL 1 C 1% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Technical Bulletin “Storage of Foam Concentrates”. The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting foam concentrate’s long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 1 C Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 1 C Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 1% AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL 1 C 1% AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 1 C 1% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 1 C 1% AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight
F101390C1	25 L Pail	27.45kg
F101390D1	200 L Drum	218.5kg
F101390T1	1,000 L Tote	1,110 kg

For bulk orders, consult an account

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect an actual measurement.

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## HYDRAL 1 M 1% AFFF Concentrate

### Description

HYDRAL 1 M 1% AFFF (Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 1% solution in fresh, salt, or hard water.

HYDRAL 1 M foam solution utilizes three suppression mechanisms for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms an aqueous film that suppresses fuel vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Clear amber liquid
Density	1.06 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3780 minimum
Viscosity*	6.0 ± 2.0 cSt
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 1% dilution
Pour Point	≤ -18 °C
Freeze Point	≤ -22 °C
Storage and Operating Range**	-15 °C to 60 °C

\*Cannon-Fenske viscometer

\*\*EN 1568:2008 protocol

The environmentally-mindful HYDRAL 1 M 1% AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program and the current ECHA Directive (EU) 2017/1000.



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### Approvals, Listings, and Standards

HYDRAL 1 M 1% AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- EN 1568:2008
  - Parts 1, 3
- ICAO
  - Level B
- IMO MSC.1/Circ. 1312
- MED Modules B and D



### Application

HYDRAL 1 M 1% AFFF Concentrate is intended for use on Class B hydrocarbon fuel fires with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels. It is not suitable for use on polar fuels with appreciable water solubility such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate has excellent wetting properties that can effectively combat Class A fires as well. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL 1 M Concentrate can be ideal for fixed, semi-fixed, and emergency response firefighting applications such as:

- Docks, on-board marine, and helipad systems
- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas

**Nota:** La versión oficial de este documento es la versión inglesa. Si este documento es traducido a otro idioma distinto del inglés y hubiera discrepancias entre la versión inglesa y la versión traducida, prevalecerá la versión inglesa sobre la versión traducida.

## Foaming Properties

HYDRAL 1 M 1% AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 1% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL 1 M Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Aspirating low-expansion discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

Proportioning Rate	1%
Expansion Ratio	≥ 7.0
25% Drain Time (min:sec)	≥ 2:30
50% Drain Time (min:sec)	≥ 4:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL 1 M 1% AFFF Concentrate is -15 °C to 60 °C per EN 1568. However, the diluted solution will freeze at 0 °C. This foam concentrate can require special proportioning equipment. It can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may be diluted with fresh or sea water to a 1% pre-mix solution.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL 1 M 1% AFFF Concentrate. Refer to SABO Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL 1 M 1% AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Technical Bulletin "Storage of Foam Concentrates". The product should be maintained within the recommended temperature range. If the concentrate freezes during transport or storage, full product serviceability can be restored upon thaw with gentle re-mixing.

Factors affecting foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL 1 M Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL 1 M Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 1% AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL 1 M 1% AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL 1 M 1% AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL 1 M 1% AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight
F101386C1	25 L Pail	27.45 kg
F101386D1	200 L Drum	218.5 kg
F101386T1	1,000 L Tote	1,110 kg

For bulk orders, consult an account representative.

Safety Data Sheets (SDS) are available at [www.tfpemea.com](http://www.tfpemea.com)

SABO FOAM, HYDRAL, and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

### Description

SABOFOAM HYDRAL AR 3-6 S AR-AFFF (Alcohol Resistant Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B, polar solvent and hydrocarbon fuel fires. This synthetic foam concentrate is intended for firefighting applications at 3% solution for hydrocarbon fuels and at 6% solution for polar solvent fuels in fresh, salt, or hard water.

HYDRAL AR 3-6 S foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms either:
  - An aqueous film on a hydrocarbon fire, or
  - A polymeric membrane on a polar solvent fire which suppresses the vapor and seals the fuel surface
- The water content of the foam solution produces a cooling effect for additional fire suppression.

#### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Yellow Gelled Liquid
Density	1.00 ± 0.02 g/ml
pH	7.0-8.5
Refractive Index	1.3450 minimum
Viscosity*	1400 ± 300 cPs
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	-3 °C
Freeze Point	-5 °C

\*Brookfield Viscometer Spindle #4, speed 60 rpm

\*\*EN 1568:2008 protocol

HYDRAL AR 3-6 S Concentrate is a non-Newtonian fluid that is both pseudoplastic and thixotropic. Due to these properties, dynamic viscosity will decrease as shear increases.

The environmentally-mindful HYDRAL AR 3-6 S AR-AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



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### Approvals, Listings, and Standards

HYDRAL AR 3-6 S AR-AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrate



### Application

HYDRAL AR 3-6 S AR-AFFF Concentrate is intended for use on both types of Class B fires: hydrocarbon fuels with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels; and polar solvent fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone. The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL AR 3-6 S Concentrate can be ideal for fixed, semi-fixed and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Docks and on-board marine systems
- Mobile equipment

## Foaming Properties

HYDRAL AR 3-6 S AR-AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at the correct dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL AR 3-6 S Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Aspirating discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

	Hydrocarbon	Polar Solvent
Proportioning Rate	3%	6%
Expansion Ratio	≥ 5	≥ 6
25% Drain Time (min:sec)	≥ 5:00	≥ 12:00
50% Drain Time (min:sec)	≥ 10:00	≥ 20:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL AR 3-6 S AR-AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

For immediate use: The concentrate may also be premixed with fresh or salt water to 3% solution for hydrocarbon fuel fires or a 6% solution for polar solvent fuel fires.

For delayed use: Consult Technical Services for guidance regarding suitability of a pre-mix solution (fresh water only).

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL AR 3-6 S AR-AFFF Concentrate. Please refer to SABO Española Protection Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Storage and Handling

HYDRAL AR 3-6 S AR-AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the foam system equipment recommended in SABO Española Protection Products Technical Bulletin "Storage of Foam Concentrates". A thin layer up to 6 mm thick of appropriate-grade mineral oil may be applied to the surface of the foam concentrate stored in a fixed, atmospheric storage container to help minimize evaporation. Please consult SABO Española Products for further guidance regarding the use of mineral oil to help seal the surface of AR-AFFF concentrates.

The concentrate should be maintained within the recommended operational temperature range. Freezing of the product should be avoided. If, however, the product freezes

during transport or storage, it must be thawed and inspected for signs of separation. If separation has occurred, or is suspected, the HYDRAL AR 3-6 S Concentrate should be mechanically mixed until homogeneous, and additional testing may be required after mixing to verify product quality.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL AR 3-6 S Concentrate can be maximized through optimal storage conditions and proper handling. SABO Española concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL AR 3-6 S Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3x6 AR-AFFF products for immediate incident response is appropriate.

## Inspection

HYDRAL AR 3-6 S AR-AFFF Concentrate should be inspected periodically in accordance with any of the following standards: NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Española Protection Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL AR 3-6 S AR-AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing, and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL AR 3-6 S AR-AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part Number	Description	Shipping Weight	Container Volume
F116377C1	25 L Pail	27.45 kg (60 lb)	0.0329 m <sup>3</sup> (1.16 ft <sup>3</sup> )
F116377D1	200 L Drum	218.5 kg (481 lb)	0.2477 m <sup>3</sup> (8.74 ft <sup>3</sup> )
F116377T1	1000 L Tote	1110 kg (2447 lb)	1.398 m <sup>3</sup> (49.36 ft <sup>3</sup> )

For bulk orders consult Account Representative.

Note: The converted values provided in this document are for dimensional reference only and do not reflect an actual measurement.

HYDRAL and the product names listed in this material are marks and/or registered marks. Unauthorized use is strictly prohibited.

## Description

HYDRAL AR 3-3 XS AR-AFFF (Alcohol Resistant Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B, polar solvent and hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 3% solution for hydrocarbon fuels and gentle firefighting applications at 3% solution for polar solvent fuels in fresh, salt, or hard water.

HYDRAL AR 3-3 XS foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms either:
  - An aqueous film on a hydrocarbon fire, or
  - A polymeric membrane on a polar solvent fire which suppresses the vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional fire suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Viscous pale amber liquid
Density	1.02 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3525 minimum
Viscosity*	1600 ± 300 cPs
Sediment**	≤ 25%
Spreading Coefficient	3 dynes/cm minimum at 3% dilution
Pour Point	-4 °C
Freeze Point	-5 °C

\* Brookfield Viscometer Spindle at #4, 60 rpm

\*\* EN 1568:2008 protocol

HYDRAL AR 3-3 XS Concentrate is a non-Newtonian fluid that is both pseudoplastic and thixotropic; therefore dynamic viscosity will decrease as shear increases.

The environmentally-mindful HYDRAL AR 3-3 XS AR-AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not break-down to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program.



## Approvals, Listings, and Standards

HYDRAL AR 3-3 XS AR-AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates
- ULC S564, Category 2 Foam Liquid Concentrates
- EN 1568: 2008
  - Parts 1, 3, 4



## Application

HYDRAL AR 3-3 XS AR-AFFF Concentrate is intended for use on both types of Class B fires: hydrocarbon fuels with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels; and polar solvent fuels with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL AR 3-3 XS Concentrate can be ideal for semi-fixed, and emergency response firefighting applications such as:

- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment



## Foaming Properties

HYDRAL AR 3-3 XS AR-AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at the correct dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL AR 3-3 XS Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Aspirating low-expansion discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and the flow rate. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### Typical Foaming Characteristics\* (Fresh and Sea Water)

Proportioning Rate	3%
Expansion Ratio	≥ 8.0
25% Drain Time (min:sec)	≥ 9:00
50% Drain Time (min:sec)	≥ 13:30

\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL AR 3-3 XS AR-AFFF Concentrate is 2 °C to 49 °C. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with fixed eductor/pick-up tubes

## Storage and Handling

HYDRAL AR 3-3 XS AR-AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Fire Protection Products Technical Bulletin “Storage of Foam Concentrates”. A thin layer up to 1/4 in. (6 mm) thick of appropriate-grade mineral oil may be applied to the surface of the foam concentrate stored in a fixed, atmospheric storage container to help minimize evaporation. Consult SABO Fire Protection Products for further guidance regarding the use of mineral oil to help seal the surface of AR-AFFF concentrates.

The concentrate should be maintained within the recommended operational temperature range. Freezing of the product should be avoided. If, however, the product freezes during transport or storage, it must be thawed and inspected for signs of separation. If separation has occurred, or is suspected, the HYDRAL AR 3-3 XS Concentrate should be mechanically mixed until homogeneous, and additional testing may be required after mixing to verify product quality.

Factors affecting the foam concentrate’s long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL AR 3-3 XS Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL AR 3-3 XS Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 3x3 AR-AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL AR 3-3 XS AR-AFFF Concentrate. Refer to SABO Fire Protection Products Technical Bulletin “Acceptable Materials of Construction” for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL AR 3-3 XS AR-AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Fire Protection Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Ordering Information

HYDRAL AR 3-3 XS AR-AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Shipping Weight	Container Volume
F113384C1	25 L Pail	27.45 kg	0.0329 m <sup>3</sup>
F113384D1	200 L Drum	218.5 kg	0.2477 m <sup>3</sup>
F113384T1*	1,000 L Tote	1,110 kg	1.398 m <sup>3</sup>

**Note:** The converted values in this document are provided for dimensional reference only and do not reflect actual measurement.

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## Concentrado HYDRAL AR 3-3 C 3% x 3% AR-AFFF

### Descripción

El concentrado HYDRAL AR 3-3 C AR-AFFF (espuma formadora de película acuosa resistente al alcohol) combina tecnologías de tensioactivos hidrocarbúricos y fluorados que ofrecen una contención efectiva del fuego y del vapor en incendios de combustibles tipo hidrocarburo de Clase B y disolventes polares. Este concentrado de espuma sintética está indicado para aplicaciones de control de incendios contundentes o moderadas en una solución al 3 % en combustibles tipo hidrocarburo y para aplicaciones de control de incendios moderadas en una solución al 3 % en combustibles disolventes polares en agua dulce, salada o dura. El doble nivel de disolución al 3 % del HYDRAL AR 3-3 C minimiza el producto necesario para proteger contra riesgos de incendio de combustibles hidrocarbúricos y disolventes polares.

La solución espumante HYDRAL AR 3-3 C utiliza tres mecanismos de abatimiento para conseguir una reducción rápida del fuego y una excelente resistencia a la reignición:

- La capa de espuma bloquea el suministro de oxígeno al combustible.
- El líquido se escurre de la capa de espuma y forma:
  - Una película acuosa en un fuego con hidrocarburos, o bien
  - Una membrana polimérica en un fuego de disolvente polar que abate el vapor y sella la superficie del combustible
- El contenido acuoso de la solución de espuma produce un efecto refrigerante que favorece el abatimiento del fuego.

### PROPIEDADES FÍSICOQUÍMICAS NORMALES 20°C

Aspecto	Líquido ámbar viscoso
Densidad	1,05 ± 0,02 g/ml
pH	7,0 – 8,5
Índice de refracción	mínimo 1,3680
Viscosidad*	2.300 ± 300 cSt
Sedimento**	≤ 0,25 %
Coefficiente de expansión	3 dinas/cm diluido como mínimo al 3 %
Punto de fluidez	≤ -15°C
Punto de congelación	≤ -18°C
Intervalo de funcionamiento y almacenamiento**	-13°C a 60°C

\*Viscosímetro Brookfield, eje n.º 4, velocidad 60 rpm

\*\*Protocolo EN 1568:2008

Debido a que el concentrado HYDRAL AR 3-3 C es un fluido no newtoniano, tanto pseudoplástico como tixotrópico, la viscosidad dinámica decrece al aumentar el esfuerzo cortante.

La formulación del concentrado HYDRAL AR 3-3 C AR-AFFF, respetuosa con el medio ambiente, contiene productos químicos fluorados C-6 de cadena corta fabricados mediante un proceso de base telomérica. El proceso telomérico no produce ácido perfluorooctanosulfónico (PFOS) y estos materiales C-6 no se descomponen para producir ácido perfluorooctanoico (PFOA). Los productos químicos fluorados que se utilizan en el concentrado cumplen con los objetivos del Programa de supervisión del PFOA 2010/15 de la Agencia de Protección Medioambiental de los EE. UU. y la directiva (EU) 2017/1000 de la Agencia Europea de Sustancias y Mezclas Químicas (ECHA).

**Nota:** La versión oficial de este documento es la versión inglesa. Si este documento es traducido a otro idioma distinto del inglés y hubiera discrepancias entre la versión inglesa y la versión traducida, prevalecerá la versión inglesa sobre la versión traducida.



### Aprobaciones, homologaciones y normativas

El concentrado HYDRAL AR 3-3 C AR-AFFF está aprobado, homologado y cualificado según (o cumple los requisitos de) las siguientes especificaciones y normativas:

- EN 1568:2008
  - Partes 1, 2, 3, 4
- ICAO
  - Nivel B
- IMO MSC. 1/Circ. 1312
- MED Módulos B y D



### Aplicación

El concentrado HYDRAL AR 3-3 C AR-AFFF está indicado para ambos tipos de fuego de Clase B: combustibles con hidrocarburos de baja solubilidad en agua (como crudos, gasolinas, combustibles diésel y combustibles de aviación) y combustibles disolventes polares de considerable solubilidad en agua (como alcohol metílico y etílico, acetona y metiletilcetona).

Además, el concentrado cuenta con excelentes propiedades de mojabilidad que pueden combatir de forma efectiva fuegos de Clase A. También puede ser utilizado junto con agentes químicos secos para conseguir un rendimiento incluso mayor al abatimiento del fuego.

El concentrado HYDRAL AR 3-3 C puede ser ideal para aplicaciones en control de incendios fijas, semifijas y de respuesta a emergencias, como:

- Muelles, sistemas para plataforma de helipuerto y a bordo de embarcaciones
- Tanques de almacenamiento de combustibles o de productos químicos
- Instalaciones industriales de procesamiento de productos químicos y petróleo
- Instalaciones de carga y descarga de camiones/trenes
- Zonas de confinamiento de líquidos inflamables

## Propiedades espumantes

El concentrado HYDRAL AR 3-3 C AR-AFFF puede aplicarse eficazmente utilizando la mayoría de los equipos de descarga de espuma convencionales en una disolución correcta con agua dulce, salada o dura. Para un rendimiento óptimo, la dureza del agua no debe superar los 500 ppm expresados como calcio y magnesio.

El concentrado HYDRAL AR 3-3 C requiere poca energía para espumar y la solución espumante puede aplicarse con dispositivos de descarga aspirantes o no aspirantes. Los dispositivos no aspirantes, como las boquillas de baja presión de vapor/vaho de agua o los cabezales rociadores normales, suelen producir proporciones de expansión de 2:1 a 4:1. Los dispositivos de descarga aspirantes de baja expansión normalmente producen unas proporciones de expansión de 3,5:1 a 10:1 según el tipo de dispositivo y la velocidad de flujo. Los dispositivos de descarga de expansión media suelen producir proporciones de expansión de 20:1 a 60:1.

### CARACTERÍSTICAS ESPUMANTES NORMALES\*\*

(agua dulce y salada)

Tasa de dosificación	3 %
Proporción de expansión	≥ 8,0
25 % del tiempo de drenaje (min:seg)	≥ 8:00
50 % del tiempo de drenaje (min:seg)	≥ 12:00

\*\*Según el protocolo EN 1568-3, 2008

## Dosificación

El intervalo de temperaturas de funcionamiento recomendado para el concentrado HYDRAL AR 3-3 C AR-AFFF es de -13°C a 60°C según EN 1568. Sin embargo, la solución diluida se congela 0°C. Este concentrado espumígeno puede necesitar equipos de dosificación especiales. Puede dosificarse correctamente con equipos de dosificación en línea convencionales bien calibrados, tales como:

- Dosificadores por bomba de presión equilibrados y equilibrados en línea
- Controladores de flujo de presión y tanques de membrana equilibrados a presión
- Dosificadores para mezcla con toda el agua de la bomba
- Dosificadores en línea fijos o portátiles tipo venturi
- Boquillas a baja presión con tubos eductores/de recogida fijos

Para uso inmediato: el concentrado puede diluirse con agua dulce o de mar en una solución premezclada al 3 %.

Para uso aplazado: si necesita información relacionada con la idoneidad de una solución premezclada almacenada (solo agua dulce), póngase en contacto con el Servicio técnico.

## Compatibilidad con los materiales de construcción

Para ayudar a evitar la corrosión, los conectores y las tuberías galvanizadas nunca deben utilizarse en contacto con el concentrado HYDRAL AR 3-3 C AR-AFFF sin diluir. Para obtener recomendaciones e indicaciones sobre la compatibilidad de los concentrados espumígenos con materiales comunes de construcción en la industria de espumas extintoras, consulte el boletín técnico "Materiales de construcción aceptables" de SABO Española.

## Almacenamiento y manipulación

El concentrado HYDRAL AR 3-3 C AR-AFFF debe almacenarse en el envase original suministrado (contenedores de HDPE, bidones o garrafas) o en el equipo de sistema espumígeno recomendado, tal como se indica en el boletín técnico "Almacenamiento de los concentrados de espuma" de SABO Española. Una fina capa de hasta 6 mm de grosor de aceite mineral de grado adecuado puede aplicarse a la superficie del concentrado de espuma almacenado en un contenedor atmosférico fijo para ayudar a minimizar la evaporación. Solicite más información a SABO Española sobre el uso de aceite mineral para ayudar a sellar la superficie de los concentrados AR-AFFF.

El concentrado debe conservarse dentro del rango de temperaturas operacional recomendado. Debería evitarse la congelación del producto. Sin embargo, si el producto se congela durante su transporte o almacenamiento, deberá descongelarse e inspeccionarse en busca de signos de separación. Si se ha producido separación, o se sospecha que se ha producido, el concentrado HYDRAL AR 3-3 C deberá mezclarse mecánicamente hasta que quede homogéneo, y quizá se necesiten pruebas adicionales después de la mezcla para verificar la calidad del producto.

Los factores que afectan la efectividad a largo plazo del concentrado incluyen los ciclos y exposición a temperatura, almacenamiento, características del recipiente, exposición al aire, evaporación, disolución y contaminación. La vida útil del concentrado HYDRAL AR 3-3 C puede maximizarse mediante condiciones de almacenamiento óptimas y una manipulación adecuada. Los concentrados SABO FOAM han probado ser efectivos en actuaciones de extinción de incendios en productos almacenados en el envase original y bajo las condiciones adecuadas durante más de 10 años.

No se recomienda mezclar el concentrado HYDRAL AR 3-3 C con otros concentrados espumígenos para su almacenamiento a largo plazo. Es adecuado el uso junto con productos 3x3 AR-AFFF similares para una respuesta inmediata ante una emergencia

## Inspección

El concentrado HYDRAL AR 3-3 C AR-AFFF debe inspeccionarse periódicamente según la NFPA 11, EN 13565-2, u otra normativa aplicable. Debe enviarse una muestra representativa del concentrado a los Servicios de análisis de espumas de SABO Española o a otro laboratorio cualificado para analizar la calidad según la normativa aplicable. Normalmente es suficiente con una inspección y análisis de muestras anuales, a no ser que el producto haya sido expuesto a condiciones inusuales.

## Aseguramiento de la calidad

El concentrado HYDRAL AR 3-3 C AR-AFFF está sujeto a estrictos controles de calidad durante su producción, desde la inspección a la llegada de las materias primas hasta la comprobación del producto terminado, y se fabrica en una instalación certificada ISO 9001:2008.

## Información para pedidos

El concentrado HYDRAL AR 3-3 C AR-AFFF se comercializa en garrafas, bidones, contenedores o a granel.

Referencia	Descripción	Peso al embarque
F113389C1	Garrafa de 25 l	27,45 kg
F113389D1	Bidón de 200 l	218,5 kg
F113389T1	Contenedor de 1000 l	1110 kg

## Description

HYDRAL AR 1-3 S AR-AFFF (Alcohol Resistant Aqueous Film-Forming Foam) Concentrate combines fluoro- and hydrocarbon-surfactant technologies to provide superior fire and vapor suppression for Class B, polar solvent and hydrocarbon fuel fires. This synthetic foam concentrate is intended for forceful or gentle firefighting applications at 1% solution on hydrocarbon fuels and gentle firefighting applications at 3% solution on polar solvent fuels in fresh, salt, or hard water.

HYDRAL AR 1-3 S foam solution utilizes three suppression mechanisms intended for rapid fire knockdown and superior burnback resistance:

- The foam blanket blocks oxygen supply to the fuel.
- Liquid drains from the foam blanket and forms either:
  - An aqueous film on a hydrocarbon fire, or
  - A polymeric membrane on a polar solvent fire which suppresses the vapor and seals the fuel surface.
- The water content of the foam solution produces a cooling effect for additional suppression.

### TYPICAL PHYSIOCHEMICAL PROPERTIES AT 20 °C

Appearance	Viscous yellow liquid
Density	1.04 ± 0.02 g/ml
pH	7.0 – 8.5
Refractive Index	1.3620 minimum
Viscosity*	1200 ± 300 cPs
Sediment**	≤ 0.25%
Spreading Coefficient	3 dynes/cm minimum at 1% dilution
Pour Point	–4 °C
Freeze Point	–5 °C

\*Brookfield Viscometer Spindle #4, speed 60 rpm

\*\*EN 1568:2008 protocol

HYDRAL AR 1-3 S Concentrate is a non-Newtonian fluid that is both pseudoplastic and thixotropic: therefore, dynamic viscosity will decrease as shear increases.

The environmentally-mindful HYDRAL AR 1-3 S AR-AFFF Concentrate formulation contains short-chain, C-6 fluorochemicals manufactured using a telomer-based process. The telomer process produces no PFOS, and these C-6 materials do not breakdown to yield PFOA. The fluorochemicals used in the concentrate meet the goals of the U.S. Environmental Protection Agency 2010/15 PFOA Stewardship Program and the current ECHA Directive (EU) 2017/1000.



## Approvals, Listings, and Standards

HYDRAL AR 1-3 S AR-AFFF Concentrate is approved, listed, qualified under, or meets the requirements of the following specifications and standards:

- UL Standard 162, Foam Liquid Concentrates
- EN 1568:2008
  - Part 1, 3, and 4



## Application

HYDRAL AR 1-3 S AR-AFFF Concentrate is intended for use on both types of Class B fires: hydrocarbon fuels with low water solubility, such as crude oils, gasolines, diesel fuels, and aviation fuels; and polar solvents with appreciable water solubility, such as methyl and ethyl alcohol, acetone, and methyl ethyl ketone.

The concentrate also has excellent wetting properties that can effectively combat Class A fires. It may also be used in conjunction with dry chemical agents to provide even greater fire suppression performance.

HYDRAL AR 1-3 S Concentrate can be ideal for semi-fixed, and emergency response firefighting applications such as:

- Fuel or chemical storage tanks
- Industrial chemical and petroleum processing facilities
- Truck/rail loading and unloading facilities
- Flammable liquid containment areas
- Mobile equipment



## Foaming Properties

HYDRAL AR 1-3 S AR AFFF Concentrate may be effectively applied using most conventional foam discharge equipment at a 3% dilution with fresh, salt, or hard water. For optimum performance, water hardness should not exceed 500 ppm expressed as calcium and magnesium.

HYDRAL AR 1-3 S Concentrate requires low energy to foam and the foam solution may be applied with aspirating and non-aspirating discharge devices. Non-aspirating devices, such as handline water fog/stream nozzles or standard sprinkler heads, typically produce expansion ratios from 2:1 to 4:1. Aspirating low-expansion discharge devices typically produce expansion ratios from 3.5:1 to 10:1, depending on the type of device and flow rate. Medium-expansion discharge devices typically produce expansion ratios from 20:1 to 60:1.

### TYPICAL FOAM CHARACTERISTICS\*\* (Fresh and Salt Water)

	Hydrocarbons	Polar Solvents
Proportioning Rate	1%	3%
Expansion Ratio	≥ 7.0	≥ 9.0
25% Drain Time (min:sec)	≥ 3:50	≥ 11:00
50% Drain Time (min:sec)	≥ 6:30	≥ 17:00

\*\*per EN 1568-3, 2008 protocol

## Proportioning

The recommended operational temperature range for HYDRAL AR 1-3 S AR AFFF Concentrate is 2 °C to 49 °C per UL-162. This foam concentrate can be correctly proportioned using most conventional, properly calibrated, in-line proportioning equipment such as:

- Balanced and in-line balanced pressure pump proportioners
- Balanced pressure bladder tanks and ratio flow controllers
- Around-the-pump type proportioners
- Fixed or portable in-line venturi type proportioners
- Handline nozzles with a fixed eductor/pick-up tubes

For immediate use: The concentrate may also be premixed with fresh or sea water to a 1% solution for hydrocarbon fuel fires or a 3% solution for polar solvent fuel fires.

For delayed use: Consult Technical Services for guidance regarding suitability of a stored pre-mixed solution (fresh water only).

## Storage and Handling

HYDRAL AR 1-3 S AR-AFFF Concentrate should be stored in the original supplied package (HDPE totes, drums, or pails) or in the recommended foam system equipment as outlined in SABO Fire Protection Products Technical Bulletin "Storage of Foam Concentrates". A thin layer up to 6mm thick of appropriate-grade mineral oil may be applied to the surface of the foam concentrate stored in a fixed, atmospheric storage container to help minimize evaporation. Consult SABO Fire Protection Products for further guidance regarding the use of mineral oil to help seal the surface of AR-AFFF concentrates.

The concentrate should be maintained within the recommended operational temperature range. Freezing of the product should be avoided. If, however, the product freezes during transport or storage, it must be thawed and inspected for signs of separation. If separation has occurred, or is suspected, the HYDRAL AR 1-3 S Concentrate should be mechanically mixed until homogenous, and additional testing may be required after mixing to verify product quality.

Factors affecting the foam concentrate's long-term effectiveness include temperature exposure and cycling, storage container characteristics, air exposure, evaporation, dilution, and contamination. The effective life of HYDRAL AR 1-3 S Concentrate can be maximized through optimal storage conditions and proper handling. SABO FOAM concentrates have demonstrated effective firefighting performance with contents stored in the original package under proper conditions for more than 10 years.

Mixing HYDRAL AR 1-3 S Concentrate with other foam concentrates for long-term storage is not recommended. Use in conjunction with comparable 1x3 AR-AFFF products for immediate incident response is appropriate.

## Materials of Construction Compatibility

To help avoid corrosion, galvanized pipe and fittings should never be used in contact with undiluted HYDRAL AR 1-3 S AR-AFFF Concentrate. Refer to SABO Fire Protection Products Technical Bulletin "Acceptable Materials of Construction" for recommendations and guidance regarding compatibility of foam concentrate with common materials of construction in the firefighting foam industry.

## Inspection

HYDRAL AR 1-3 S AR-AFFF Concentrate should be inspected periodically in accordance with NFPA 11, EN 13565-2, or other relevant standard. A representative concentrate sample should be sent to SABO Fire Protection Products Foam Analytical Services or other qualified laboratory for quality analysis per the applicable standard. An annual inspection and sample analysis is typically sufficient, unless the product has been exposed to unusual conditions.

## Quality Assurance

HYDRAL AR 1-3 S AR-AFFF Concentrate is subject to stringent quality controls throughout production, from incoming raw materials inspection to finished product testing and is manufactured in an ISO 9001:2008 certified facility.

## Ordering Information

HYDRAL AR 1-3 S AR-AFFF Concentrate is available in pails, drums, totes, or bulk shipment.

Part No.	Description	Weight	Volume
F113383C2	20 L Pail	22.1 kg	0.0285 m <sup>3</sup>
F113383C1	25 L Pail	27.45 kg	0.0329 m <sup>3</sup>
F113383D1	200 L Drum	218.5 kg	0.2477 m <sup>3</sup>
F113383T1*	1000 L Tote	1100 kg	1.398 m <sup>3</sup>

For bulk orders, consult an account representative.

\*Totes are not UL approved packaging.

Safety Data Sheets (SDS) are available at [www.tfppea.com](http://www.tfppea.com).

**Note:** The converted values in this document are for dimensional reference only and do not reflect an actual measurement.

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