

H2K-Dr. Sthamer Foam School – Program 2024

DAY 1 – March 11

Traveling to France

- 15:30 – 16:30 Arrival & registration
- 16:30 – 17:00 **Welcome and introduction (Sthamer / H2K)**
- Course introduction
 - Introduction course participants and instructors
 - House rules and emergency procedures
 - General safety briefing
 - Explanation of the schedule
 - Course aim and objectives
- 17:00 – 18:00 **Module 1: Hydrocarbon Firefighting (H2K)**
- Flammable liquids
- Behavior of flammable liquids
 - Hydrocarbons and polar liquids
 - Physical properties
 - Burning rates
 - Solubility
 - Heat flux
- 18:00 – 19:00 **Module 2: Foam and Fire (Sthamer)**
- Firefighting foams
- Why foam
 - The Anatomy of Fire
 - The Composition of Foam
- 19:30 – 22:00 Course dinner

DAY 2 – March 12

08:15 – 08:30 Arrival

08:30 – 10:00 **Module 3: The Concentrates (Sthamer)**

- Composition of foam concentrates
- Manufacturing fluorine free foam concentrates
- Types of foam concentrates
- Fluorine free versus fluorinated foam concentrates
- Basic principles of fluorine free foam
 - Expansion rate
 - Application rate
- Liquid handling/ transportation
- AR-demo: Polymer film
- LV vs Polymer film
- Polymer film on EtOH vs Glycols

10:00 – 10:15 Coffee / tea

10:15 – 11:15 **Module 4: Foam Proportioning (Sthamer)**

- Foam concentrates
 - Viscosity
 - Temperature in relation to viscosity
- Foam proportioning systems
 - System design
 - Venturi
 - Around the pump proportioners
 - Wide range proportioners
 - Balanced pressure wide range proportioners
 - Bladder tank proportioning systems
 - Pressure tank proportioning systems
 - Water driven pump proportioners
 - Electronic proportioning systems

11:15 – 12:00 **Module 5: Foam and fire (Sthamer)**

- Sustainable/ renewable fuels
- Fuel ethers
 - MTBE/ ETBA
 - TAME/ TAEE
 - Ethanol blends
- Characteristics
- Fuel sensivity

12:00 – 12:45 Lunch

12:45 – 13:15 Transfer to training field

13:15 – 14:15 **Practical workshop 1: Foam Proportioning (Sthamer / H2K)**

- 15-minute sessions in 3 rotating sub-groups
- Explanation fire truck proportioning systems
 - Proportioning systems working principles
 - Explanation and demo inline inductors

Program continues on next page.

14:15 – 16:30 **Practical workshop 2 & 3: Firefighting Foam**
1-hour sessions in 2 rotating sub-groups

Part I – Foam fights fire (H2K)

Effective use and behaviour of fluorine free firefighting foams

Small experiments with the foam box

- Spill fires
 - Gasoline (E5)
 - Ethanol
 - Methanol
 - IPA
 - Gasoil
- Heat flux
- Fuel sensitivity non-polar
- Fuel sensitivity on polar
- Forceful vs gentle on polar and non-polar

Part II – Foam quality (Sthamer)

- Gentle and forceful application (F3)
- Drainage time
- AR/ non-AR on polar
- Gentle vs forceful on polar fuels
- Low- medium and high expansion on polar liquids
- Demo cold and 'hot' concentrate viscosity, impact on proportioning
- Vapor suppression (ammonia)

16:30 – 17:30 **Practical workshop 4: Hydrocarbon fires (Sthamer / H2K)**

Effective use and behaviour of fluorine free firefighting foams

- Firefighting strategy
- Use of low expansion foam
- Use of medium expansion foam
- Use of non-aspirated foam (handlines/ monitor)
- Application methods
- Cooling with foam

19:30 – 22:00 Course dinner

DAY 3 – March 13

08:15 – 08:30 Arrival

08:30 – 10:00 **Module 6: Making it work (Sthamer)**

- Picking the right foam (fuel types, fuel-foam-interaction)
- International standards
- Selecting foams
- Foams on duty

10:00 – 10:15 Coffee / tea

10:15 – 11:15 **Module 7: Foam application (H2K)**

- Aeration of premix in relation to hardware
- Application rates
- Application times
- Effective use of fluorine free foam
- Foam calculations

11:15 – 12:15 **Case study 1: Hydrocarbon firefighting (H2K)**

- Priority setting
- Firefighting strategy
- Burning rates
- Water & foam calculations
- Application rates
- Application times
- Application methods
- Logistics
- Foam proportioning rates

12:15 – 12:30 **Q&A**

12:30 – 13:15 Lunch

13:15 – 15:30 **Practical workshop 5 & 6: Hydrocarbon pressure and spill fires (Sthamer / H2K)**

- High pressure fire
- Large ethanol pool fire
 - Use of different types of foam concentrate
 - Heat flux
 - Firefighting strategy
 - Application techniques
 - Foam run
 - Fire-fighting foam and effective cooling
 - Use of foam support lines

15:30 – 15:45 Coffee / tea

15:45 – 17:30 **Practical workshop 7: Bund- and storage tank fire (Sthamer / H2K)**

- Positioning of equipment
- Effective use of water/ foam monitors
- Heat flux
- Firefighting strategy
- Application rates
- Foam run
- Use of foam support lines

19:00 – 22:00 Course dinner

DAY 4 – March 14

08:15 – 08:30 Arrival

08:30 – 9:15 **Module 8: Industrial firefighting in public-private partnerships (Guest speaker)**

- Introduction Unified Fire Department Rotterdam
- Challenging scenarios
- Lessons learned from recent incidents
- Actual developments 'collective' firefighting equipment for F3 foam
- Supply chain: logistical issues for tank and bund firefighting

09:15 – 10:15 **Case study 2: Tank fire (H2K)**

- Firefighting strategy
- Extinguishing polar solvents
- Consequences of the foam transition
- Application methods
- Application rates
- Foam proportioning rates
- Application times
- Water- and firefighting foam calculations

10:15 – 10:30 Coffee / tea

10:30 – 11:00 **Module 9: PFAS legal background (Sthamer)**

- Legal background
- Law and legislation
- Analytics
- Water rinse vs. chemical cleaning

11:00 – 11:30 **Module 10: PFAS lessons learned (Sthamer)**

- Experiences from practical foam transitions
- Possibilities and limitations
- Flushing the system
 - Stationary systems
 - Mobile equipment e.g., fire trucks
- Wastewater treatment

11:30 – 12:00 **Module 11: Compressed Air Foam (CAF) (Sthamer)**

- CAFS principle
- CAFS technology
- Ratio definitions
- CAFS applications

12:00 – 12:30 **Q&A**

12:30 – 13:15 Lunch

Program continues on next page.

13:15 – 14:45 **Practical workshop 8 & 9: CAFS and slop-over**
1-hour sessions in 2 rotating sub-groups

Part I – CAFS (Sthamer)

Effective use and behaviour of Compressed Air Foam System

- Foam spread and performance
- Vapor suppression and drainage time
- Use of 'dry' foam
- Use of 'wet' foam
- Application methods
- Cooling with CAFS

Part II - Slop-over (H2K)

- Small scale demonstration Slop-over
- Behavior of crude oil
- Tank teasing
- Foam pourers
- Subsurface injection
- Firefighting foam and liquefied gasses

14:45- 15:00 Coffee / tea

15:00 – 17:00 **Practical workshop 10: Firefighting foams - Practical demos and training with foam concentrates (Sthamer / H2K)**

- Spill fires
- Pool fires
- 3-dimensional fires
- Application methods
 - Foam aeration
 - Foam run
 - Fuel pick-up
 - Vapor suppression

18:00 – 22:00 **Closing ceremony (Sthamer / H2K)**

- Course evaluation
- Presentation of the certificates
- Course dinner

DAY 5 – March 15

Transit to airport / traveling home.