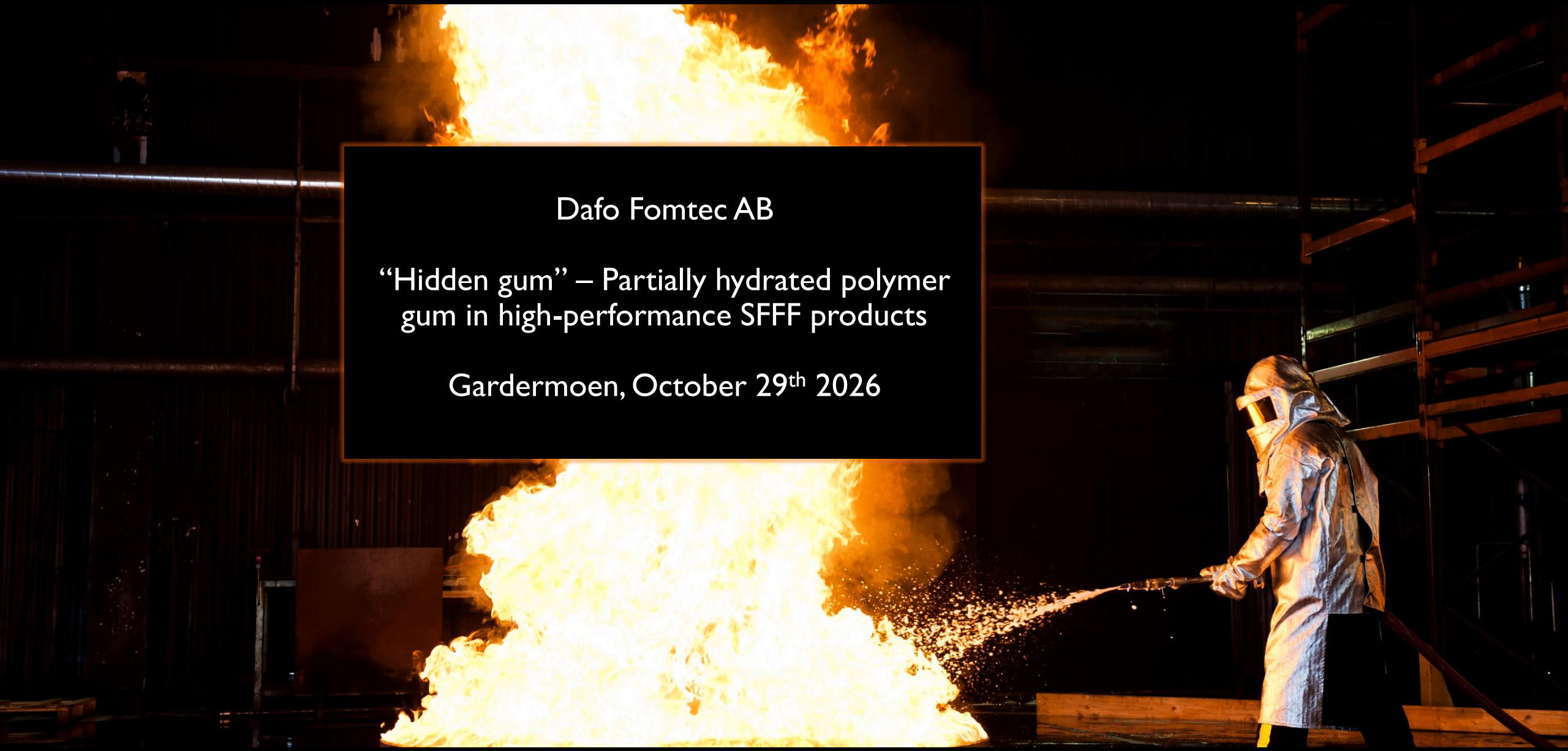


Dafo Fomtec AB

"Hidden gum" – Partially hydrated polymer gum in high-performance SFFF products

Gardermoen, October 29th 2026

Opening Remarks

- Appreciation and thanks
- Schedule 10.25 → 10.50
- Language
- Safety briefing
- Telephones
- “Hidden gum” table top-test demo

Finans Norge
Forsikringsdrift

Selecting SFFF product – what is "hidden gum"?

fomtec
Fire Fighting Foams & Equipment

Why do we need high viscosity foams?

To compensate for the absence of fluorine surfactants the fluorine free products needs boosting

Adding natural water-soluble polymers (Polysaccharides or "Gum") improves fire performance **dramatically** compared to low viscous Newtonian fluorine free products

All high-performance SFFF:s – synthetic fluorine free foams – are based on **polymer gum** in the chemical formulation. The polymer gum will protect the foam layer (expanded foam) when applied on the fuel surface.

The more gum added the better performance!

Selecting SFFF product – what is "hidden gum"?

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Polysaccharides

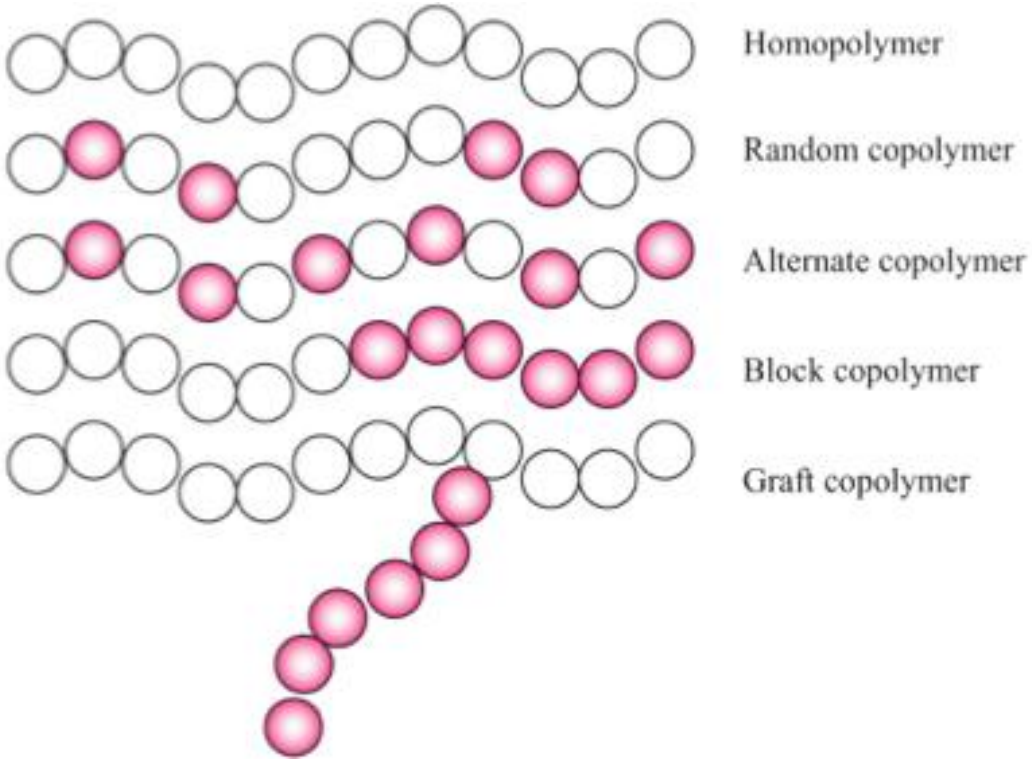
Water soluble polymers are built up of small units (monomers) in very long molecular chains

In water they stretch out to their full length and **increase viscosity** of the liquid - **hydration**

Better foam structure with strong bubbles that keep water:
- long drainage time

Excellent for highest fire performance:
- fast extinction
- long burnback resistance

Tempting to add as much polymer gum as possible!



Selecting SFFF product – what is “hidden gum”?

Dissolution of polysaccharides



Unavoidable path for POLYSACCHARIDES in water solution



Polymer gum in suspension
No viscosity increase

Polymer gum fully hydrated
Viscosity increase

Selecting SFFF product – what is "hidden gum"?

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Drawbacks with non- or partially hydrated polymer gum

There is a limit how much polymer gum can be **fully hydrated** (absorbed/blended) in a firefighting foam concentrate chemical formulation.

A foam concentrate based on **non- or partially hydrated polymer gum** "hidden gum" technology will – in theory – encapsulate additional polymer gum to release it when the concentrate is mixed with water (foam premix solution).

Huge amounts of gum can be added without getting high viscosity and is virtually stable – a **metastable** formulation.

It is critical to adjust and balance a metastable formulation to keep part of the gum in suspension – non- or **partially hydrated**

The gum is kept in a **metastable state** but is at risk of changing due to for example:

- Increased temperature
- Addition of water

Selecting SFFF product – risks with "hidden gum"

Drawbacks with non- or partially hydrated polymer gum

"Hidden gum" technology in firefighting foam concentrates is a shortcut to high rating in EN, UL, FM approval standards – at a lower cost!

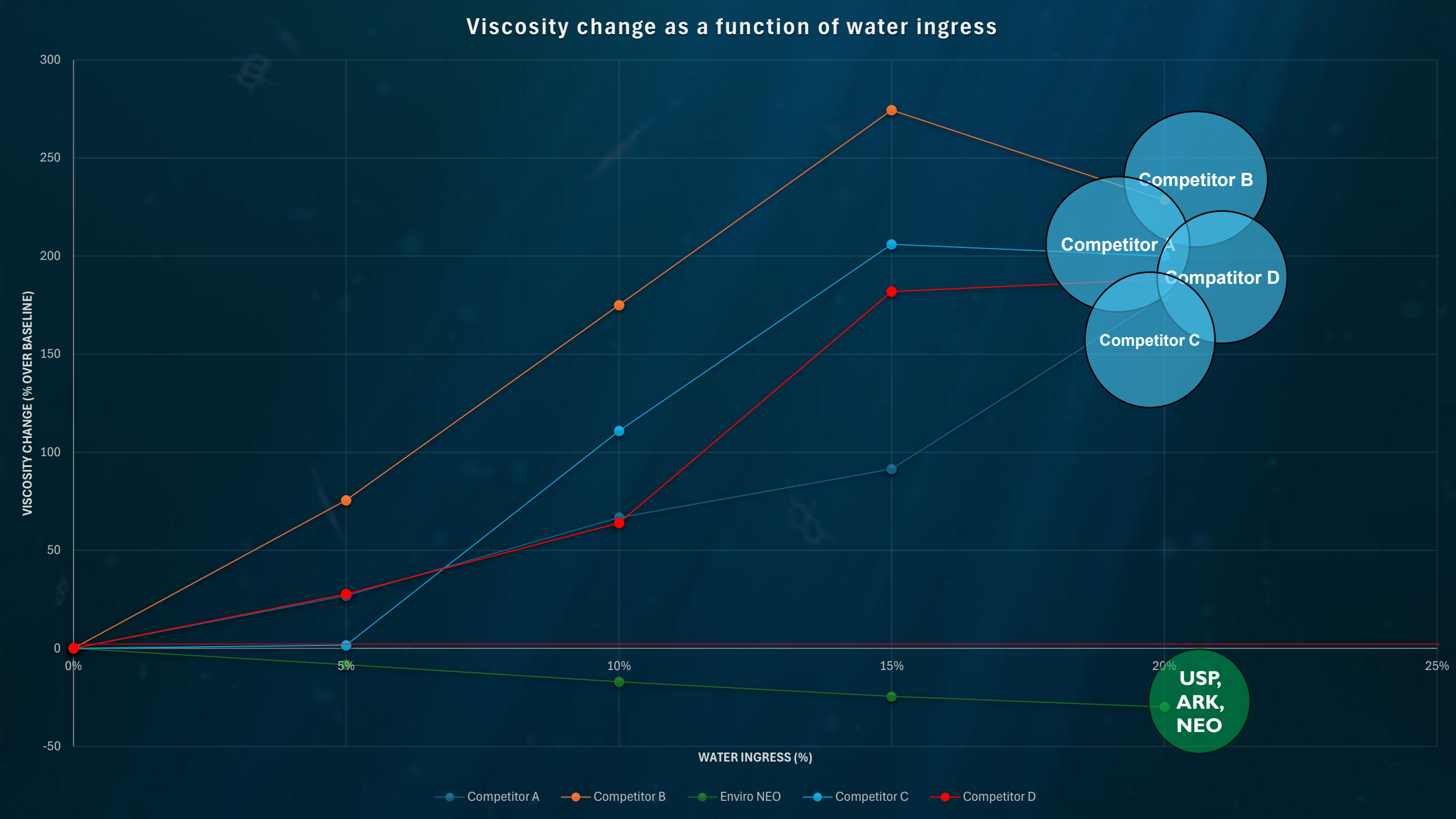
"Hidden gum" technology is **not stated or tested for** in the certification to recognized standards such as EN, UL, FM, ICAO, IMO, GESIP or LASTFIRE protocol.

"Hidden gum" technology is **not stated** in product TDS.

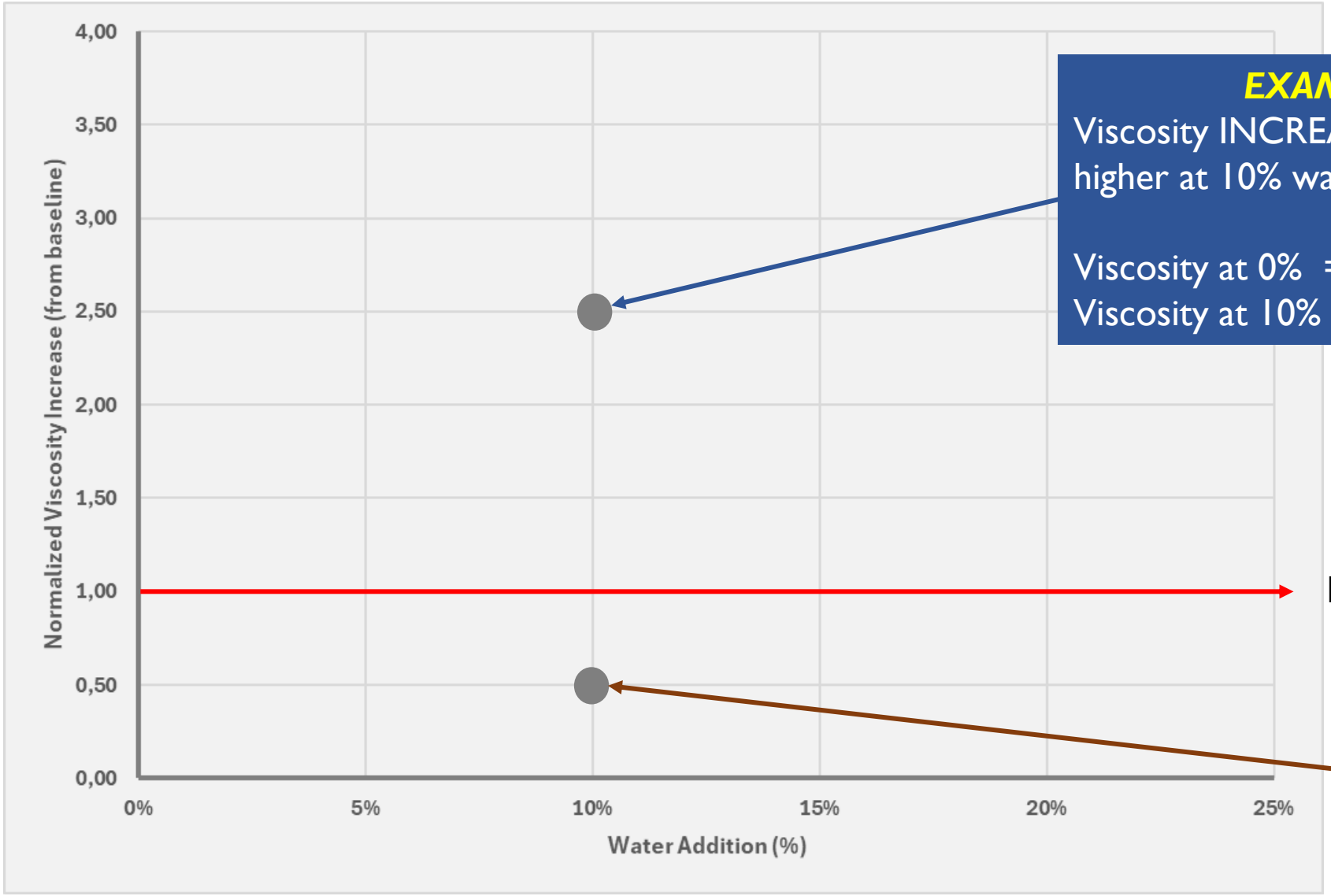
By adding 10-15% water – a simple water ingress test - to the concentrate a "hidden gum" product can be detected as the viscosity will **increase** heavily instead of **decrease** as expected.

A simple table-top test (Fomtec test procedure #1318 or similar) can confirm if a product is based on "hidden gum".

Viscosity change as a function of water ingress



Interpretation of diagram



EXAMPLE

Viscosity INCREASE is 2,5 times higher at 10% water addition

Viscosity at 0% = 2 500 mPas
Viscosity at 10% = 6 250 mPas

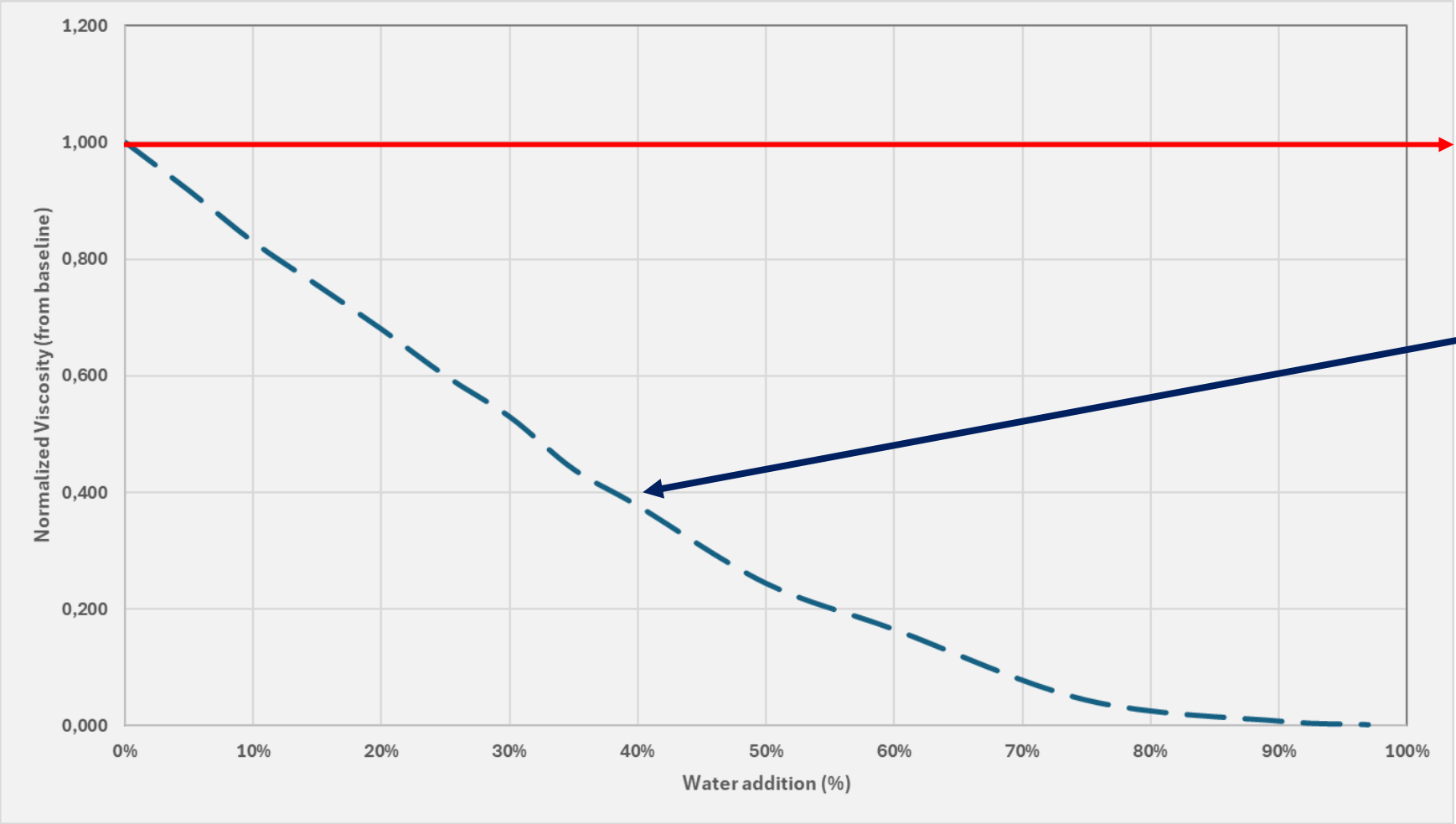
Baseline at 0% water addition

EXAMPLE

Viscosity DECREASE to half at 10% water addition

Viscosity at 0% = 3 000 mPas
Viscosity at 10% = 1 500 mPas

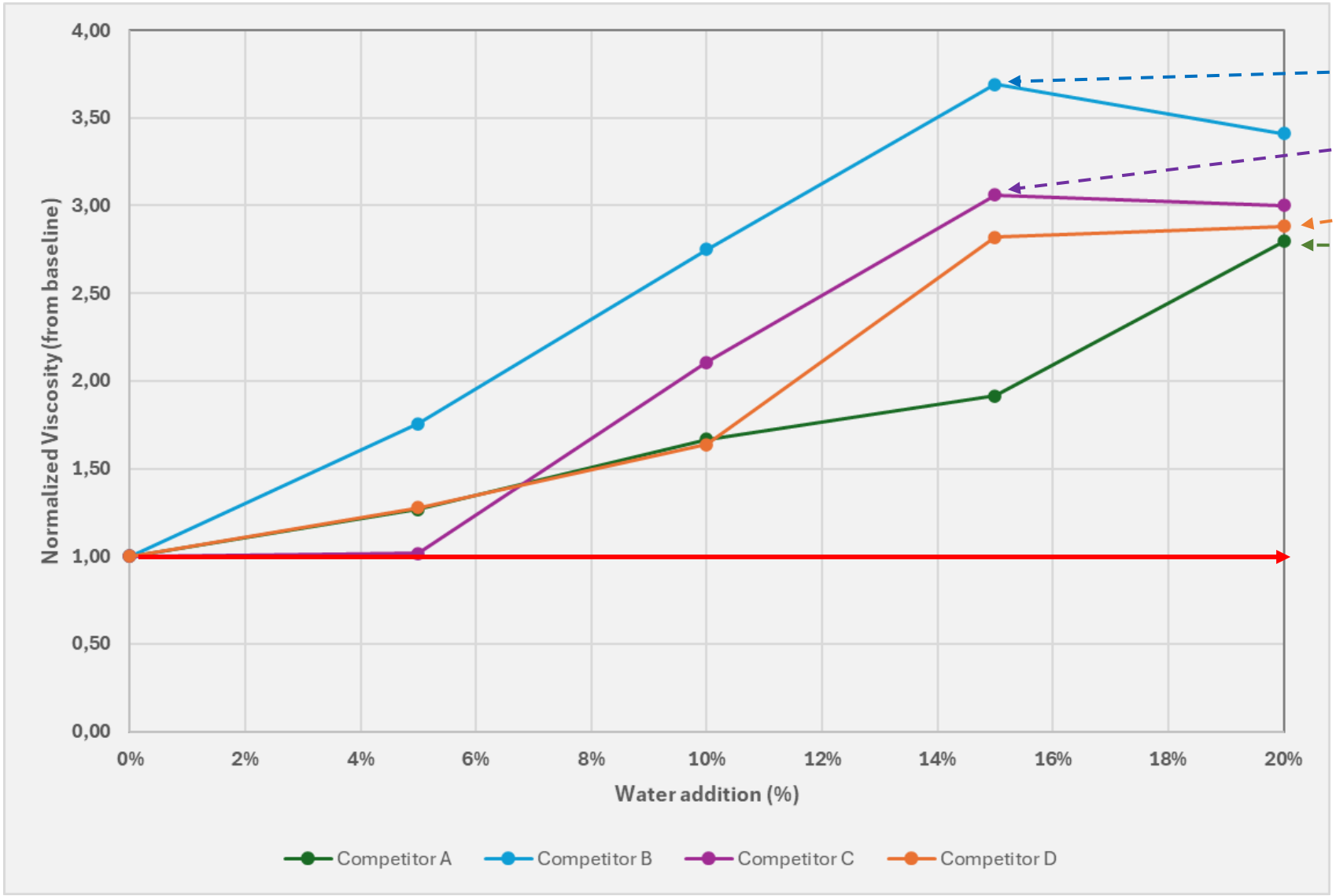
Expectation of a foam solution preparation



Baseline at 0% water addition

Viscosity decrease constantly upon water addition

Viscosity for hidden gum products



6 440 mPas

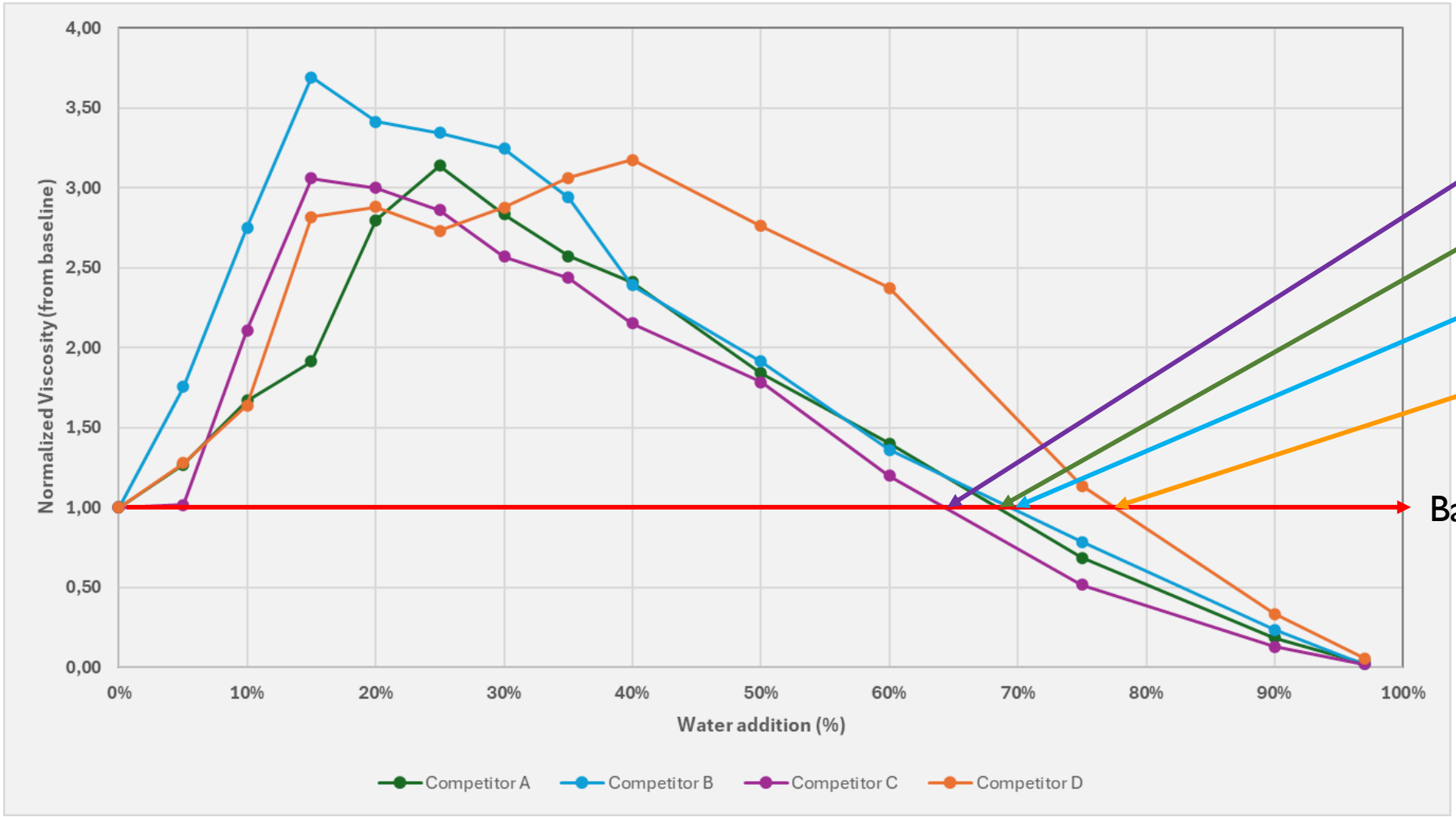
7650 mPas

6 860 mPas

6 880 mPas

Baseline at 0% water addition

When do the viscosity decrease?



64%
67%
69%
77%

%-age water to decrease viscosity from startpoint

Baseline at 0% water addition

Risks with "hidden gum" products – **viscosity increase**

All foam concentrates storage tanks are connected to a water source.

Water ingress is not unlikely!

- In foam systems it is difficult to remove all residue (cleaning) water before refilling with new foam concentrate or flush water after commissioning test, training or annual system function control
- In foam systems it is difficult to avoid water leakage – due to a check valve in a mobile foam system (fire truck, marine vessel etc) or from a pressure peak in the water delivery system

Dramatically increased viscosity or formation of solid lumps!

- Blockage in orifices in foam concentrate suction piping, pumps, proportioning devices, strainers
- Incorrect or complete cease of mixing in a proportioning device or system
- Failure in annual quality control

Selecting SFFF product – risks with “hidden gum”

SFFF product based on partially or non-hydrated polymer gum, before (left) and after (right) a simple water ingress test



Selecting SFFF product – risks with “hidden gum”

SFFF product based on partially or non-hydrated polymer gum, after water ingress test



Risks with “hidden gum” products – **phase separation**

Firefighting foam concentrates based on formulations using partially hydrated polymers are “metastable”.

Small changes in ambient conditions such as temperature fluctuations can easily offset this delicate balance, resulting in gum drop-out and phase separation.



Owning the risk using a "hidden gum" firefighting foam concentrate

The risk is real, and reports of phase separation and viscosity issues in real-world systems are surfacing.

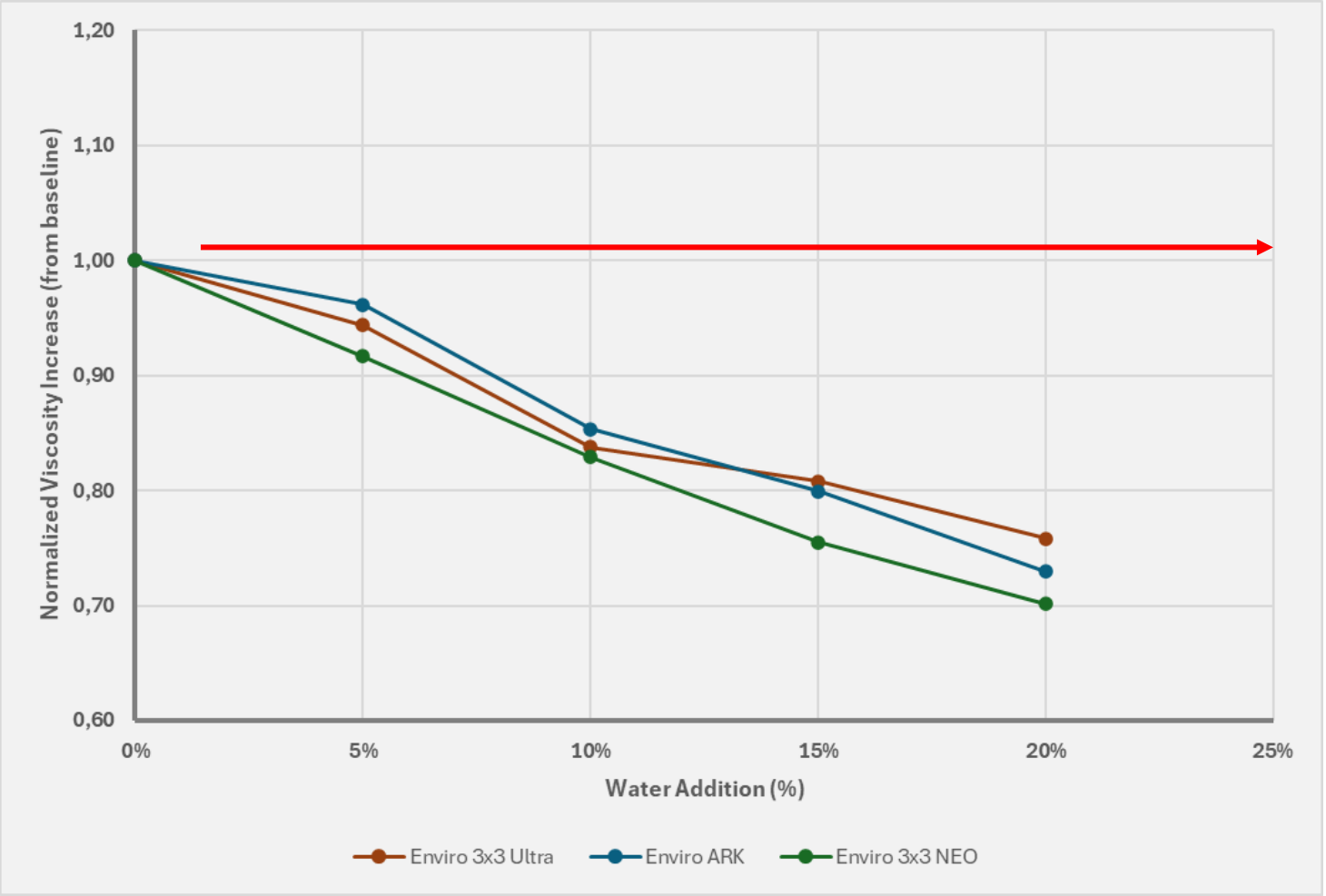
If you are offered two products with the same approvals, the same listings, the same fire performance on paper:

One carries a known, built-in instability. The other is engineered to avoid it completely.

Which risk would **you choose to own**?

Selecting SFFF product – Fomtec foams

- Fomtec decided not to use hidden gum technology
- When adding water to the concentrate viscosity shall **decrease**
- All Fomtec gum-based SFFF:s follow same path
- Guarantee for not having problem with solidification or gum drop-out



Selecting SFFF product – Fomtec foams

No Fomtec product use “hidden gum” technology

Our industry is about safety!

15 years ago, Fomtec decided against taking this shortcut to performance. Long term stability and reliability should not be negotiable. Dormant systems must work when there is a fire!

In the Enviro program we have done more than 3500 fire tests resulting in products such as:

- Fomtec Enviro 3x3 Plus (2011)
- Enviro 3x3 Ultra (2013)
- Enviro USP (2016, worlds first SFFF approved to UL and FM for sprinkler)
- Enviro ARK (2021)
- Enviro NEO (2025)

Selecting SFFF product – Fomtec foams

After more than 3 years of intense R&D based on DNA from the Enviro program Fomtec now introduce the pinnacle of our efforts – adding highest saltwater capability to an SFFF – without hidden gum:

enviro neo
by fomtec

Selecting SFFF product – Fomtec foams

Fomtec Enviro NEO documentation as per today

Tested and documented to standards such as:

- UL 162 Type III and Type II discharge devices, Sprinkler, Water Foam Sprinkler devices on hydrocarbon and polar fuels using fresh and saltwater
- EN 1568 part 1-2-3-4 using fresh and saltwater
- ICAO Level B
- LASTFIRE protocol
- IMO 1312
- GreenScreen

Tested and documented on fuels such as:

- IPA
- Ethanol
- Methanol
- Ethyl Acetate
- Butyl Acetate
- Methyl Ethyl Ketone
- Acetone
- Acetic Acid
- Heptane
- Gasoline
- Jet A 1
- Diesel
- Hexane

And we are just getting started…

Selecting SFFF product – Fomtec foams

…testing and documenting Fomtec Enviro NEO.

More foam system equipment:
- Discharge devices
- Proportioning

More large scale fire tests:
- Beaumont Texas
- GESIP France

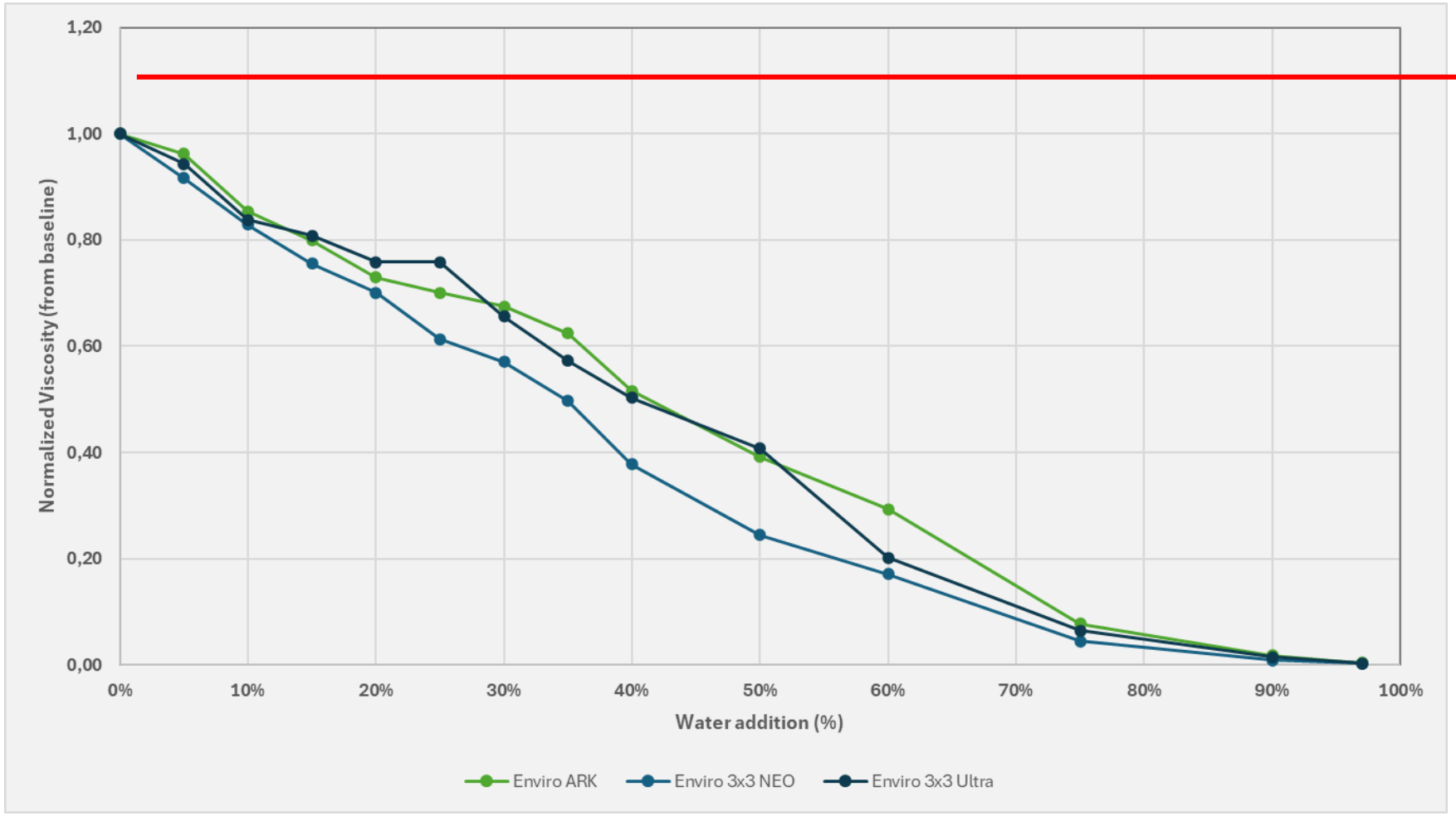
More relevant documentation:
- Friction loss curves
- Corrosion testing

Fomtec Enviro USP, ARK and NEO are all heavily documented by full scale fire tests but also included in third party verified – unique - "foam prediction tool", a database where we can make accurate predictions of gel-formation and fire performance on more than 10000 chemicals. *)

*) The unique model, underlying test data and details for Fomtec foam prediction tool have been peer reviewed under NDA by technical software, nanostructures, coating/printing and formulations field expert Prof. Steven Abbott at Leeds University, UK: "I have been allowed a detailed, confidential, insider look at their prediction system and my view as an independent scientist is that their claim, with the limitations they make clear, is valid."

Selecting SFFF product – Fomtec foams

Full dilution curve – expectations on an SFFF without hidden gum



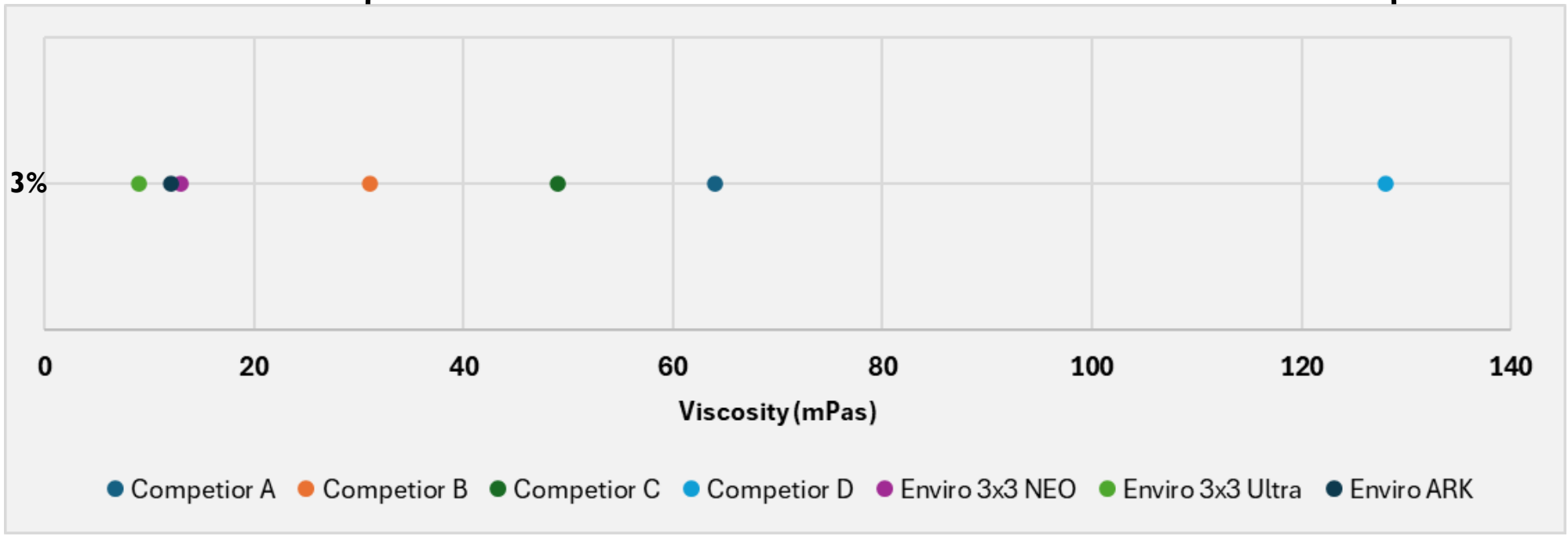
Baseline at 0% water addition

Selecting SFFF product – Fomtec foams

Viscosity for 3% foam premix solution

Fomtec Enviro products
9 - 13 mPas

Hidden Gum products
> 30 mPas



Fluorine free products for sprinkler and industry/ERS

Product	Foam type	Main application	Certification	Mixing ratio	Viscosity
Fomtec Enviro USP	Class B	Sprinkler system Tank protection Bund protection	UL 162 FM 5130 EN 1568-3	2-3%	Pseudoplastic
Fomtec Enviro ARK	Class A & B AR	Sprinkler system Tank protection Bund protection for polar solvent fuels and chemical spill	UL 162 FM 5130 EN 1568-3 & 4	3%	Pseudoplastic
Fomtec Enviro 3x3 NEO	Class A& B AR	Emergency response Tank protection Bund protection for polar solvent fuels and chemical spill	GESIP LASTFIRE protocol EN1568-3 & 4 UL 162	3%	Pseudoplastic
Fomtec Enviro 3x3 Super	Class A& B AR	Emergency response Tank protection Bund protection for polar solvent fuels and chemical spill	EN1568-3 & 4	3%	Pseudoplastic
Fomtec Enviro 3x3 Ultra	Class A & B AR	Emergency response, municipal fire brigade Tank protection Bund protection for polar solvent fuels and chemical spill	GESIP LASTFIRE protocol EN1568-3 & 4	3%	Pseudoplastic

Complete product documentation available at www.fomtec.com:
Technical datasheet, material safety datasheet (incl. all EU language versions) and approval certificates