Introducing a new roto tank grade - *Icorene* 1480
Why our industry needs a new high flow HDPE?

John Steele, LYB EU. Rotopol Krakow 2025

30 May 2025 V5

Subjects to present today

- Introduction and why a new tank grade?
- Review unique properties
- Lab testing
- Lab results. Compare with our tank grade *Icorene* 1314
- Conclusions

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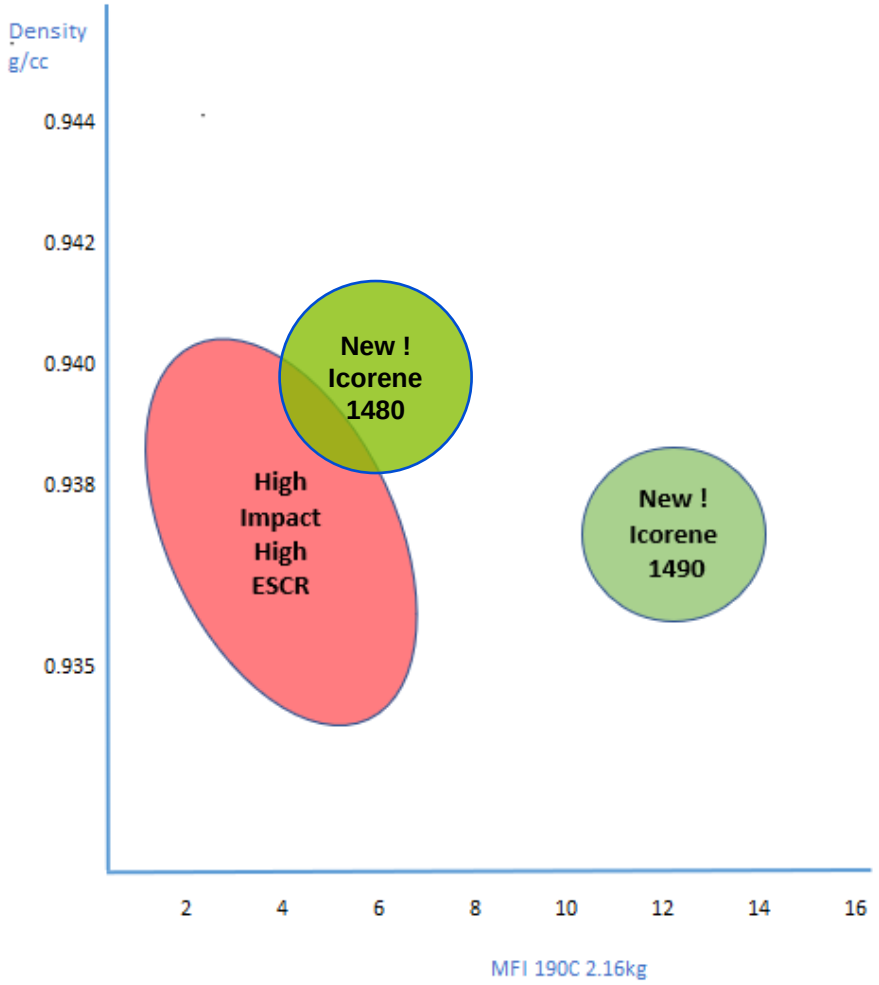
1 Introducing *Icorene* 1480

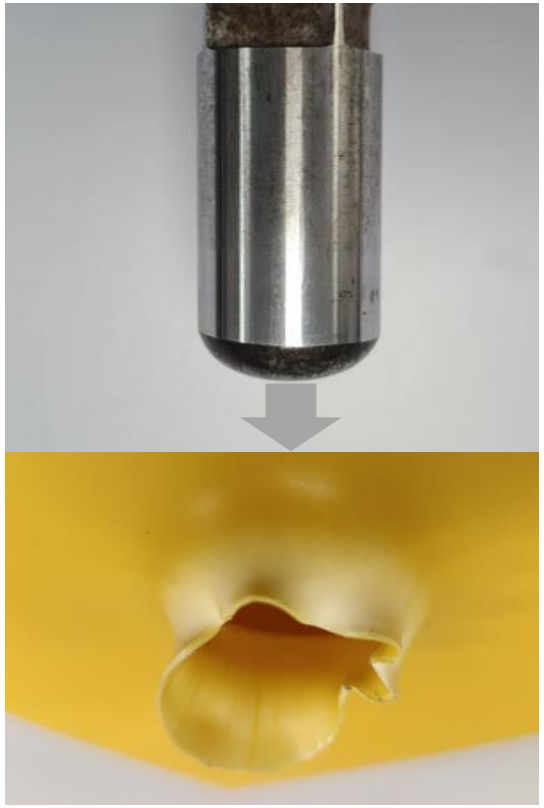
Icorene 1480 – Why our industry needs a new high flow HDPE

LYB is seeking ways to help rotomoulders to reduce their carbon footprint

Icorene 1480 – Introducing “big brother” to *Icorene* 1490

LYB is able to make a high melt flow rate (MFR) PE which has impact and ESCR values more like lower MFR grades





Icorene 1480 – Introduction

Our TDS looks very similar to other TDS of our roto grades. But there is an unusual difference!

Technical Data Sheet

***Icorene* 1480 NAT**

LyondellBasell

High Density Polyethylene

Product Description

Icorene 1480 is a UV stabilised hexene high density polyethylene specifically developed for use in rotational moulding. This grade is typically used by customers to manufacture large tanks, boats and also underground infrastructure parts. *Icorene* 1480 has a wide processing window very good flow, great ESCR and impact strength (especially at low temperatures). This fast melting grade is designed to reduce oven cycle time and use less gas or energy in heating, which can lead to shorter cooling times. It can be moulded to lower than typical PIATs. It is not intended for use in medical and pharmaceutical applications.

Regulatory Status

For regulatory compliance information, see *Icorene* 1480 NAT Product Stewardship Bulletin (PSB) and Safety Data Sheet (SDS).

Availability	Europe
Processing Method	Rotomolding
Attribute	Fast Molding Cycle; High ESCR (Environmental Stress Cracking Resistance); High Rigidity; High Toughness; Low Temperature Impact Resistance; UV Resistant
Forms	Powder
Appearance	Natural Color
Additive	Antioxidant; UV Stabilizer
Application	Agricultural Tanks; Tanks

Typical Properties	Nominal Value	Units	Test Method
Physical			
Melt Flow Rate, (190 °C/2.16 kg)	6.0	g/10 min	ISO 1133
Density	0.940	g/cm³	ISO 1183
Mechanical			
Tensile Modulus	770	MPa	ISO 527
Tensile Strength at Yield	19.0	MPa	ISO 527-1
Flexural Modulus	790	MPa	ISO 178
Tensile Strain at Yield	9.0	%	ISO 527-1
Tensile Strain at Break	>450	%	ISO 527-1
Environmental Stress Crack Resistance			
(Condition B, F50, 10% Igepal, 50 °C)	>1000	hr	ASTM D1693
(Condition B, F50, 100% Igepal, 50 °C)	>1000	hr	ASTM D1693
Impact			
Impact Strength, (-40 °C, 3.20 mm, Rotational Molded)	>75	J	ARM
Hardness			
Shore Hardness, (Shore D, Rotational Molded)	58		ISO 868
Thermal			
Deflection Temperature Under Load Unannealed (0.45 MPa)	>66	°C	ISO 75-2/B

Environmental stress crack resistance (ESCR)

ESCR ASTM D1693 quoted as:

1000 hours for 100% Igepal
+1000 hours for 10% Igepal (actual +2000 hours)

Low temperature impact strength@-40C (ARM)

ARM impact testing: 100% ductile from 150-230 PIAT

Rotomoulded @PIAT 150C, 170C, 190C, 210C, 230C

Icorene 1480 big brother to *Icorene* 1490

***Icorene* 1480 features:**

- *High Stiffness, lower melt flow vs 1490*
- *Fast processing low dripping with thick walls*
- *Excellent impact*
- *Great moulding & release performance*
- *Great final part properties & aesthetics*
- *Process window “widest possible”*

***Icorene* 1490 features:**

- *Super fast processing vs standard LMDPE*
- *Super high impact*
- *Great moulding & release performance*
- *Excellent final part properties & aesthetics*
- *Process window “widest possible”*
- *Powder “just melted” for excellent properties*

How does this work?

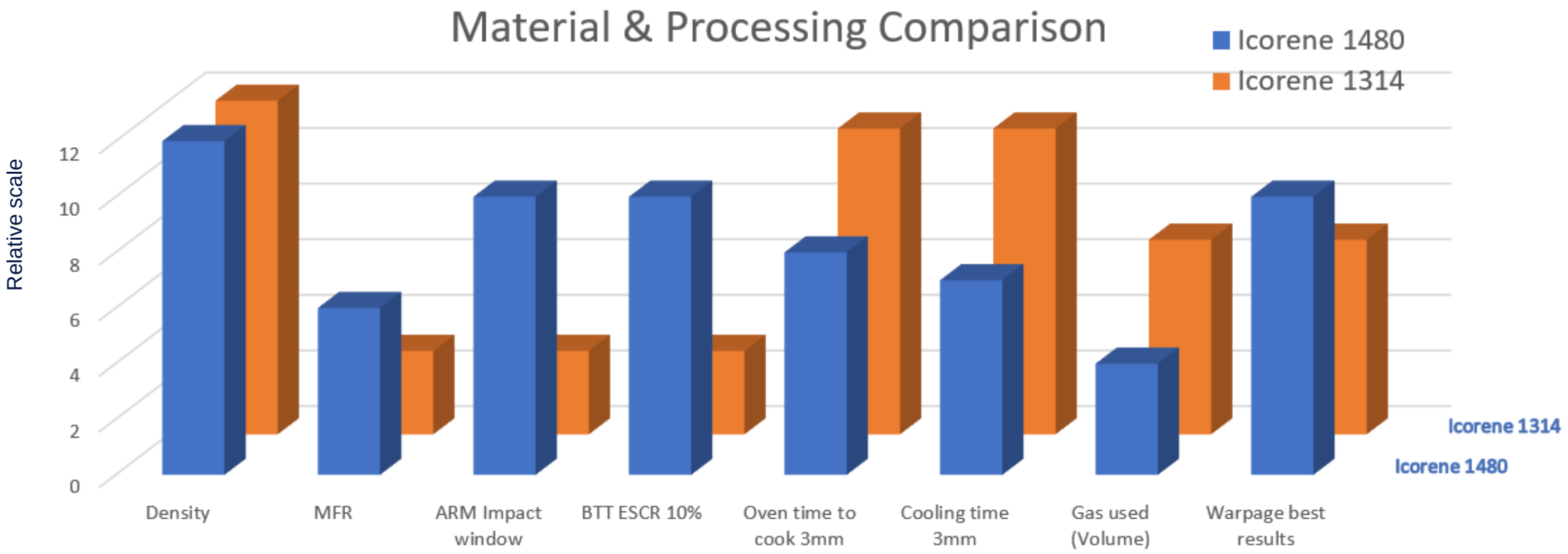
- *To show you the difference the new material 1480 can make we are going show data:*

- *Compare Icorene 1480 processed at 150C PIAT at 4mm thick*
- *With Icorene 1314 processed at 190C PIAT at 4mm thick*

- *If you were making a part using this processing how would the two processes look like?*
- *Surface smoothness outside & INSIDE, bubbles visible inside and out*
- *Process time, process PIAT, Cooling time, Process Gas*
- *Physical properties & show impact pictures*

- *To simulate a thicker tank situation we take a look at the material & processing again at 150C PIAT and 190C PIAT but at 12-13mm thick*

Icorene 1480 melt 6 vs *Icorene* 1314 (C6 939) melt 3



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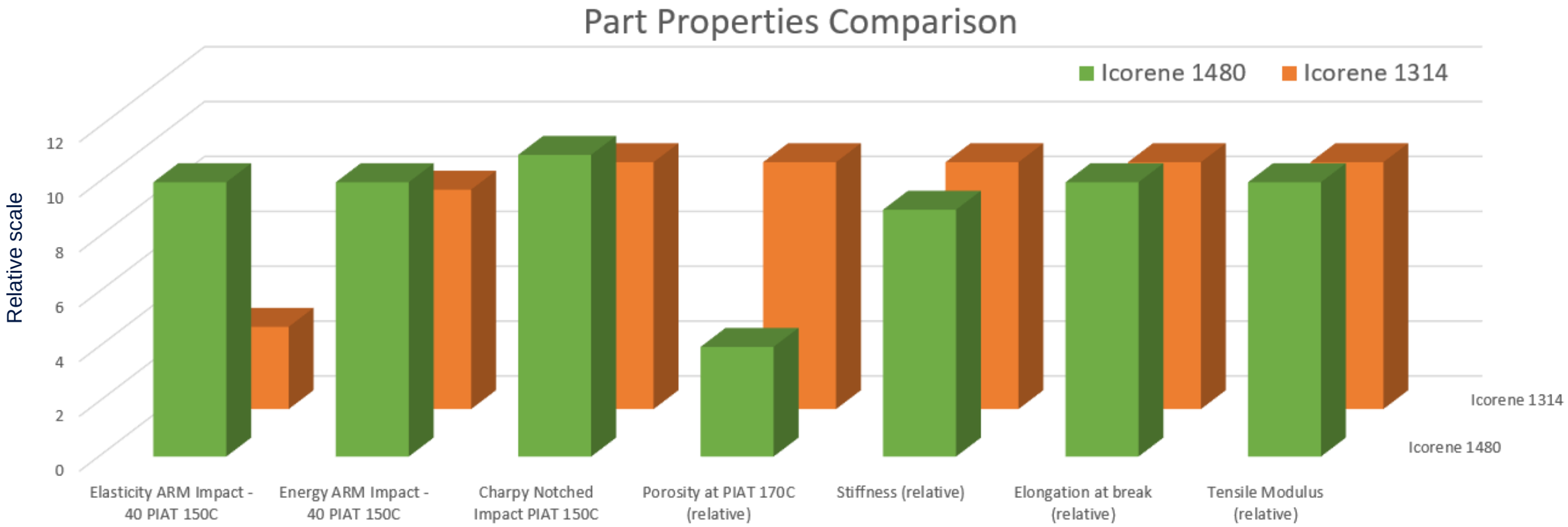


Icorene 1480 – Introduction

Quick review

What can you make with this 6-melt index grade?

Big tanks are NOW made for example in 40 mins cook/40 mins cool vs 60 mins cook/60 mins cool before!

Boats in natural or colours that have shorter cycles, fewer surface pinholes but incredibly high impact strength and better metal insert coverage !

Any stiff mouldings that need to be tough, high ESCR or where moulding time is too long…

2 Comparison *Icorene* 1480 with *Icorene* 1314 in lab rotomoulding

How did we assess the rotomoulded *Icorene* 1480?

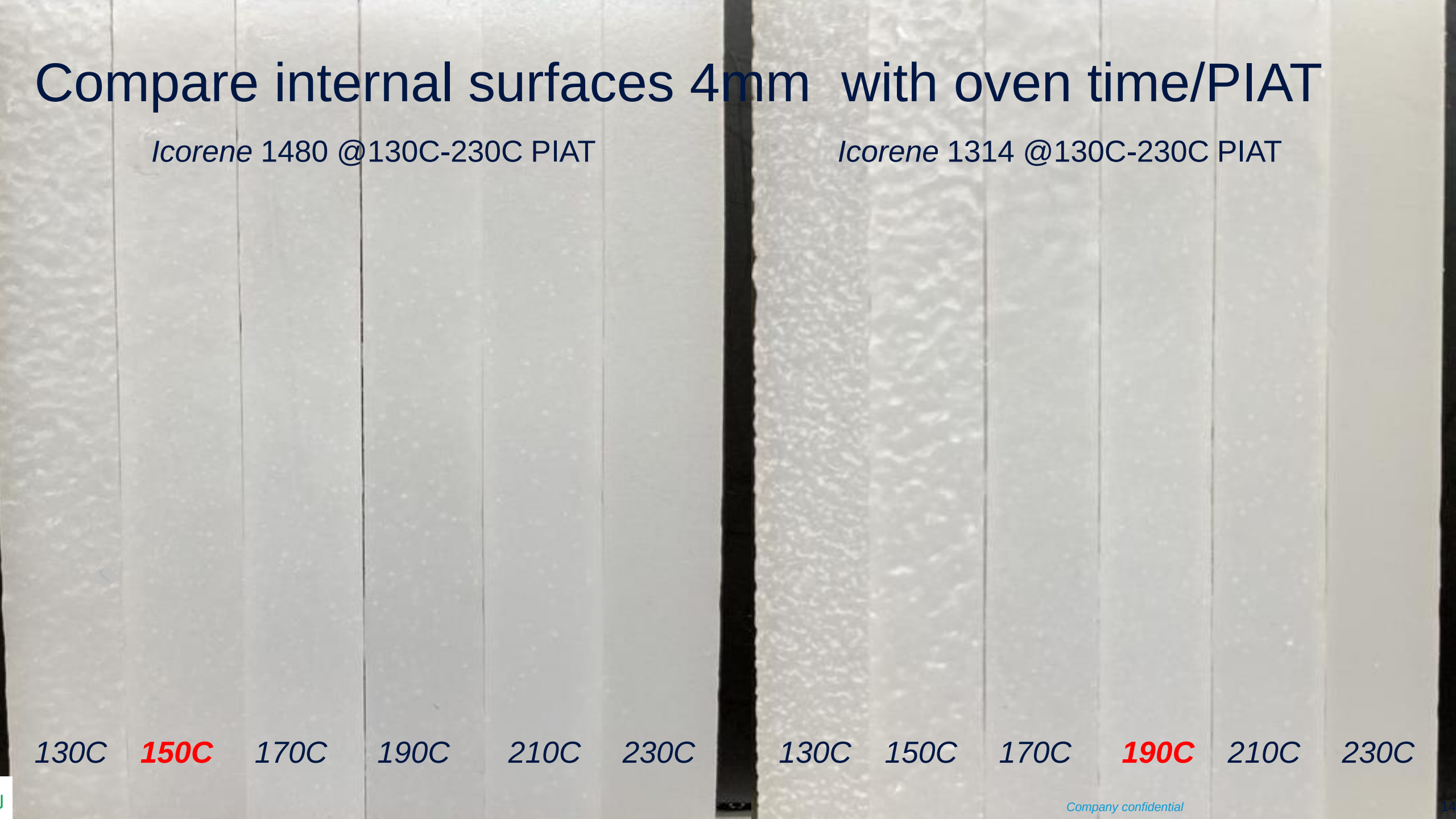
- Lab rotomoulding 3.2mm 4mm 8mm 13mm
- Measure rotomoulding machine gas consumption

- Part testing 3.2mm 4mm 8mm 13mm (We can ARM test 3.2mm but not 13mm)
- Measure part density & bubbles in the wall
- Impact strength
- Stiffness
- Tensile
- Other material testing

Compare internal surfaces 4mm with oven time/PIAT

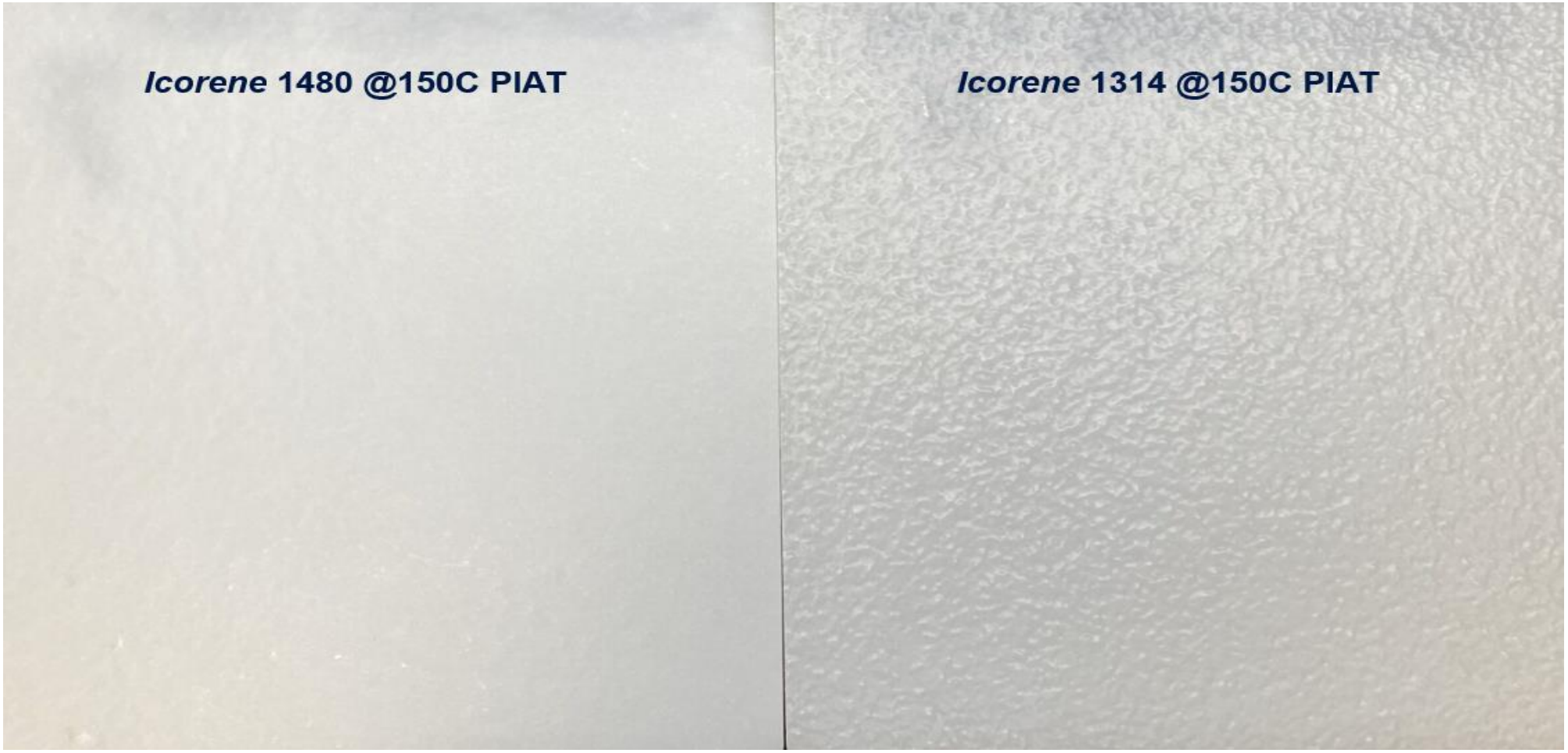
Icorene 1480 @130C-230C PIAT

Icorene 1314 @130C-230C PIAT



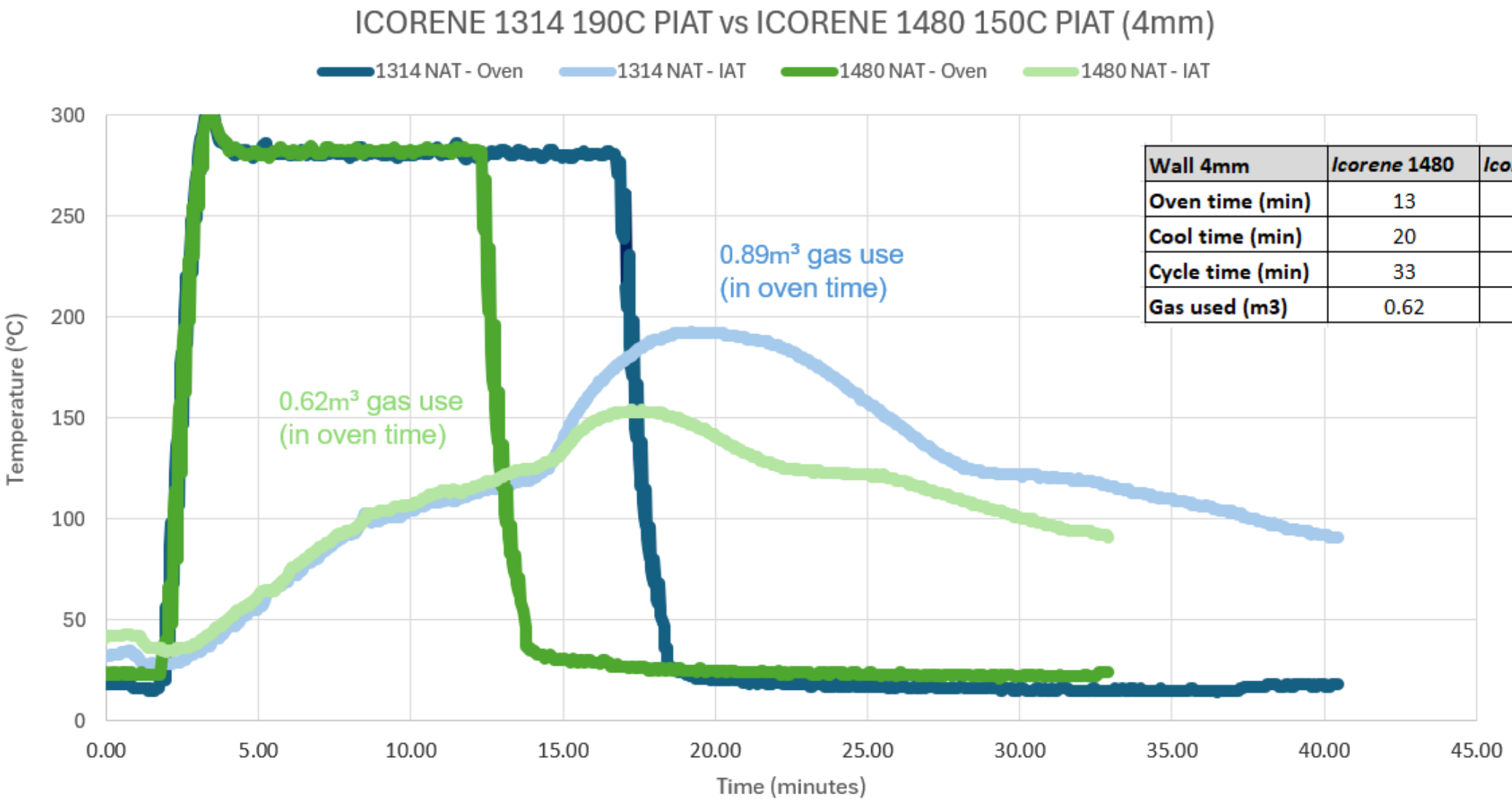
Reduction of required heating time using *Icorene* 1480. Photo inside surface @ 150C PIAT

Same process time to PIAT 150C, 3,2mm, *Icorene* 1480 inner surface smooth & excellent impact strength



Process data – rotolog compare 1480 and 1314 (4mm)

- *Lab data showing the cycle for Icorene 1480 (PIAT 150C) and Icorene 1314 (PIAT 190C) @4mm*



Wall 4mm	*Icorene* 1480	*Icorene* 1314	Saving %
Oven time (min)	13	17	**23.5%**
Cool time (min)	20	24	**16.7%**
Cycle time (min)	33	41	**19.5%**
Gas used (m3)	0.62	0.89	**30.3%**

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Process data – rotolog compare 1480 and 1314 (13mm)

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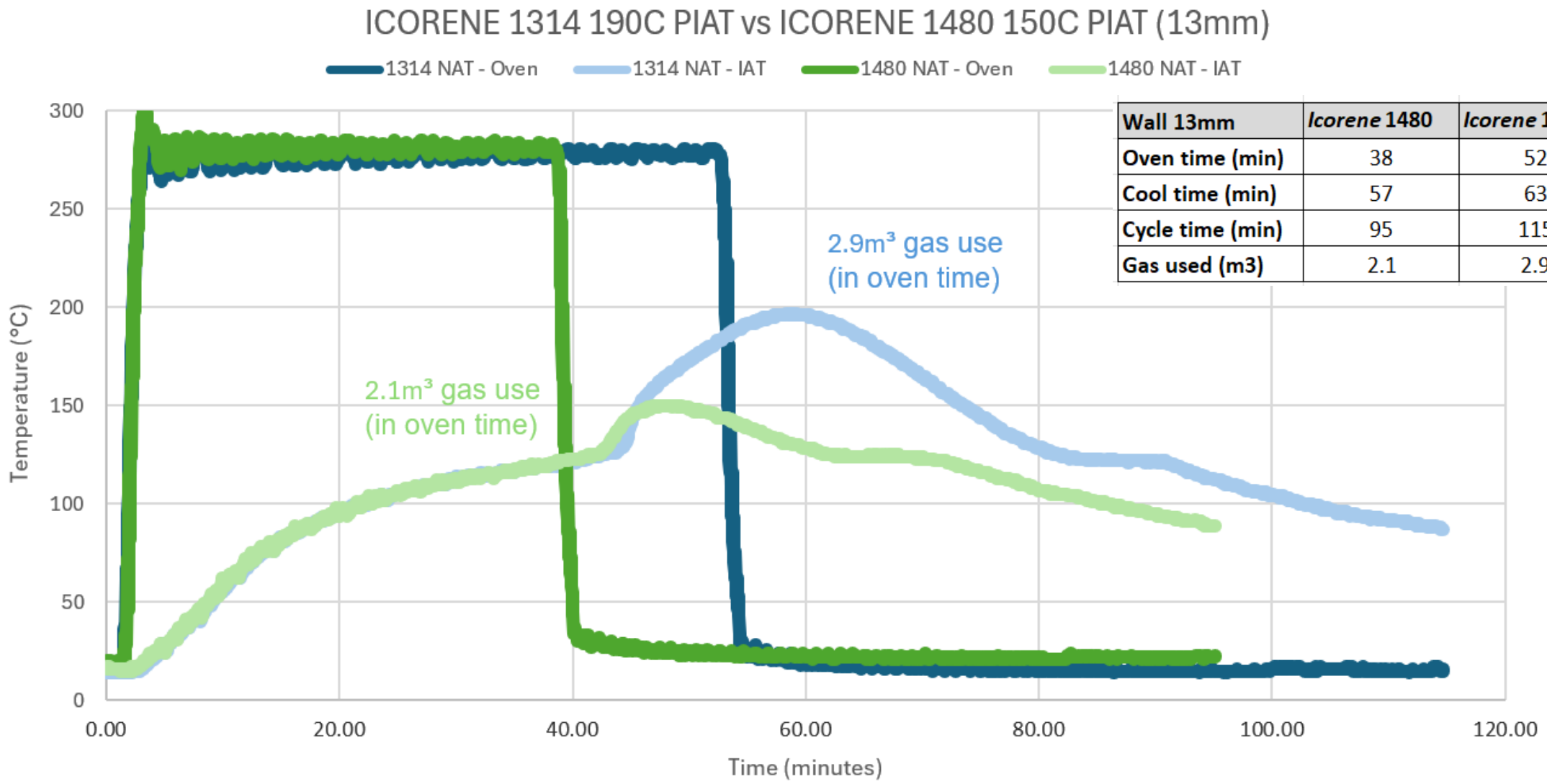

Wall 13mm	*Icorene* 1480	*Icorene* 1314	Saving %
Oven time (min)	38	52	**26.9%**
Cool time (min)	57	63	**9.5%**
Cycle time (min)	95	115	**17.4%**
Gas used (m3)	2.1	2.9	**27.6%**

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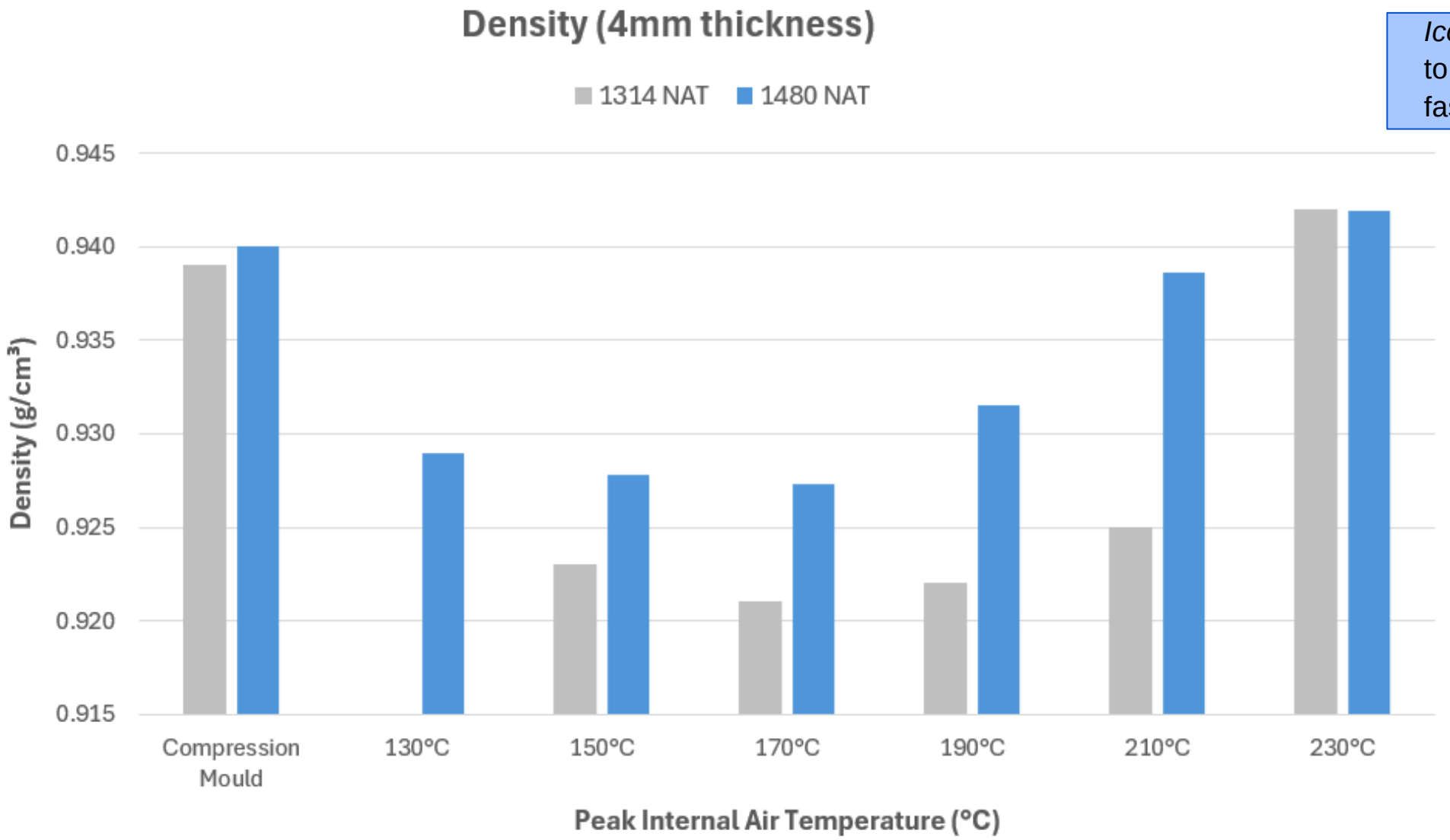
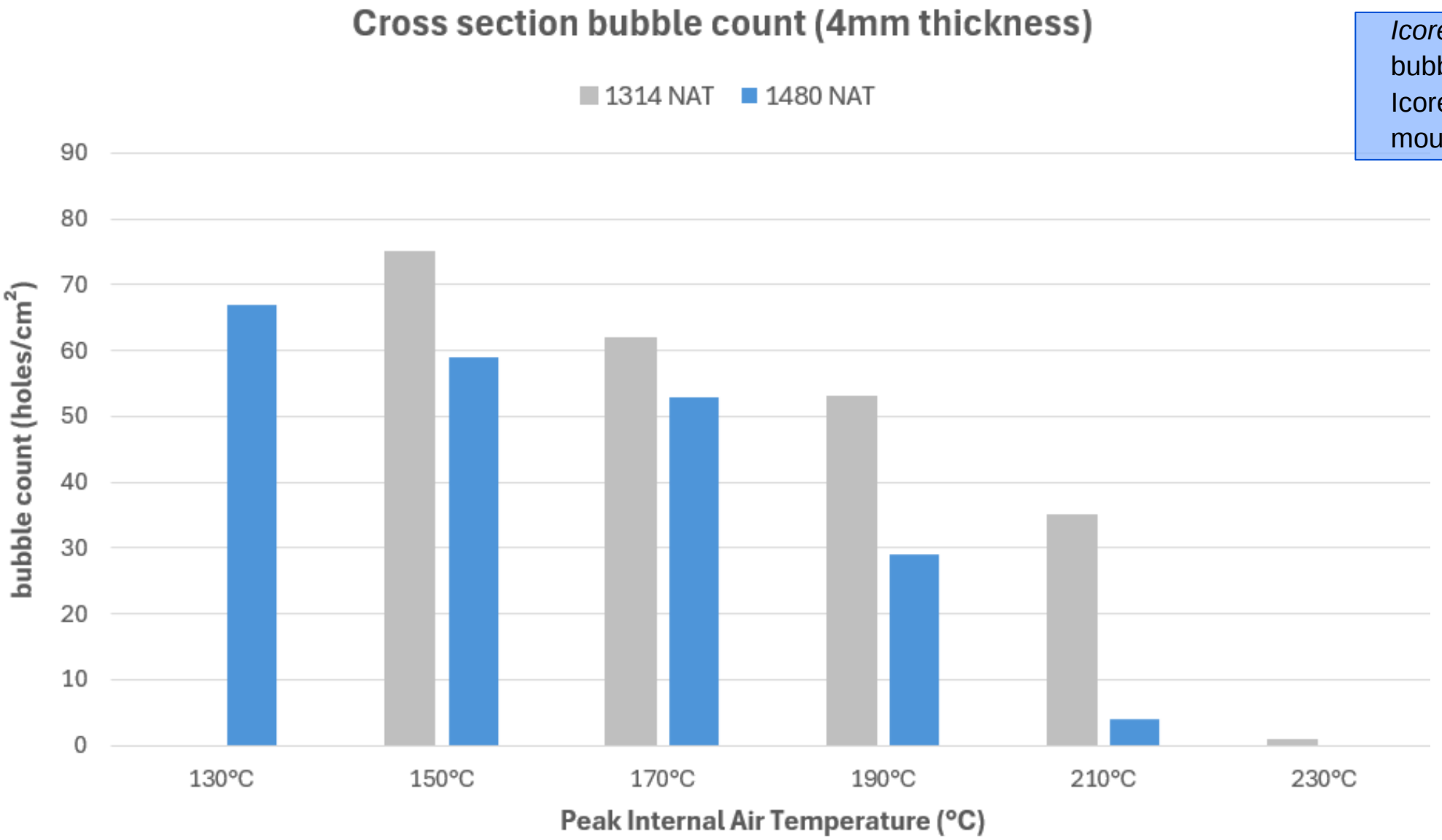
3 Lab rotomoulded property comparison (ISO) *Icorene* 1480 with *Icorene* 1314

Density comparison in rotomoulding 4mm



Icorene 1480 develops close to its target density much faster than *Icorene* 1314

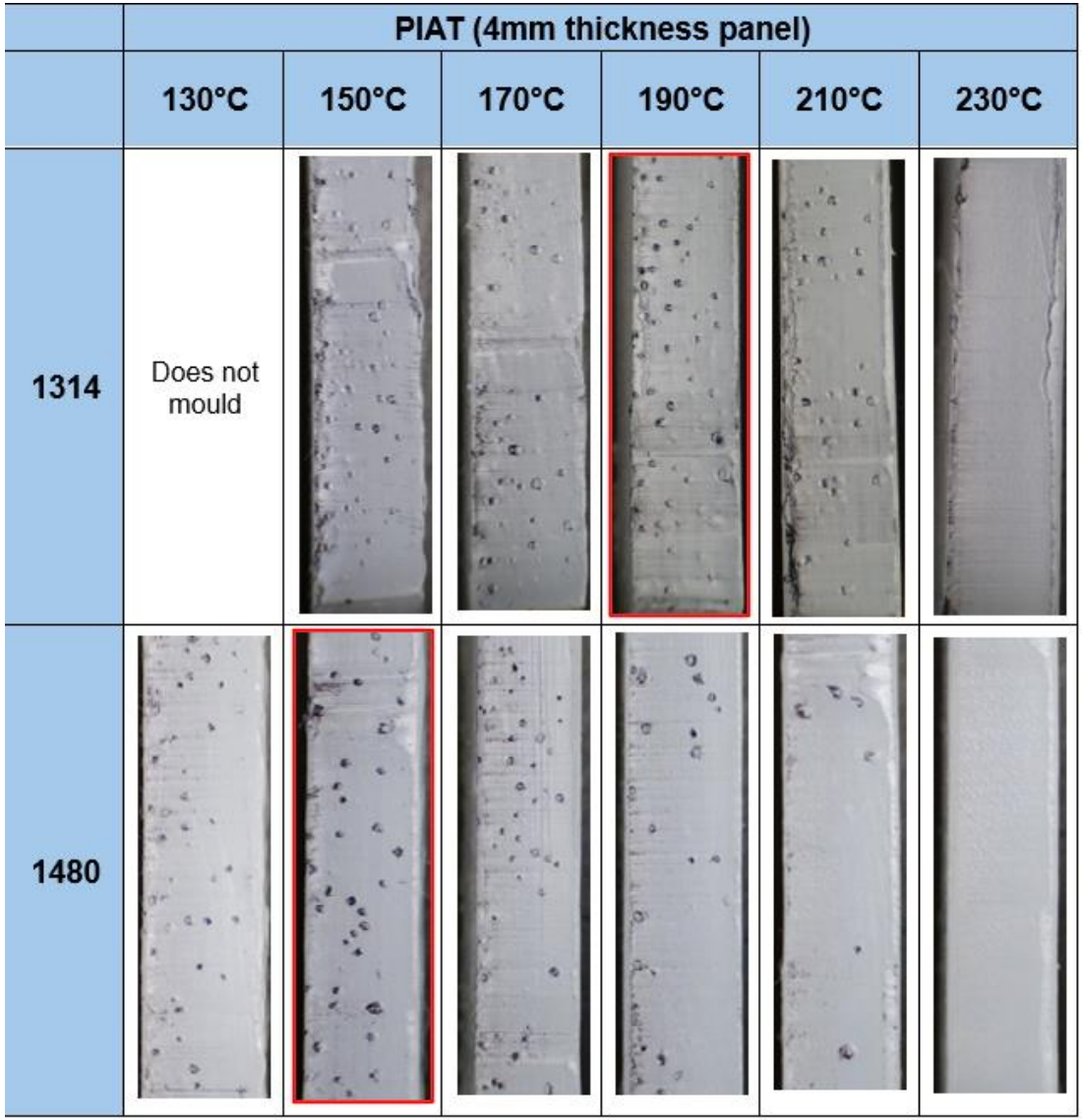
Bubble removal rate comparison



Icorene 1480 removes the bubbles much faster than Icorene 1314 which did not mould at 130C

Lab moulding *Icorene* 1480 vs *Icorene* 1314 at **4mm**

- Compare Icorene 1480 @150C vs Icorene 1314 @190C PIAT
- Bubbles in the wall for Icorene 1314 create brittleness eg PIAT 150C
- Fewer bubbles for Icorene 1480 in general vs 1314. However, near zero brittleness for 1480 created by presence of bubbles!!



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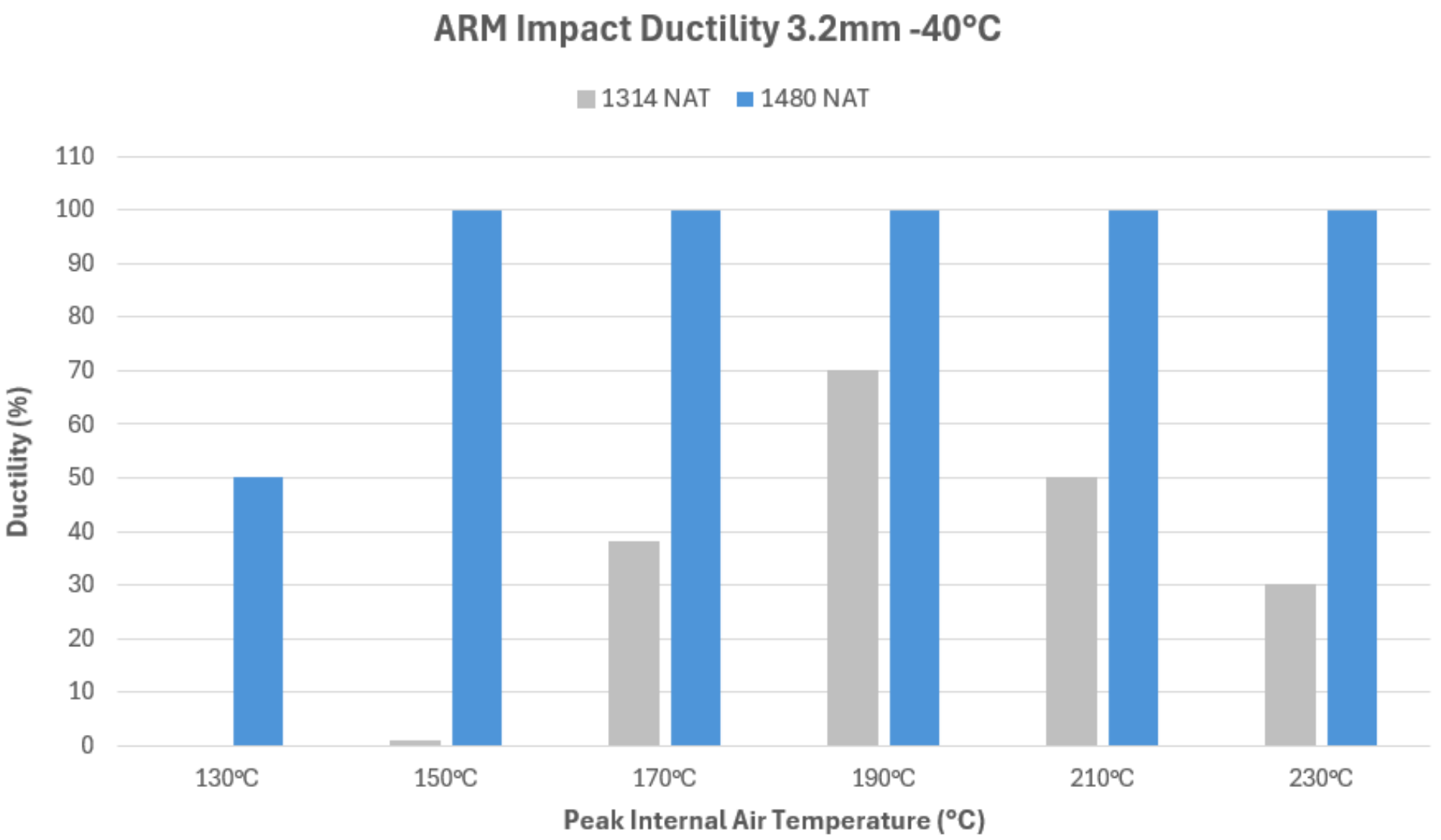
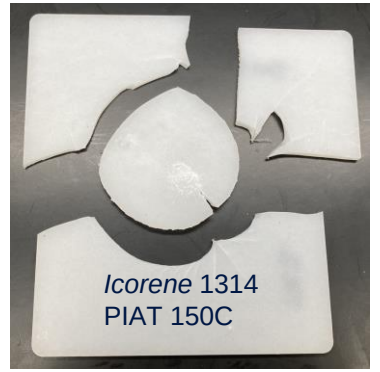
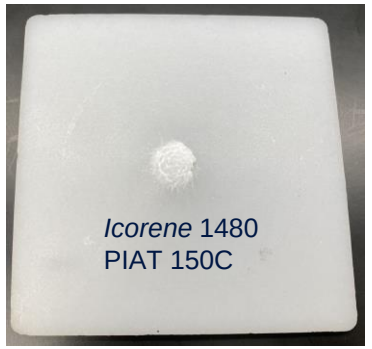
ARM impact **ductility** -40C Compare 3.2mm data



Icorene 1480 has a very wide -40C impact ductility window compared with *Icorene* 1314. *Icorene* 1480 is tough at all processing PIATS used





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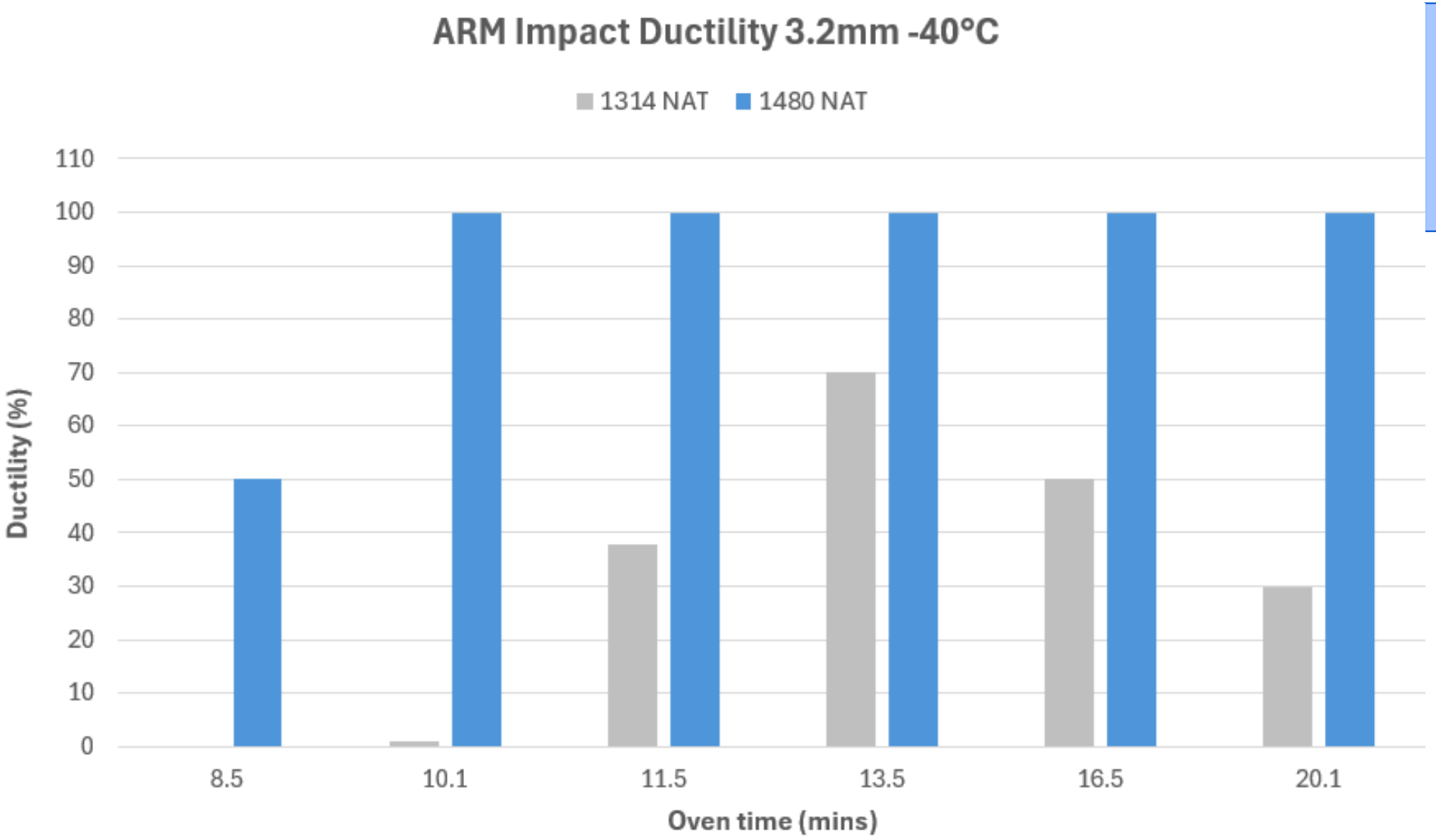
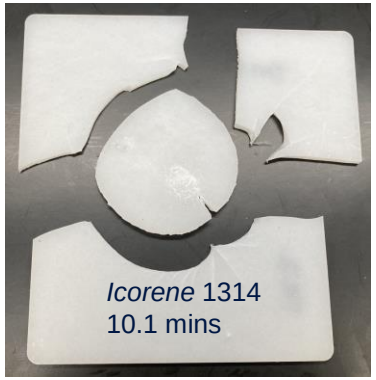
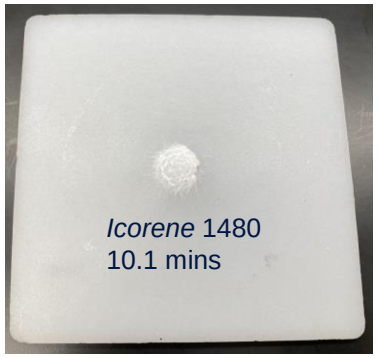


Icorene 1480 has a very wide impact ductility window compared with *Icorene* 1314. *Icorene* 1480 is tough at all oven processing times used

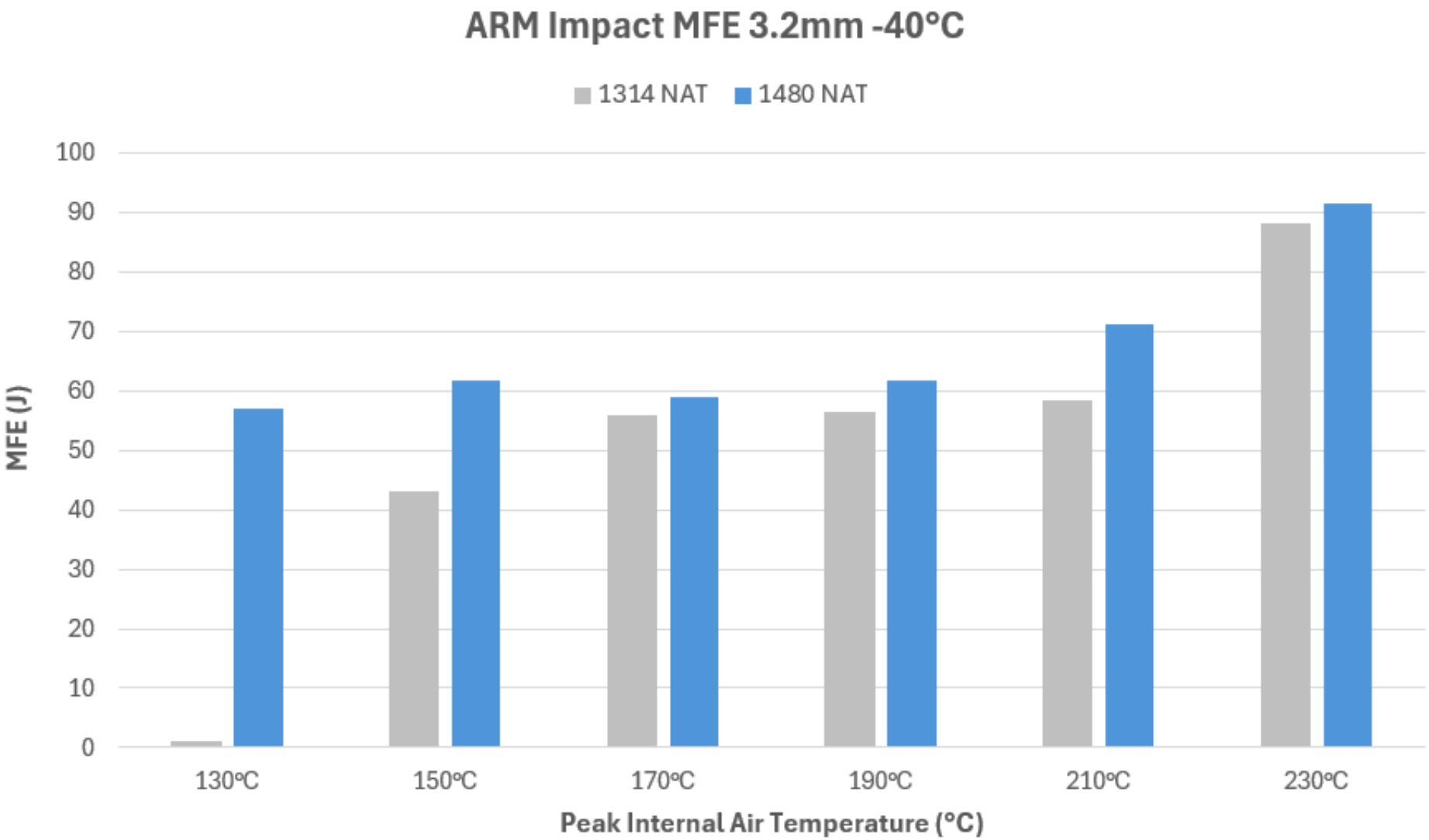




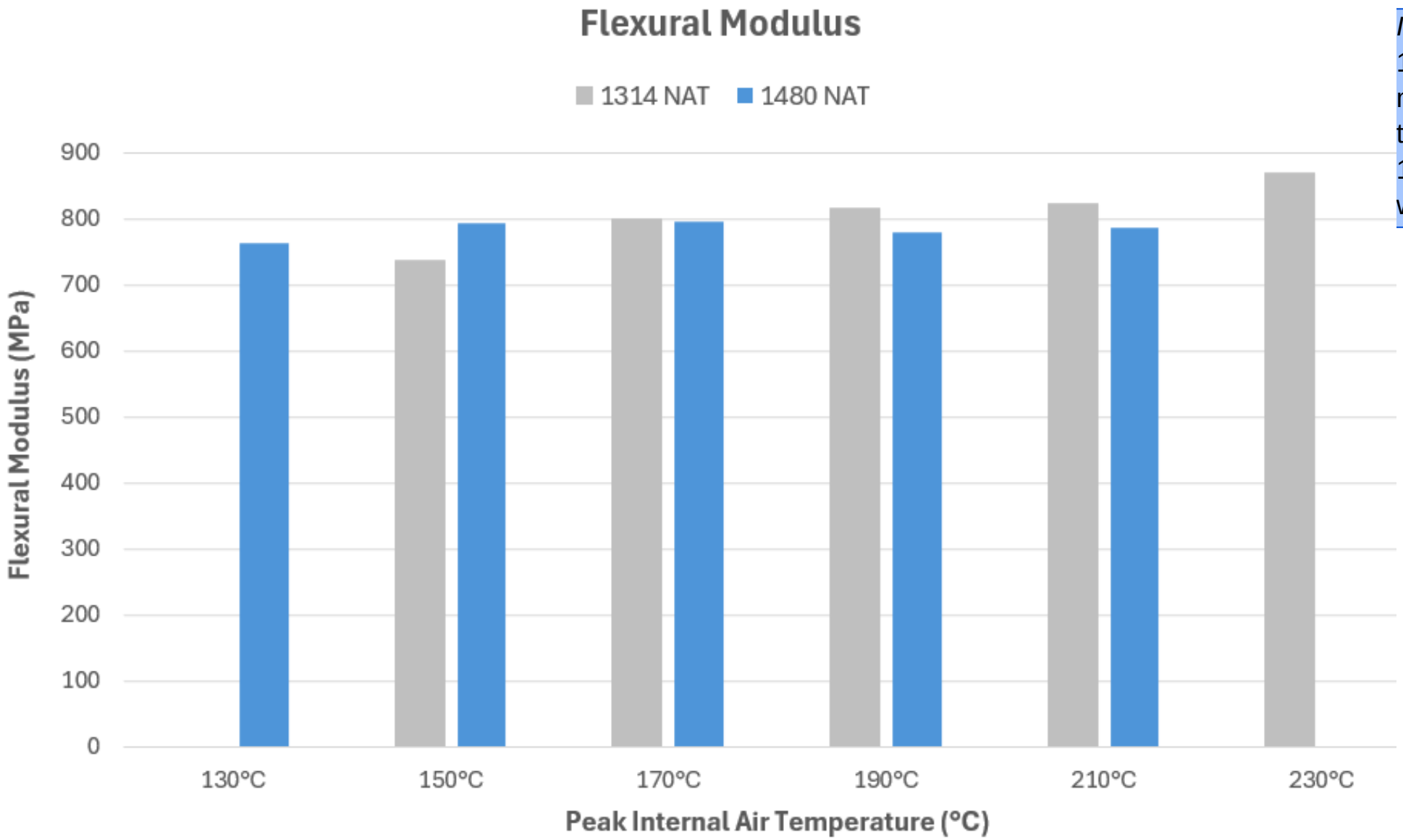
ARM impact at -40C Compare 3.2mm data

- Icorene 1480 develops higher impact strength earlier than Icorene 1314

Icorene 1480 develops impact resistance at low PIAT and is elastic at all PIATS

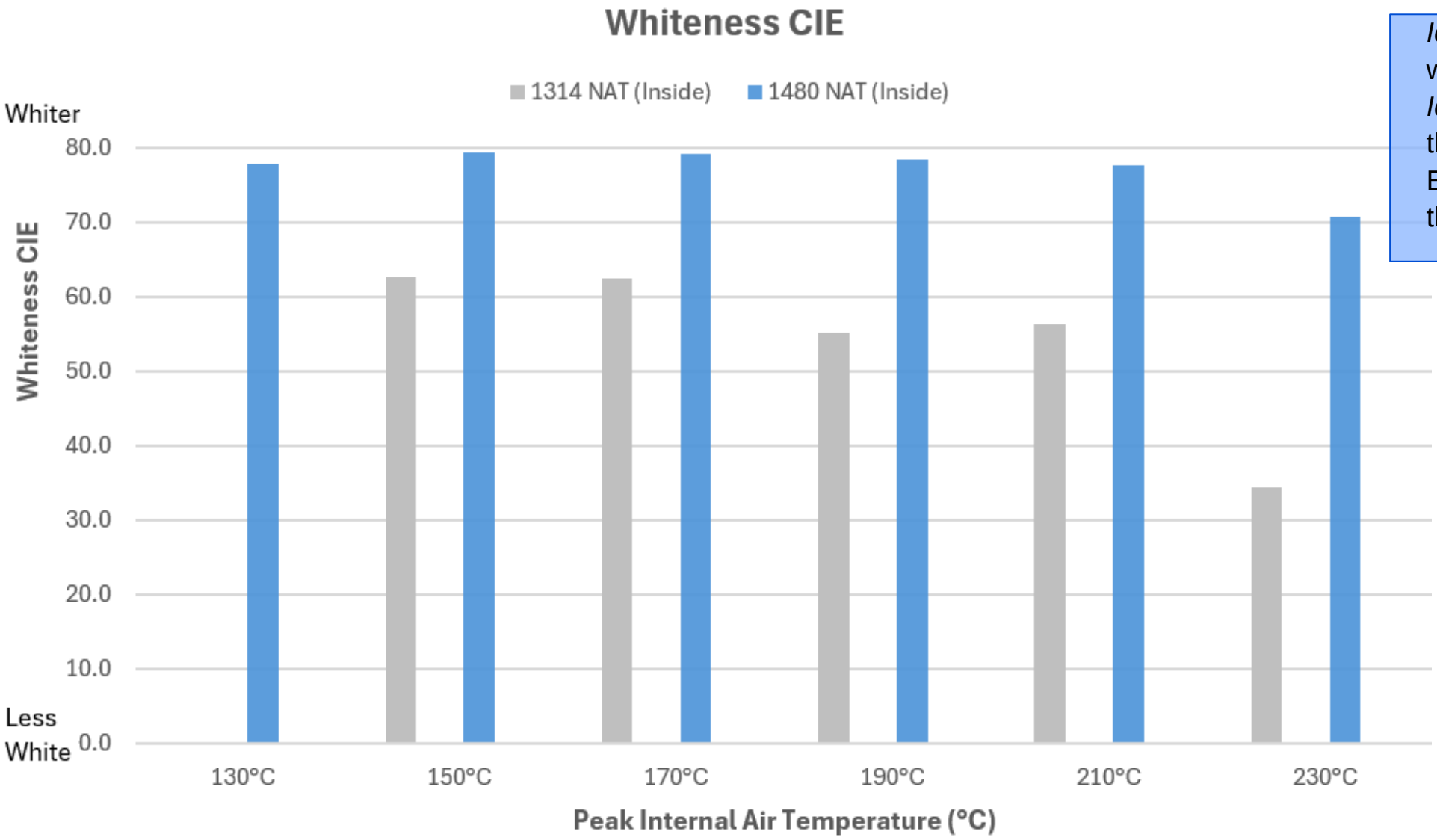


Flexural modulus comparison 4mm data



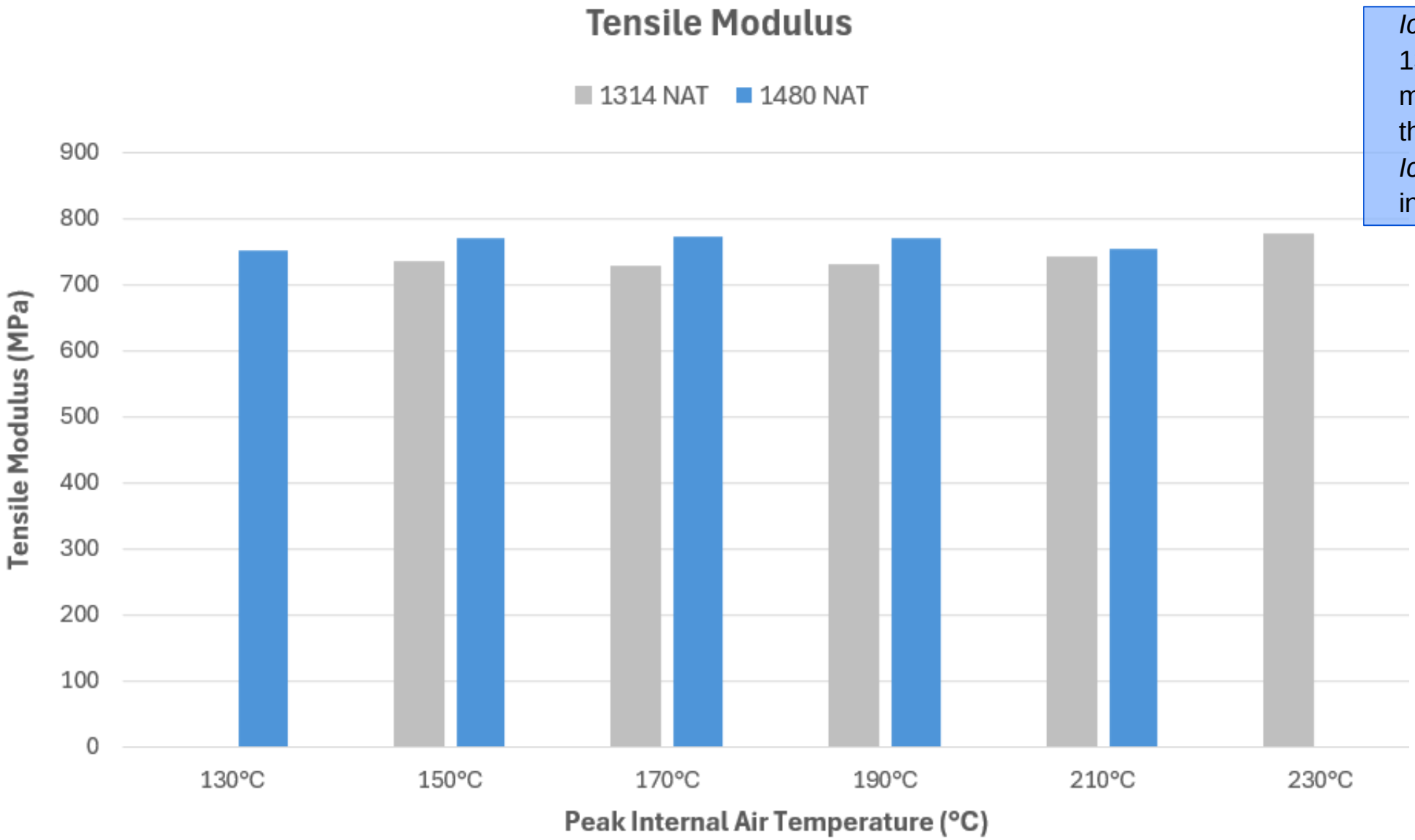
Icorene 1480 and *Icorene* 1314 have a similar flexural modulus at 4mm under these conditions. *Icorene* 1314 modulus increases when overcooked

Whiteness (inside surface) compare 4mm data



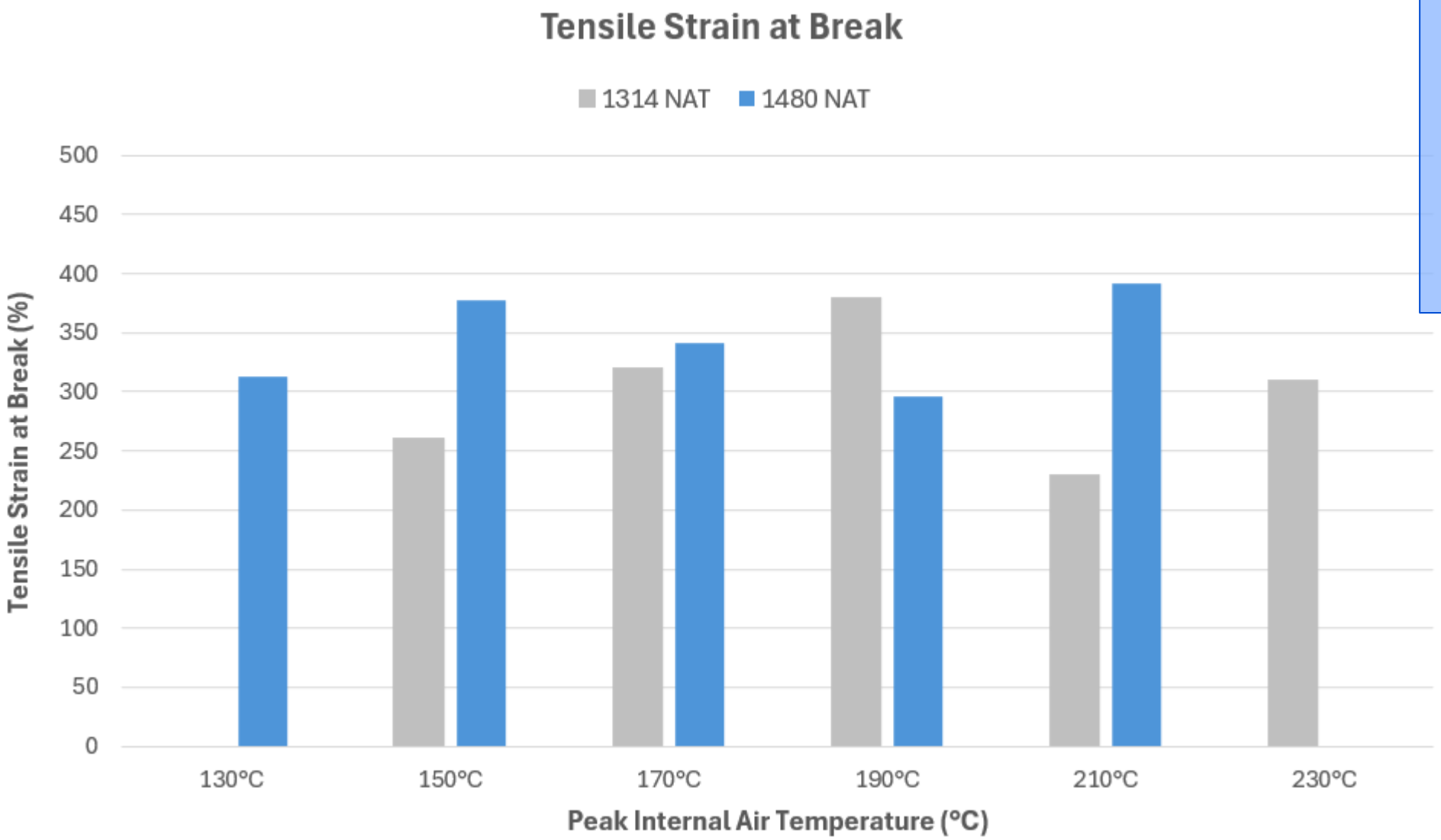
Icorene 1480 has better whiteness inside than *Icorene* 1314 at 4mm under these ISO conditions. Exterior whiteness follows the same trend.

Tensile modulus comparison 4mm data



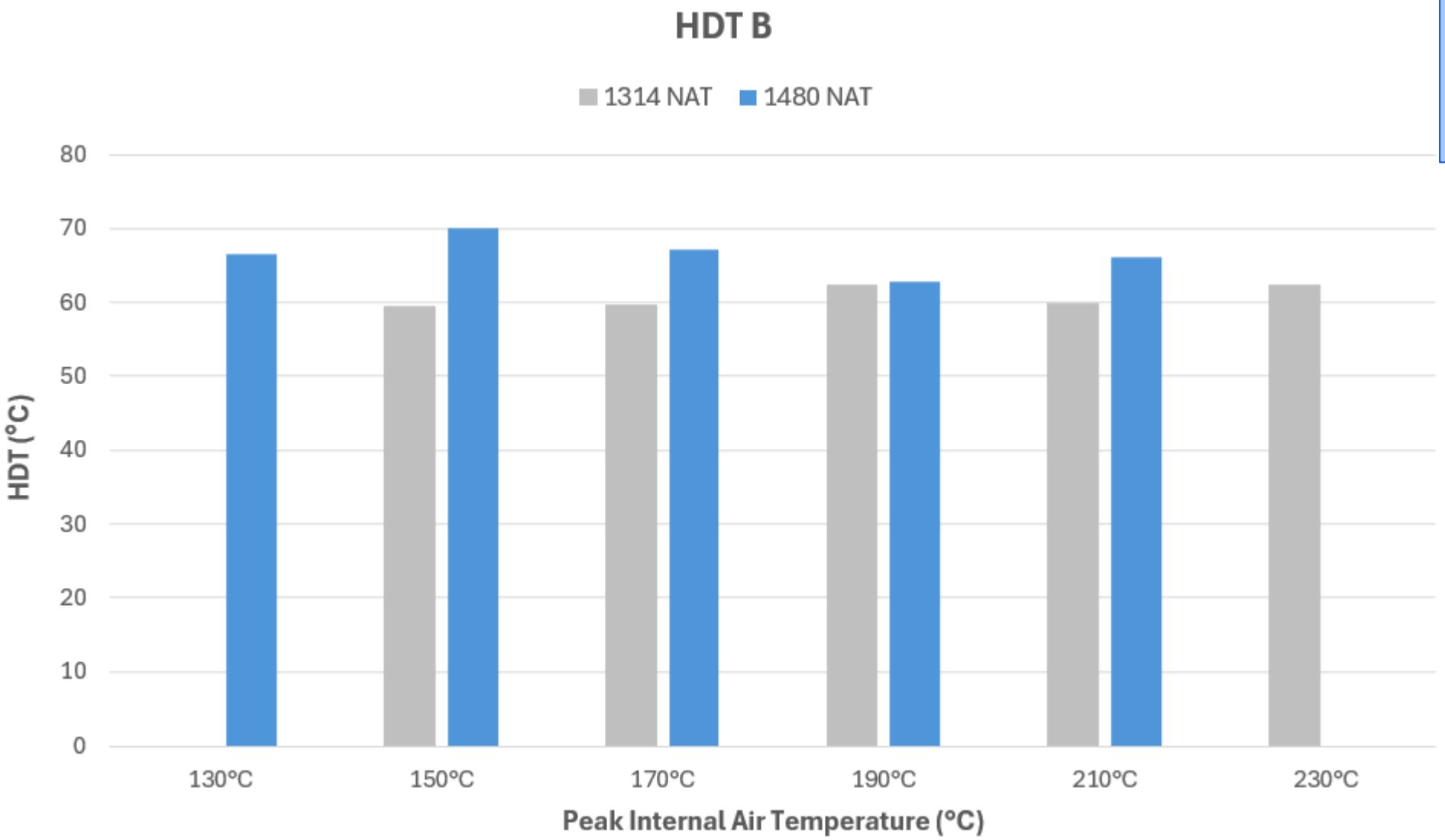
Icorene 1480 and *Icorene* 1314 have a similar tensile modulus at 4mm under these ISO conditions. *Icorene* 1314 modulus increases when overcooked

Tensile elongation comparison 4mm data



Icorene 1480 and *Icorene* 1314 have a similar tensile elongation at break at 4mm under these ISO conditions.
Icorene 1314 decreases when undercooked.
Icorene 1480 has great elongation even when at low PIAT

Heat Distortion Temperature (HDT) Compare 4mm data



Icorene 1480 has slightly higher HDT than *Icorene* 1314 at 4mm under these ISO conditions.

Icorene 1480 vs 1314 at 3.2mm & 4mm

- *Summary of the two materials in the lab test*

Property	Conditions	Method	Unit	Icorene 1480	Icorene 1314
Melt Flow Rate	(190 °C/2.16 kg)	ISO 1133	g/10 min	6	3
Density	Compression moulded	ISO 1183	g/cm³	0.940	0.939
Environmental Stress Crack Resistance	(Condition B, F50, 10% Igepal, 50 °C)	ASTM D1693	hr	>1000	>300
Environmental Stress Crack Resistance	(Condition B, F50, 100% Igepal, 50 °C)	ASTM D1693	hr	>1000	>1000
Tensile Modulus*		ISO 527	MPa	760	730
Tensile Strength at Yield*	(23 °C, Type I)	ISO 527	MPa	18	19
Tensile Elongation at Break*	(23 °C)	ISO 527	%	380	380
Flexural Modulus*	(23 °C)	ISO 178	MPa	790	815
Impact Strength (ductility)*	(-40 °C, 3.20 mm, Rotational Moulded)	ARM PIAT 150C	J	62 (100%)	43 (0%)
Impact Strength (ductility)*	(-40 °C, 3.20 mm, Rotational Moulded)	ARM PIAT 190C	J	63 (100%)	56 (70%)
Charpy Notched*	(-30 °C, 4 mm, Rotational Moulded)	ISO 179-1/1eA	kJ/m2	6.1	5.5
Deflection Temperature Under Load *	Unannealed (0.45 MPa)	ISO 75-2/B	°C	70	62
Melting Temperature		DSC	°C	127	127

*Icorene 1480 LAB test values rotomoulded at 3.2mm or 4mm PIAT 150C

*Icorene 1314 LAB test values rotomoulded at 3.2mm or 4mm PIAT 190C

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Inspiration to save CO2

Conclusion: *Icorene* 1480

- The wide process window vs standard materials means that you can be ***flexible in your process times*** – so long as you and your customers are happy with the inside and outside finish.
- Property testing of the *Icorene* 1480 has been done across *the whole process window* and it varies very little in terms of toughness. This means that there is ***no more anxiety about "correct" processing***
- The higher MFR for *Icorene* 1480 will for sure give you a **smoother inside finish *earlier*** in the cycle and better insert coverage or flow into tight areas compared with your current tank grade
- If you select a shorter oven time using *Icorene* 1480 you will get a shorter cooling time and *you* ***will save*** both time and money and the carbon footprint will be reduced.
- With Shorter process time ***productivity will increase*** and your production capacity will increase
- We invite you to try *Icorene 1480* and **see for yourself**!

For more information about *Icorene* 1480

For arranging a full technical discussion about how *Icorene* 1480 can benefit your business or if you would like a trial? please make contact with your local LYB salesperson.

THANK YOU!

John Steele, Technical Service Manager

John.Steele@lyondellbasell.com

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