

## AS A MARKET LEADER OF CURING AGENTS, MLPC HAS DEVELOPED A NEW SOLUTION TO REPLACE ETU

### MLPC OFFERS A "REACH" SAFE SOLUTION

#### 5,5'-dithiobis(1,3,4-thiadiazole-2-thiol)

CLASSIFICATION (REGULATION (EC) NO 1272/2008):  
 ORAL: ACUTE TOXICITY, 4, H302  
 SKIN IRRITATION, 2, H315  
 SERIOUS EYE DAMAGE, 1, H318

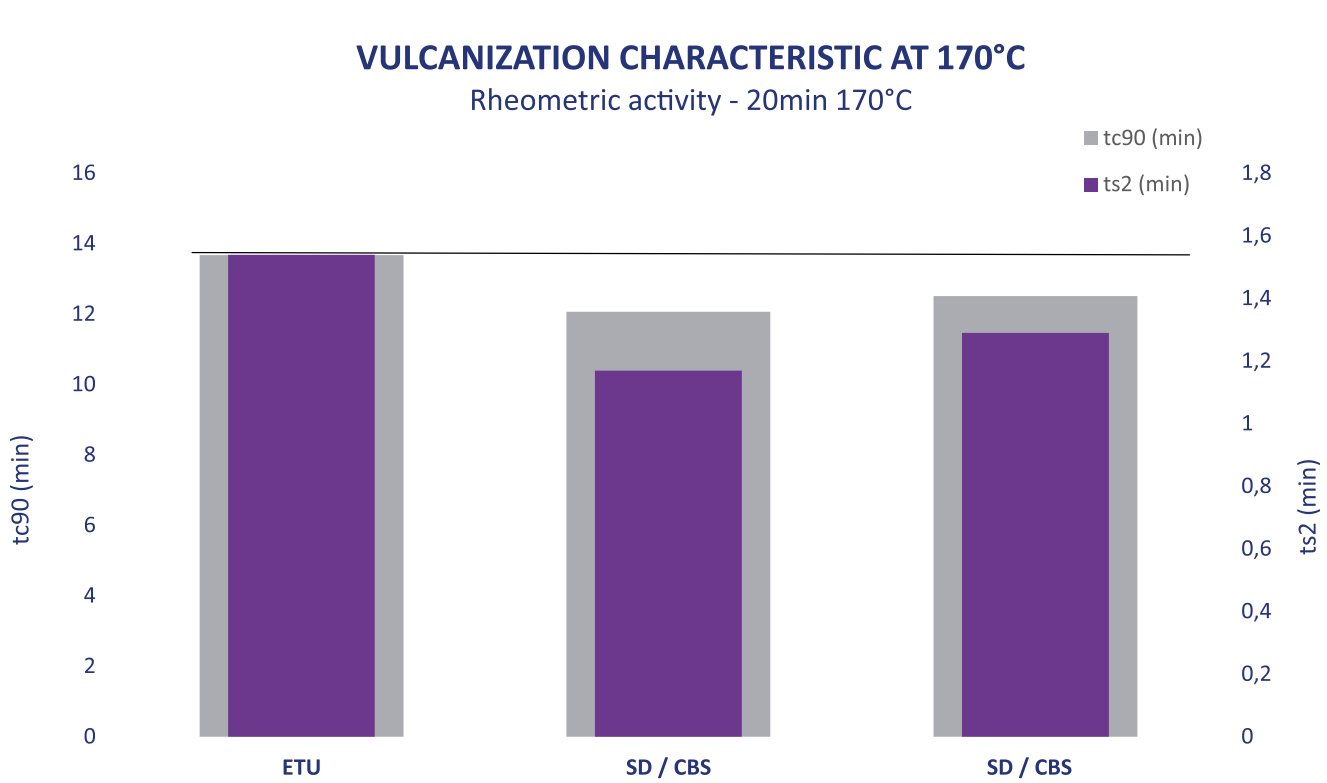
## MLPC PROPOSES TWO SAFE VULCANIZATION SOLUTIONS WITH ZnO REDUCTION

	REFERENCE COMPOUND	SOLUTION 1	SOLUTION 2
	ETU	SD / CBS MBTS	SD / CBS S + CTPI
REFERENCE RECIPE	198	198	198
MIXLAND+ ZnO 80 GA F140	6.25	3.75	3.75
MIXLAND+ ETU 80 GA F140	0.75		
MIXLAND+ SD 75 GA F250		1	1
MIXLAND+ CBS 80 GA F140		0.2	0.2
MIXLAND+ MBTS 75 GA F140		2	
MIXLAND+ SM300 80 GA F140			0.25
MIXLAND+ CTPI 80 GA F500			1

## RESULTS OF EXPERIMENTAL PLAN

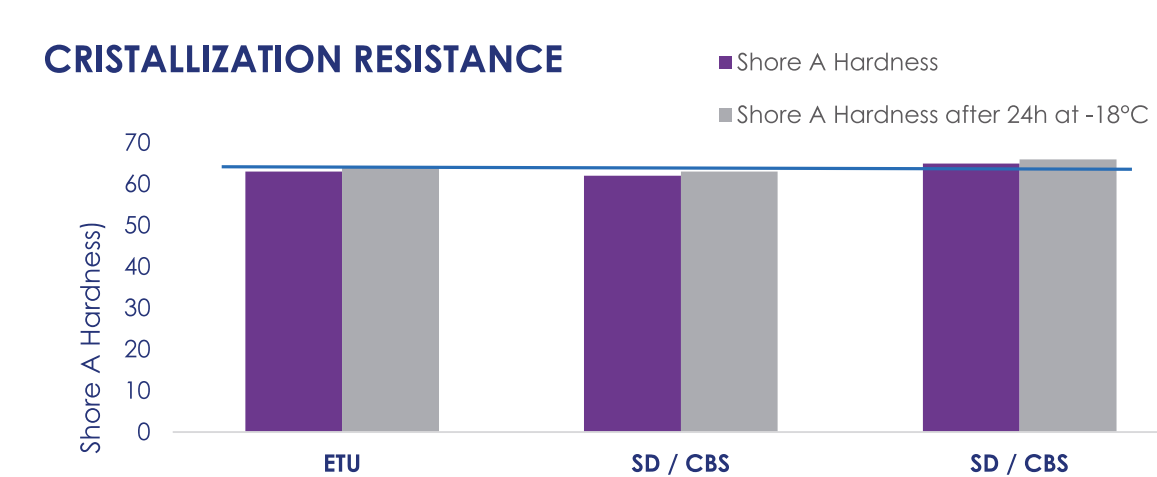
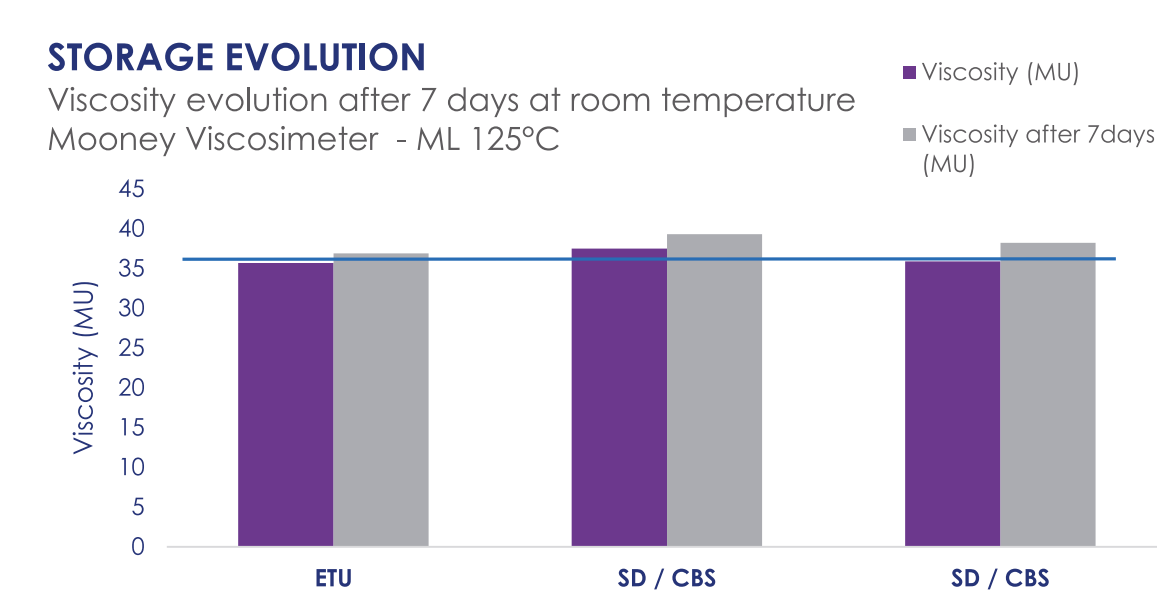
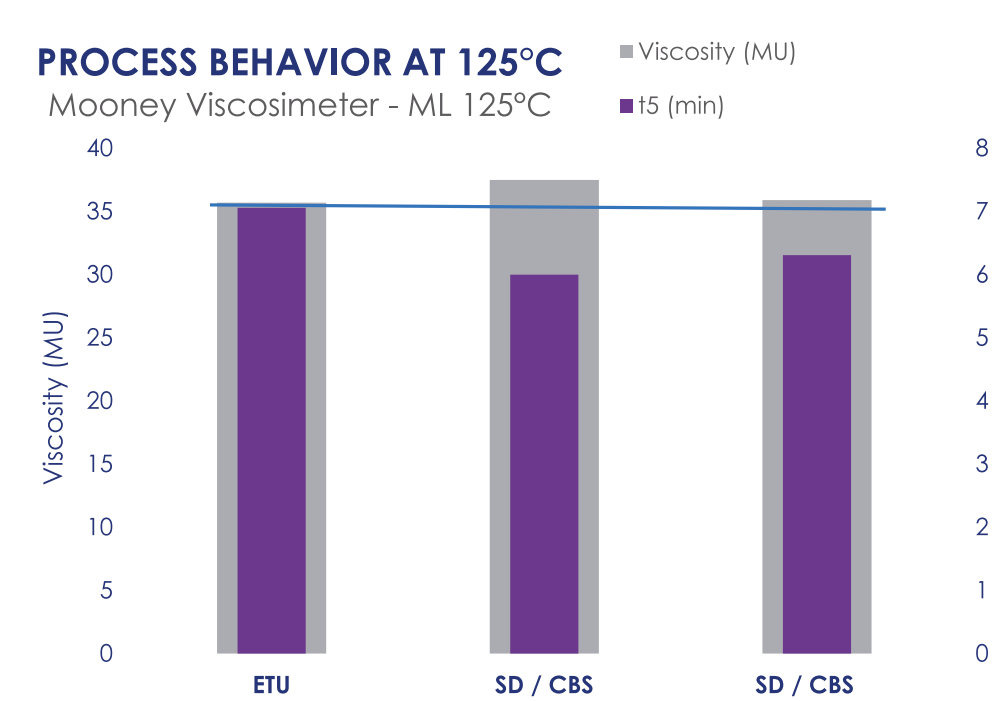
### RHEOMETRICAL BEHAVIOR

- Both SD solutions are **MORE EFFECTIVE** than ETU
- The cure rate is **MUCH BETTER** with MBTS
- The formulation with S and CTPI **IMPROVES THE SCORCH TIME**



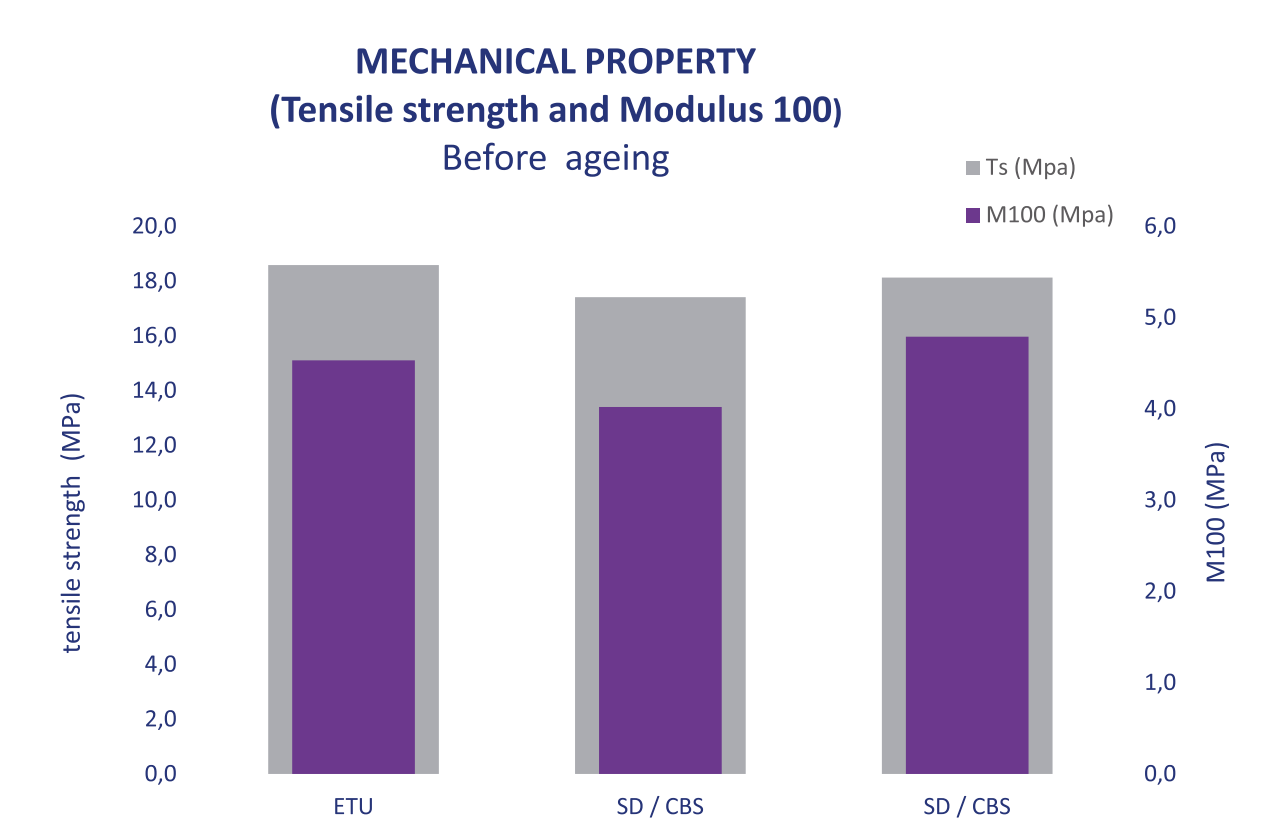
### PROCESS BEHAVIOR AND STORAGE STABILITY

- IMPROVEMENT OF SCORCH TIME** with the S and CTPI alternative solution
- Both SD solutions are **AS STABLE AS ETU** (same viscosity and hardness)



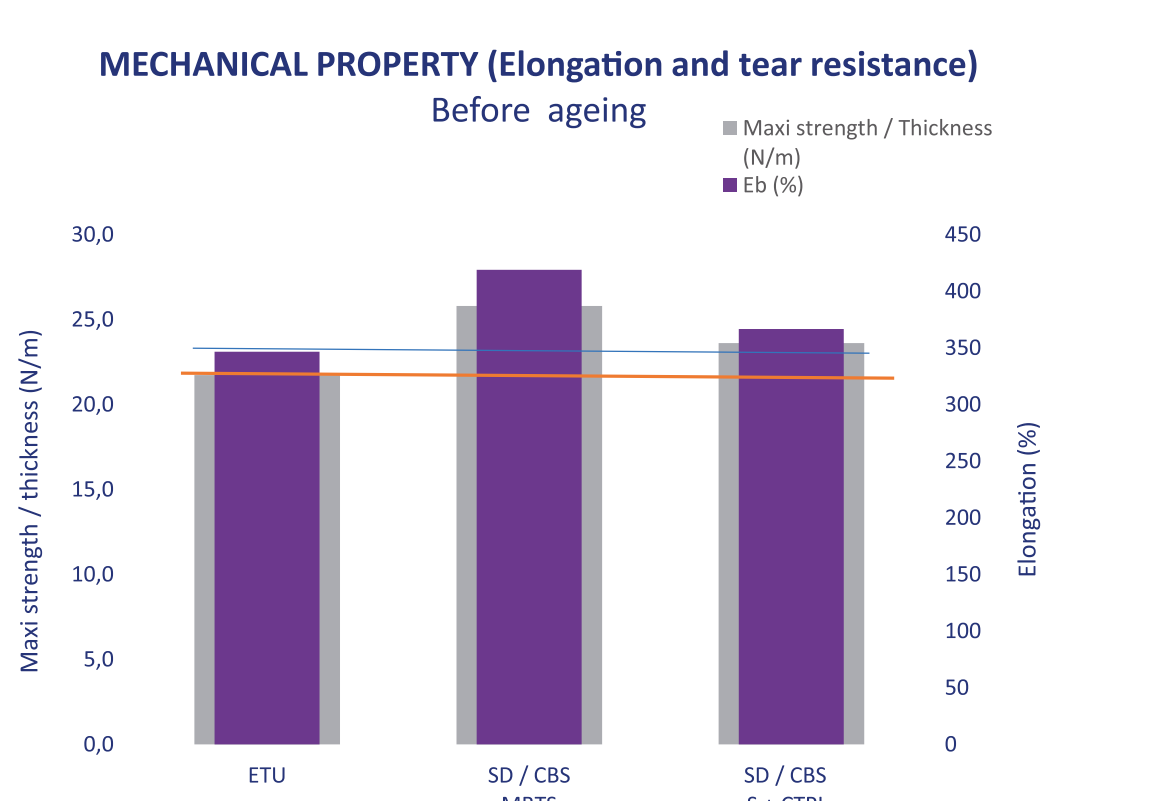
### CROSSLINKING DENSITY

- With S and CTPI: better modulus at 100% results
- >> HIGHER CROSSLINKING DENSITY**



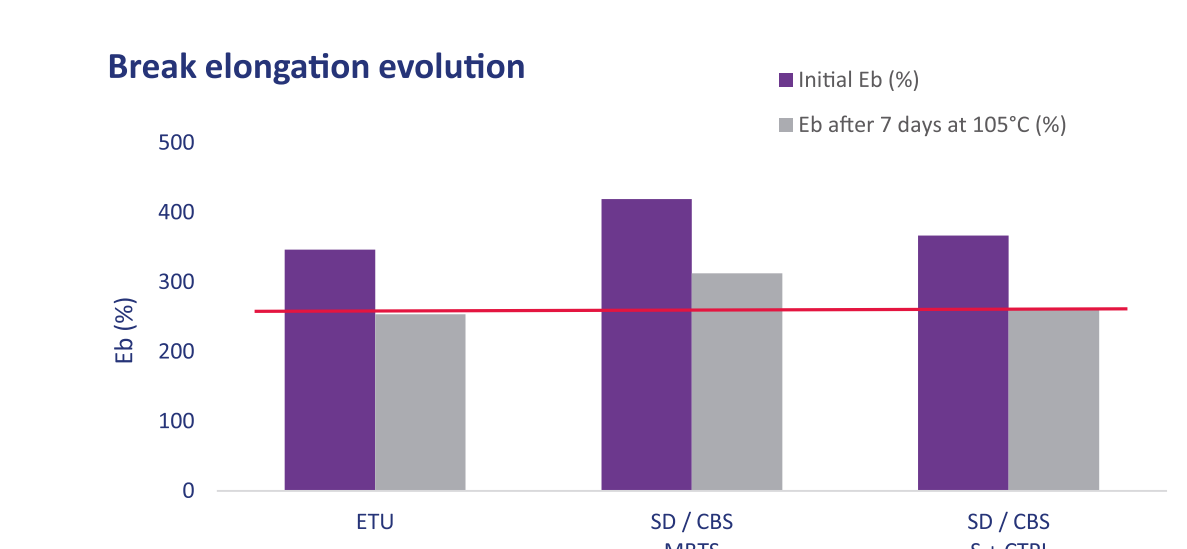
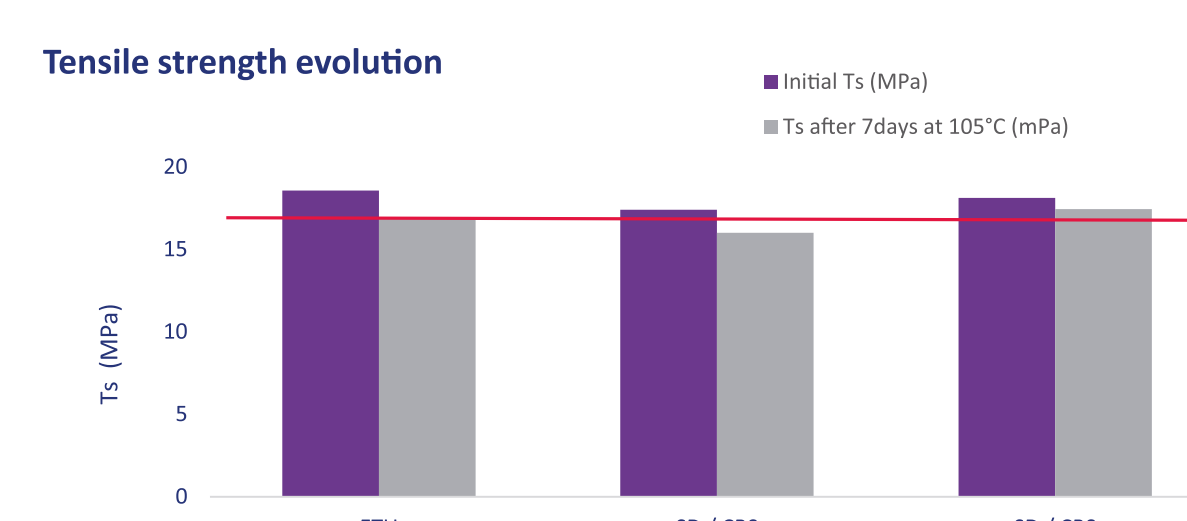
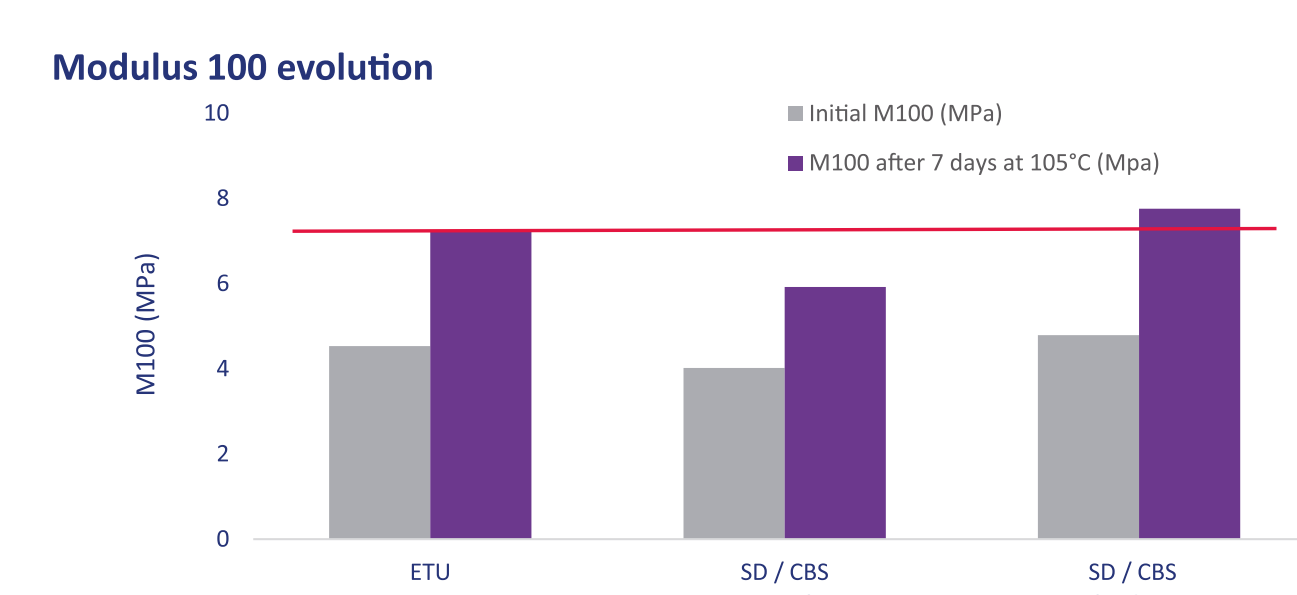
### LENGTH OF BRIDGES

- With SD and MBTS solution: better elongation at break and tear resistance for an equivalent tensile strength
- >> THE BRIDGES ARE LONGER**



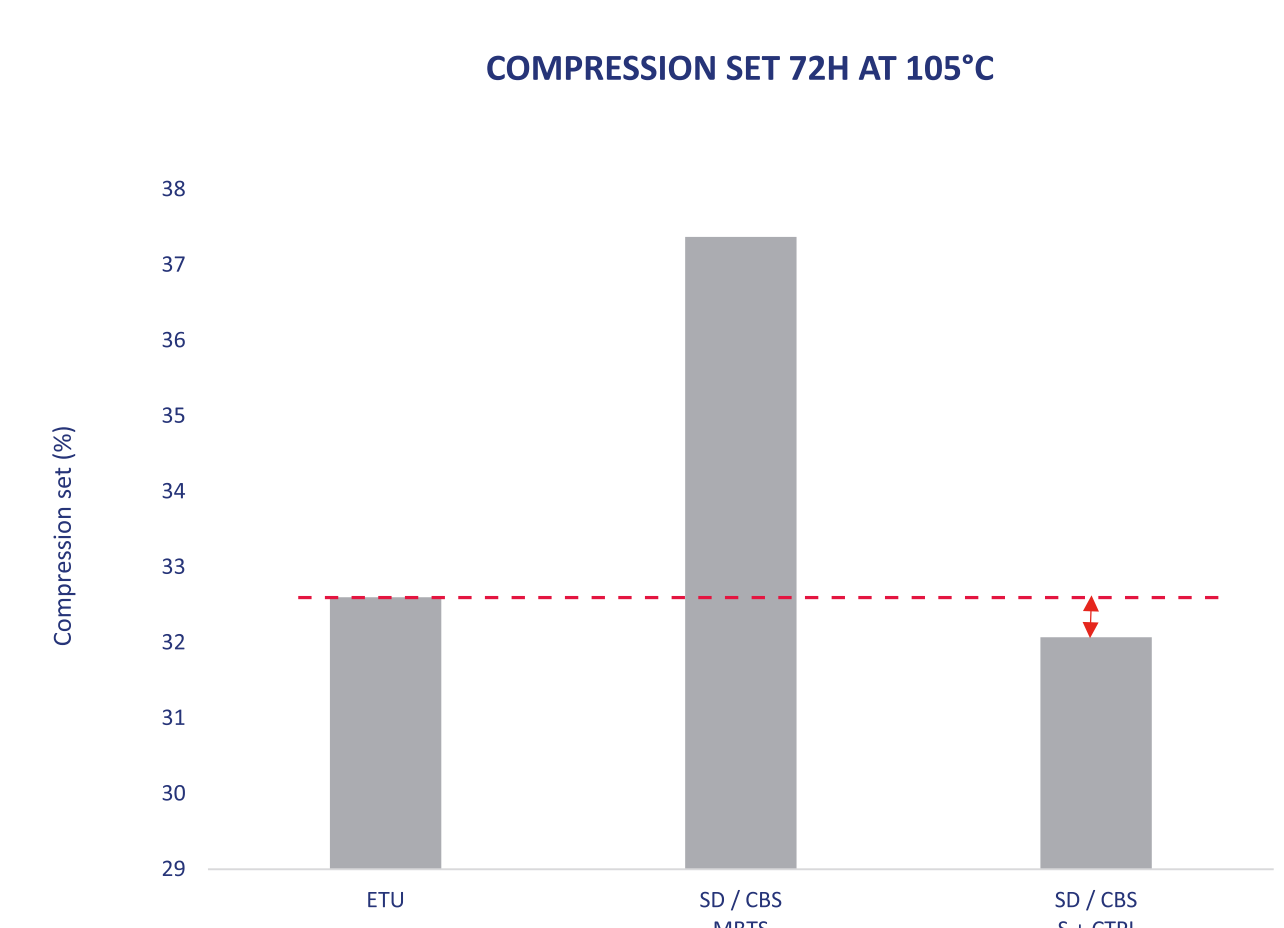
### HEAT AGEING AT 105°C MECHANICAL PROPERTIES

- Under the influence of heat, quantity of bridges increases: **>> CURING SYSTEM MATURATION EQUIVALENT TO ETU**
- With SD solutions, **TENSILE STRENGTH REMAINS EQUIVALENT TO ETU**
- Elongation at break remains **HIGHER**



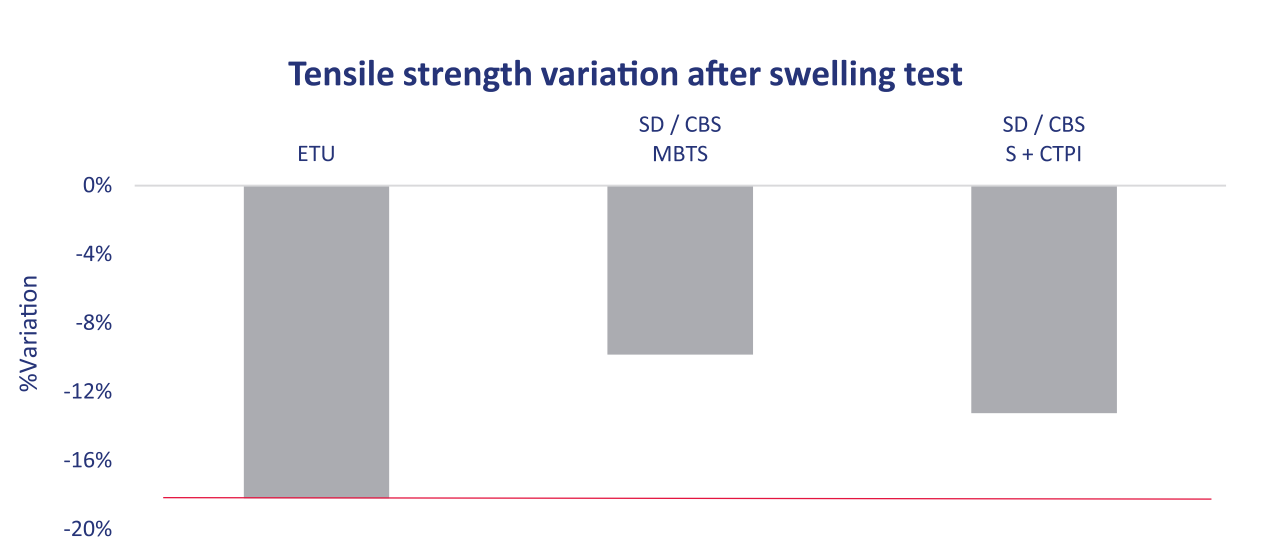
### COMPRESSION SET AT 105°C

- As a reminder, the alternative solution 2 (with S and CTPI) generates a lot of short bridges
- >> BETTER COMPRESSION SET UNDER HEATING**



### OIL RESISTANCE AT 70°C

- Both SD solutions are more resistant than ETU:
- Solution with MBTS is less sensitive thanks to longer bridges
- Even with shorter bridges, the solution with S and CTPI is more resistant than ETU thanks to a higher crosslinking density



### COMPARISON TO ETU REFERENCE

	MIXLAND+® ALTERNATIVE SOLUTIONS		OTHER SOLUTIONS		
	ALTERNATIVE FORMULATION 1	ALTERNATIVE FORMULATION 2	MIXLAND+® S / TMTM / DOTG SOLUTION	3-METHYL-THIAZOLIDINE-THIONE-2	SR102 PRODUCT
	SD / CBS MBTS	SD / CBS S + CTPI	NITROSAMINE GENERATIVE	MIT OR CRV PRODUCT	NEW CHEMICAL PRODUCT → NO TOX & ECO TOX KNOWN
SYSTEM COST VS ETU BASE 100	102	159	143	123	102
CURE RATE	Much faster	Faster	~TO ETU	Curing at 170°C	Slower
SCORCH TIME	Shorter	~TO ETU	Much slower	Slower	Slower
PROCESSABILITY	~TO ETU	~TO ETU	Lower viscosity	~TO ETU	~TO ETU
STORAGE	~TO ETU	~TO ETU		Scorch divided by 2	Slightly less
CRISTALLIZATION	~TO ETU	~TO ETU			~TO ETU
CROSSLINKING DENSITY	Lower	Higher	Higher	~TO ETU	Lower
BRIDGES LENGTH	Much longer	Longer	Shorter	~TO ETU	Longer
HEAT AGEING	~TO ETU	Better	Poorer	~TO ETU	~TO ETU
COMPRESSION SET AT 105°C	Higher	~TO ETU	Higher	Higher	Much higher
OIL SWELLING	Better	Better	Better	~TO ETU	Better
NITROSAMINE GENERATIVE	NO	NO	YES	NO	NO
BLOOMING	Lower	Lower	~TO ETU		Much lower

## BENEFITS USING MIXLAND+® SD 75 GA

- ▶ PRODUCTIVITY IMPROVEMENT
- ▶ STORAGE STABILITY
- ▶ HIGHER MECHANICAL PROPERTIES
- ▶ BETTER HEAT AGEING & OIL SWELLING RESISTANCE
- ▶ LESS BLOOMING EFFECT