



TOSOH

**TOSO-CSM**<sup>®</sup> Chlorosulphonated Polyethylene

**extos**<sup>®</sup> Alkylated Chlorosulphonated Polyethylene



TOSOH CORPORATION

# Production method of TOSO-CSM<sup>®</sup> and extos<sup>®</sup>

Chlorosulphonated polyethylene (CSM) is a special synthetic rubber manufactured through chlorination and chlorosulphonation of polyethylene.

extos<sup>®</sup> is a new type of CSM with improved dynamic and low temperature properties.

## Structural features

### Chlorine

- Destruction of the crystalline segments
- Oil resistance
- Solubility
- Higher glass-transition temperature

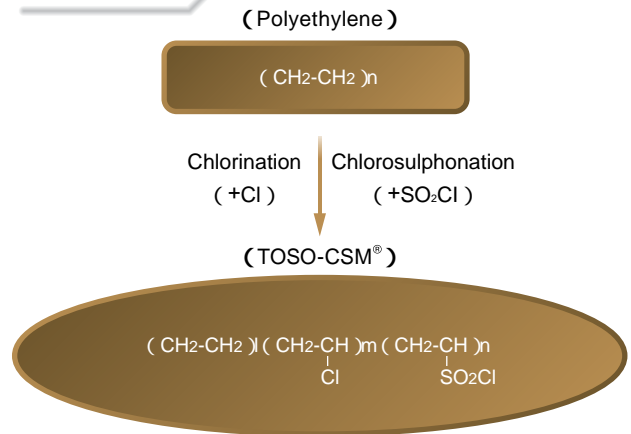
### Sulphonyl chloride groups

- Cross-linking point

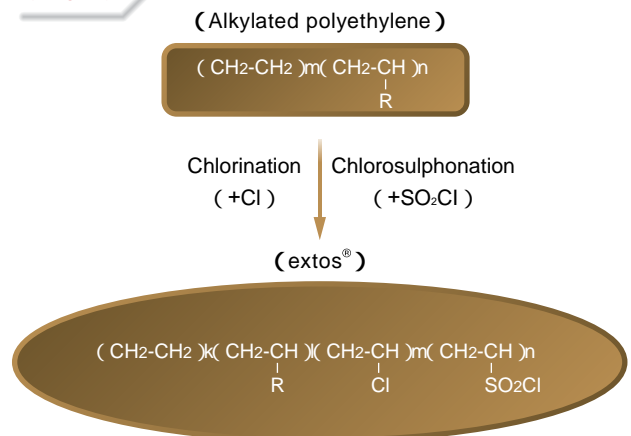
Single bond on the main chain

## Production process

### TOSO-CSM<sup>®</sup>



### extos<sup>®</sup>

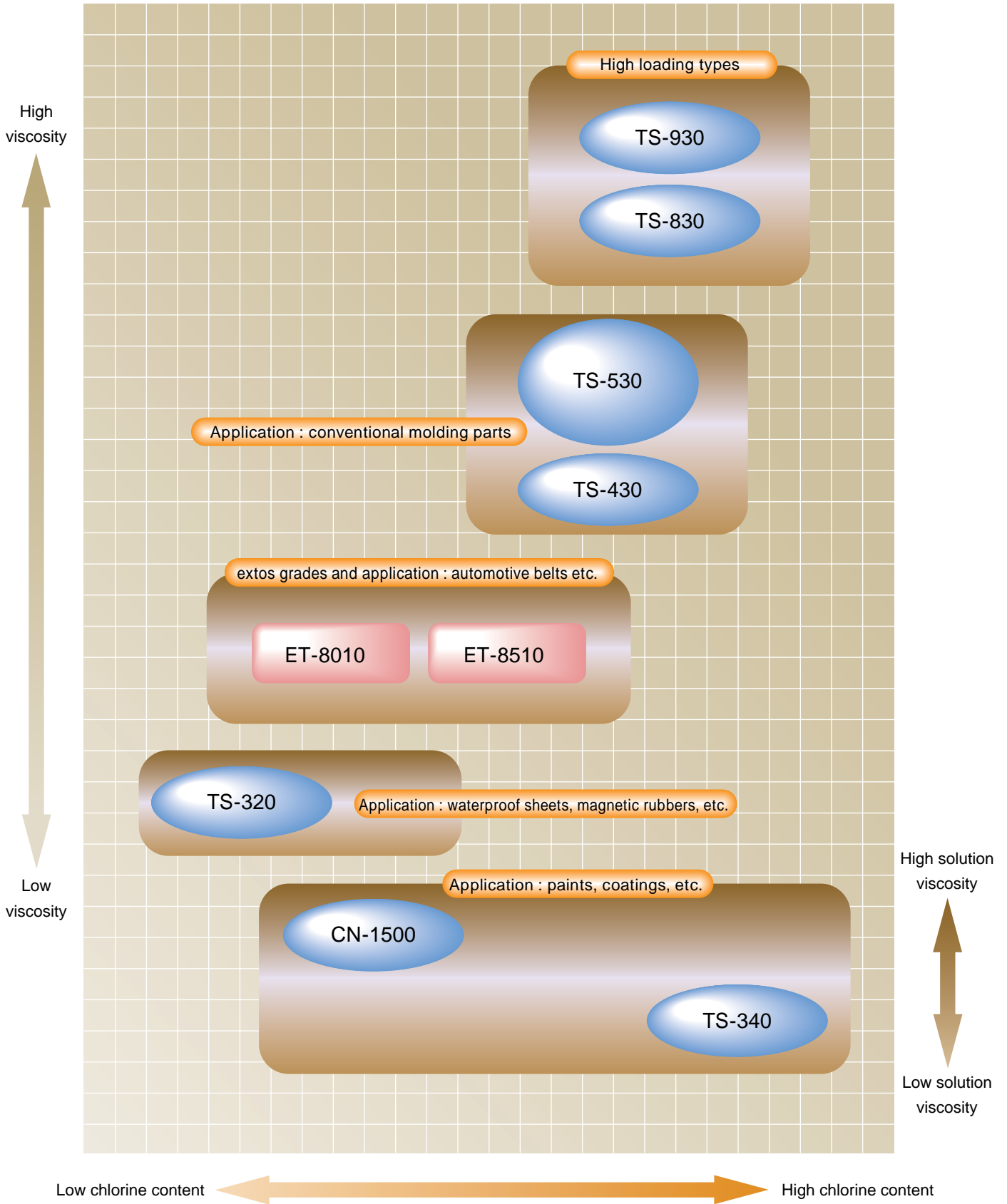


TOSO-CSM<sup>®</sup> and extos<sup>®</sup> are manufactured under certified ISO-9001 conditions at Tosoh's Nanyo Complex.





# TOSO-CSM<sup>®</sup> and extos<sup>®</sup> Grades



## Features and specifications

	Grades	Chlorine content (%)	Sulfur content (%)	Mooney viscosity ML(1+4) 100	Features
<b>TOSO-CSM®</b>					
	TS-530	35	1.0	56	General-purpose grade that achieves balance in physical properties and processability
	TS-430	35	1.0	46	Similar to the TS-530 with low Mooney viscosity
	TS-830	36	1.0	90	Similar to the TS-530 with high Mooney viscosity
	TS-930	36	1.0	105	Similar to the TS-530 with high Mooney viscosity
	TS-320	23	1.0	37	Thermoplastic that can be used without curing
	TS-340	43	1.1	350	Good solubility, low solution viscosity, oil resistance
	CN-1500	30	1.4	1400	Good solubility, low solution viscosity
<b>extos®</b>					
	ET-8010	26	0.7	40	Good dynamic and low temperature properties Vulcanizing adhesion with EPDM is possible
	ET-8510	30	0.9	40	Oil resistance

25% toluene solution viscosity {( mPa·s/Brookfield(BL) type viscometer, 23 °C )}

### TOSO-CSM®

- TS-530** Most well-balanced grade, superior in physical properties anti-degradation, and processability
- TS-430** Low viscosity form of the TS-530, with good processability
- TS-830** Viscosity is between TS-530 and TS-930
- TS-930** Highest viscosity of the TS-series. Suitable for expansion using large amounts of filler or oil in order to reduce costs
- TS-320** Lower chlorine content than general grades, with high hardness and good resistance to cold
- TS-340** Superior solubility as an organic solvent
- CN-1500** Superior solubility as an organic solvent

### extos®

- ET-8010** Good resistance to cold, offering better dynamic fatigue resistance
- ET-8510** Similar to ET-8010 in all respects, with good resistance to oil

## TOSO-CSM<sup>®</sup> Properties

Grades		TS-430	TS-530	TS-830	TS-930	TS-320	TS-340	CN-1500	
Formulation	TOSO-CSM <sup>®</sup>	100phr							
	MgO (High activity)	4							
	Pentaerythritol	3							
	Accelerator DPTT	2							
Compound Properties	Mooney viscosity ML( 1+4 )100	58	66	111	114	49	37	41	
	Mooney Scorch ML( 1 )125								
	Vm	28	34	64	66	25	12	20	
	t5	min	23.1	21.0	20.0	20.0	20.2	31.9	31.4
Vulcanizate Properties	100% Tensile stress(M100)	MPa	1.1	1.1	1.2	1.2	3.0	3.3	1.3
	300% Tensile stress(M300)	MPa	2.3	2.4	3.0	2.9	4.4	12.5	3.6
	Tensile strength(TB)	MPa	20.6	20.3	21.0	21.3	30.6	18.1	7.4
	Elongation at break(EB)	%	550	540	530	520	520	410	420
	Hardness(Hs)	JIS-A	56	55	57	57	80	82	55
	Resilience	%	40	42	38	37	61	4	49
	Compression set (25% compression, aging for 70hrs. at 70 )	%	79	73	72	69	72	83	83
	Oil resistance (ASTM#3oil, aging for 70hrs. at 125 ) Change rate in volume	%	81	80	73	71	230	35	200
	Heat resistance (Aging for 70hrs. at 100 ) Residual rate for TB	%	134	126	131	128	48	122	103
	Residual rate for Eb	%	80	80	75	77	67	71	64
Change in Hs	point	+2	+3	+3	+3	+1	+10	+3	
Curing conditions	Sheet 160	min	20	20	20	20	25	35	35
	Compression set 160	min	25	25	25	25	30	40	40

Figures are provided only as a reference and do not serve as exact specifications

## extos® Properties

Grades		ET-8010	ET-8510	
Formulation	extos®	100phr		
	MgO (High activity)	4		
	Pentaerythritol	3		
	Accelerator DPTT	2		
Compound Properties	Mooney viscosity ML( 1+4 )100	52	50	
	Mooney Scorch ML( 1 )125			
	Vm	26	25	
	t5	min	14.1	21.6
Vulcanizate Properties	100% Tensile stress(M100)	MPa	1.3	1.3
	300% Tensile stress(M300)	MPa	2.4	2.7
	Tensile strength(TB)	MPa	22.5	17.8
	Elongation at break(EB)	%	570	540
	Hardness(Hs)	JIS-A	56	56
	Resilience	%	70	60
	Compression set (25% compression, aging for 70hrs. at 70 )	%	70	70
	Oil resistance (ASTM#3oil, aging for 70hrs. at 125 ) Change rate in volume	%	260	184
	Heat resistance (Aging for 70hrs. at 100 ) Residual rate for TB	%	56	67
	Residual rate for EB	%	65	68
Change in Hs	point	+2	+3	
Curing conditions	Sheet 160	min	20	25
	Compression set 160	min	25	30

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## TOSO-CSM® Applications

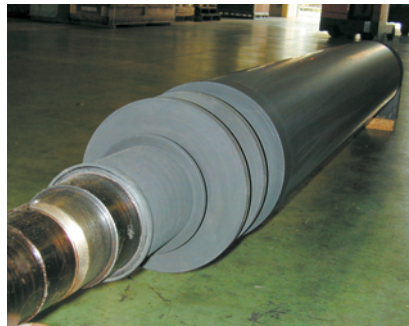
	Fields	Applications
TOSO-CSM®	Automotive parts	Fuel hoses, power steering hoses, hydraulic hoses, brake hoses
	Electric parts, electric wire	High-tension cables, low-tension cables, communication cables, submarine cables, ship's wires, heat-resistant wire coverings, radioactive-resistant cables
	General industrial articles	High-pressure hoses, LPG hoses, chemical-resistant hoses, rolls, linings
	Engineering and building articles	Escalator handrails, building gaskets pond lining sheets, roofing sheets weather-resistant paints
	Others	Rubber boats, rainwears, chemical-resistant gloves adhesives, paints, coatings

## extos® Applications

	Fields	Applications
extos®	Automotive parts	Synchronous timing belts, poly-V-belts, coverings for the weatherstrips
	Train parts	Coupling coverings
	Engineering and building articles	Building gaskets



Rubber boats



Rubber rolls for iron manufacturing



TOSOH

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