

# ATOS

## AuT0mobile Structural Steel





ATOS steel refers to all steel products used for automotive structures.

These are high strength steels of greater than 500MPa tensile strength and greater than 300MPa yield strength. High strength is obtained by adding alloying elements or cooling to low temperature. Steel products having tensile strength of more than 1,000MPa can be manufactured. POSCO produces ATOS 60 to 100 steels in compliance with the ATOS (AuTOMobile Structural Steel) specification.



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# Automobile Structural Steel

## General Characteristics

The name refers to all steel products used for automotive structures. These are steels which have high tensile strength, greater than 500MPa, and yield strength, greater than 300MPa. High strength is obtained by adding alloy elements or cooling to low temperature. Steel products with tensile strength greater than 1,000MPa can be manufactured.

POSCO produces ATOS 60 to 100 grade in compliance with the ATOS (AuTOMobile Structural Steel) specification.

## Product Types, Components, Materials, and Material Property

Specifications	Thickness(mm)	Chemical Composition (wt.%)					
		C	Si	Mn	P	S	Nb
ATOS55	2.3~12.7	≤ 0.20	≤ 0.40	≤ 1.50	≤ 0.03	≤ 0.03	Added
ATOS60	2.3~12.7	≤ 0.20	≤ 0.40	≤ 1.50	≤ 0.03	≤ 0.03	
ATOS80	2.3~14.0	≤ 0.20	≤ 0.40	≤ 2.00	≤ 0.03	≤ 0.03	
ATOS100	4.0~8.0	≤ 0.20	≤ 0.40	≤ 2.00	≤ 0.03	≤ 0.03	

Specifications	Yield Point (MPa)	Tensile Strength (MPa)	Tensile Test			Bending Test		
			Elongation(%), Thickness(mm) *Rolling Direction			Bending Angle	Inner Radius	Test Piece (JIS No.3)
			No.5 Test Piece, 2.5~5.0	No.5 Test Piece, 5.0~6.3	No.1 Test Piece, 6.3~12.7			
ATOS55	≥ 540	≥ 340	≥ 20	≥ 21	≥ 14	180°	1.5t	Perpendicular to Rolling Direction
ATOS60	≥ 590	≥ 420	≥ 19	≥ 20	≥ 13	180°	1.5t	Perpendicular to Rolling Direction
ATOS80	≥ 780	≥ 700	≥ 14	≥ 14	≥ 9	180°	1.5t	Perpendicular to Rolling Direction
ATOS100	≥ 980	≥ 880	≥ 8 (No. 5 test piece applied)			90°	3.0t	Perpendicular to Rolling Direction

- Remarks) 1. The number inside parentheses is for reference only.  
 2. Appearance, form, dimension, weight and permissible tolerances comply with JIS G 3134.  
 3. Number of tensile test pieces and bending test pieces for ATOS 60 & 80: throughout the same type and thickness of steel, one piece per class. If the weight exceeds 50 tons, two pieces per class.  
 4. Number of tensile, impact and bending test pieces for ATOS 100: use one sample per slab unit for tensile test; use one piece per class for impact test throughout the same type and thickness of steel; use one piece per class for bending test throughout the same type and thickness of steel, but in excess of 50 tons, use two pieces per class.  
 5. A bending test piece is perpendicular to JIS unit 3 rolling direction.

### ■ ATOS80

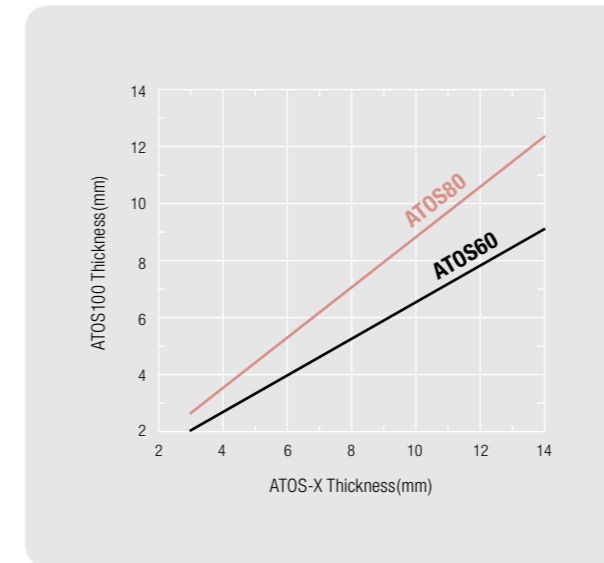
· It has high strength and excellent cold forming ability, used in making boom and arms, truck and trailer frames.

### ■ ATOS100

- It has hardness equal to that of wear resistant steel of 300HBW class.
- If the steel is heated higher than 300°C, its strength could be reduced.
- It is suitable to make boom and arms in specialty vehicles due to its high strength and excellent impact resistance at low temperature.

## Weight Savings due to High Strength Steel

- It is calculated as resistance against bending displacement: high strength steel thickness = regular steel thickness X  $(YS_{\text{regular steel}} / YS_{\text{high strength steel}})^{0.5}$
- Regarding elastic deflection, reinforcement design is necessary with thickness reduction (proportional to 'elasticity displacement E X thickness<sup>3</sup>').
- Reinforcement design is also needed for buckling (related to dimension, occurring in elastic region)



(Unit : mm, MPa)

ATOS60		ATOS80	
Thickness of original material	Thickness when ATOS 100 used	Thickness of original material	Thickness when ATOS 100 used
14	9.2	14	12.3
12	7.9	12	10.6
10	6.6	10	8.8
9	5.9	9	7.9
8	5.3	8	7.1
7	4.6	7	6.2
6	3.9	6	5.3
5	3.3	5	4.4
4	2.6	4	3.5
3	2.0	3	2.6
(YS 390)	(YS 880)	(YS 700)	(YS 880)
lightening potential 34%		lightening potential 34%	

## Adequate Welding Material Suggestion

Specifications	Yield strength tensile strength (MPa)	Bending ratio (R/t)	Ceq	Heat treatment	Heat input (butt joint)	Welding material	
ATOS60	YS ≥ 390 TS ≥ 590	-	0.35	Pre-heating, Post-heating usually not required	0.3~1.0 kJ/mm heat input amount test (in progress)	Solid-wire	AWS A5.28-05-ER80SG (Ex. KISWEL ZO-60)
						Flux-cored	AWS A5.29-07-E81T1-Ni1 (Ex. KISWEL K81-T)
ATOS80	YS ≥ 700 TS ≥ 780	-	0.40			Solid-wire	AWS A5.28-05-ER120SG (Ex. KISWEL ZH-120)
						Flux-cored	AWS A5.29-07-E121T1-G (Ex. KISWEL K120TG)
ATOS100	YS ≥ 880 TS ≥ 980	3.0	0.47	Solid-wire	AWS A5.28-05-ER130SG (Ex. ESAB Spoolarc 140)		
				Flux-cored	AWS A5.29-07-E130T1-G (Ex. KISWEL ZO-60)		

## Available Dimensions

### HR Coil & HR Sheet

#### ■ ATOS60

(Unit : mm)

Thickness Width	3.2	3.6	5.0	6.0	7.0	9.0	12	14
730								
1,120								
1,220								
1,320								
1,420								
1,495								
1,520								
1,570								
1,620								

#### ■ ATOS80

(Unit : mm)

Thickness Width	3.2	3.6	5.0	6.0	7.0	9.0	12	14
730								
1,120								
1,220								
1,320								
1,420								
1,495								
1,520								
1,570								
1,620								

⚠ Please be sure to consult with our associates when making orders for specific usage.

#### ■ ATOS100(HR-Sheet Available)

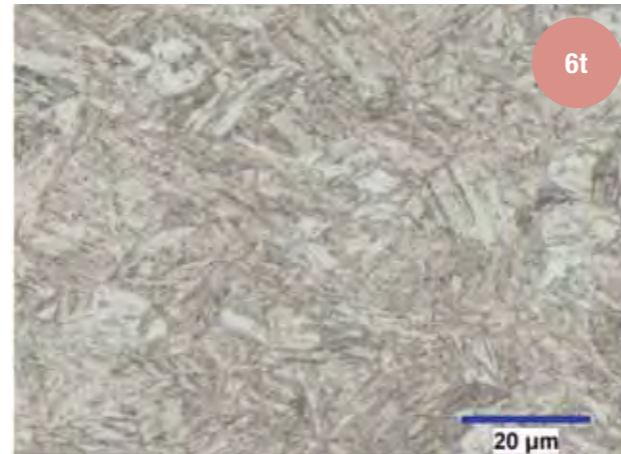
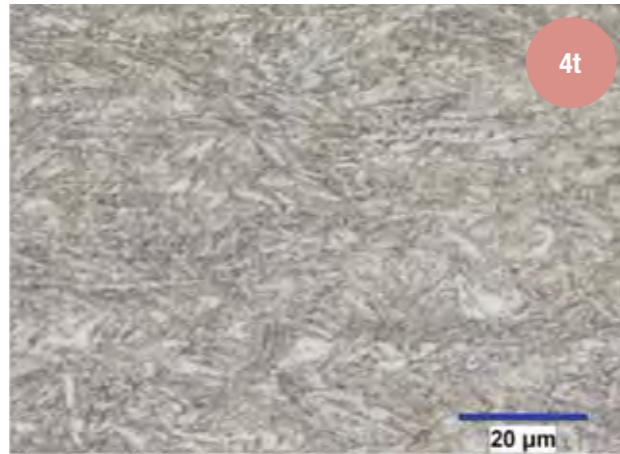
(Unit : mm)

Thickness Width	4.0	5.0	6.0	7.0	8.0	9.0	10	11
900								
1,000								
1,100								
1,200								
1,300								
1,400								
1,450								
1,500								
1,600								
1,700								

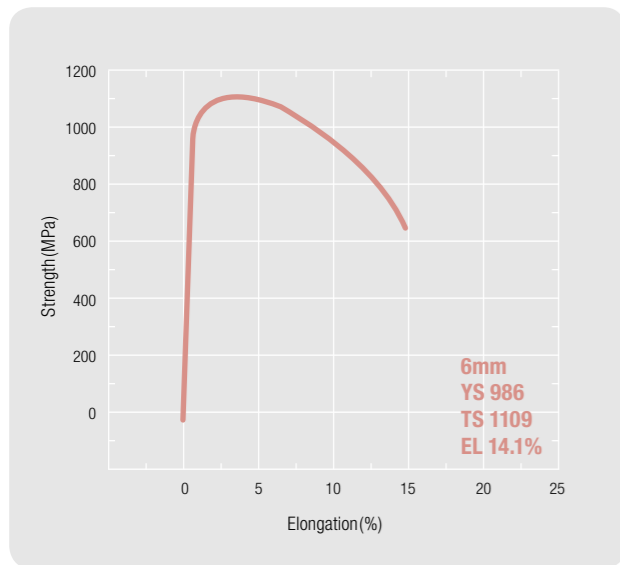
Can be produced

To be developed

Bainitic/Martensitic Microstructure

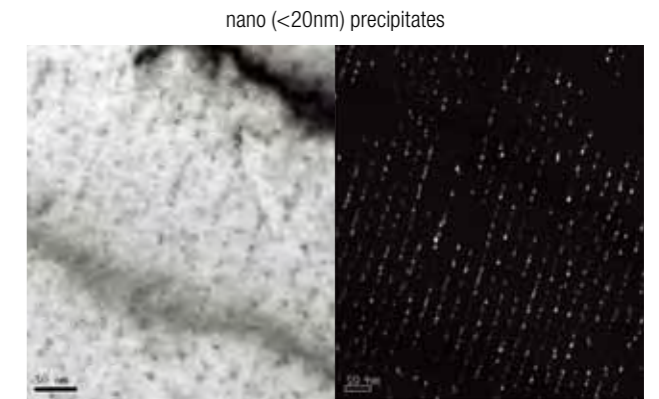
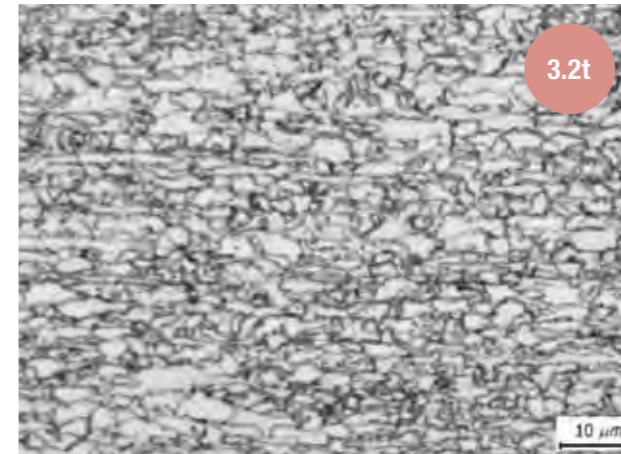


Stress-Strain Curve

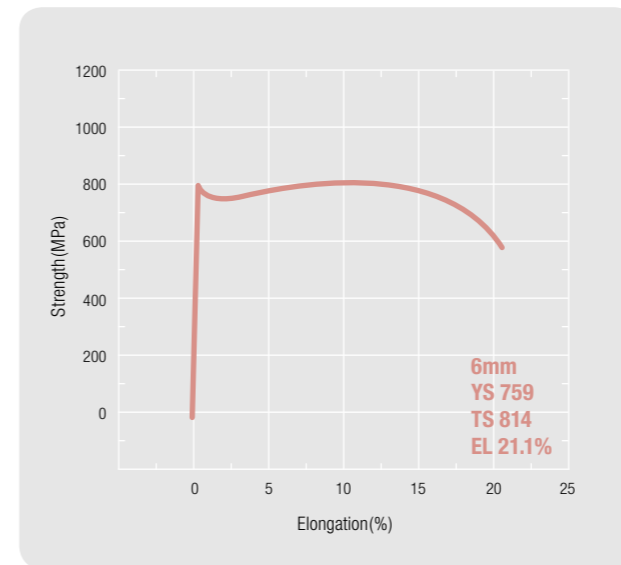


- It has hardness equal to that of wear resistant steel of 300HBW class.
- If the steel is heated higher than 300°C, its strength could be reduced.
- It is suitable to make boom arms in specialty vehicles due to its high strength and excellent impact resistance at low temperature.

Ferritic Microstructure + Nano Precipitates



Stress-Strain Curve



- With its high strength and excellent cold rolling ability, it is applied to make frames for trucks and trailers.



# ATOS

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