



**PAG-ASA
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FIRST IN QUALITY

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REBAR GRADE COMPARISON

MECHANICAL (STRENGTH) & CHEMICAL PROPERTIES

Standard	Grade	Strength				Chemical					
		Yield Strength, MPa min.	Yield Strength, MPa max.	Tensile Strength, MPa min.	TS / YS min.	% C, max.	% Mn, max.	% Si, max.	% S, max.	% P, max.	CEq*
Philippine National Standard (PNS) 49:2020	280R	280	-	420	-	-	-	-	0.0625	0.0625	-
	420R	420	-	620	-	-	-	-	0.0625	0.0625	-
	520R	520	-	690	-	-	-	-	0.0625	0.0625	-
	550R	550	-	725	-	-	-	-	0.0625	0.0625	-
	280W	280	-	420	1.25	0.33	1.26	-	0.058	0.058	0.55
	420W	420	540	550	1.25	0.33	1.26	0.55	0.058	0.058	0.55
	550W	550	675	690	1.25	0.33	1.76	0.55	0.058	0.058	0.60
American Society for Testing & Materials (ASTM) A615-16	280	280	-	420	-	-	-	-	-	0.075	-
	420	420	-	620	-	-	-	-	-	0.075	-
	550	550	-	725	-	-	-	-	-	0.075	-
	690	690	-	790	-	-	-	-	-	0.075	-
ASTM A706-16	420	420	540	550	1.25	0.33	1.56	0.55	0.053	0.043	0.55
	550	550	675	690	1.25	0.33	1.56	0.55	0.053	0.043	0.55

Carbon Equivalent (CEq) formula

* **PNS CEq** = C + (Mn/6) + (Cu/40) + (Ni/20) + (Cr/10) - (Mo/50) - (V/10)

* **ASTM CEq** = C + (Mn/6) + (Cu/40) + (Ni/20) + (Cr/10) - (Mo/50) - (V/10)

MECHANICAL PROPERTIES (ELONGATION & BENDABILITY)

Standard	Grade	Elongation in 200 mm, % min.					Diameter of Pin (d=nominal diameter of specimen, mm)				
		10-16 mm	20 mm	25 mm	28-36 mm	40-50 mm	10-16 mm	20-25 mm	28-36 mm	40-50 mm	Bending Angle, °
PNS 49:2020	280R	12	12	12	8	8	4d	5d	5d	5d	180
	420R	9	9	9	7	7	5d	5d	7d	9d	180
	520R	7	7	7	6	6	5d	5d	7d	9d	180
	550R	7	7	7	6	6	5d	5d	7d	9d	180
	280W	16	16	14	14	12	4d	4d	5d	5d	180
	420W	14	14	12	12	10	4d	4d	6d	8d	180
	550W	12	12	12	12	10	4d	5d	7d	9d	180
ASTM A615-16	280	12 ^a	12	-	-	-	3.5d	5d ^b	-	-	180
	420	9	9	8	7	7	3.5d	5d	7d	9d	180
	550	7	7	7	6	6	5d	5d	7d	9d	180
	690	7	7	7	6	6	5d	5d	7d	9d	180
ASTM A706-16	420	14	14	12	12	10	3d	4d	6d	8d	180
	550	12	12	12	12	10	3.5d	5d	7d	9d	180

^a For 10mm, the elongation requirement is 11% minimum

^b No pin diameter requirement for 25 mm