

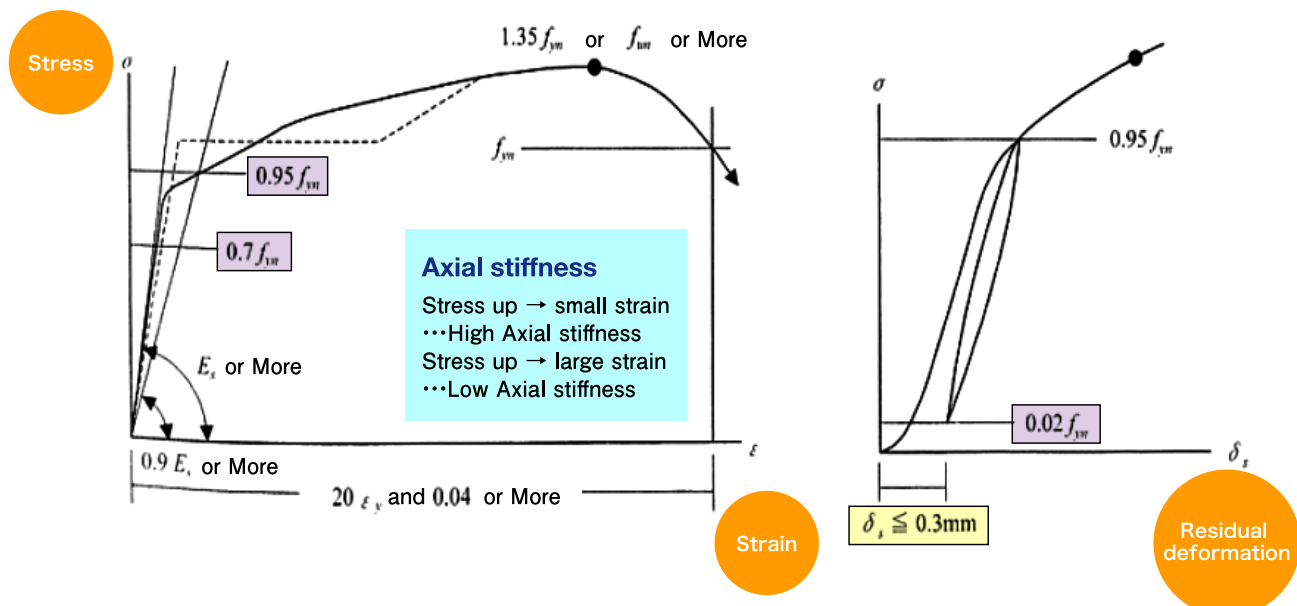
Japan Society of Civil Engineering-Steel Coupler Guidelines (2007 Edition)

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 It is not the original official English version of Japan Society of Civil Engineering-Steel Coupler Guidelines (2007 Edition).
 Therefore it is used for your reference purpose only.

1. one-way tensile test (static proof test)
2. one-way repetitive test (high stress load repetitive strength test)
3. Elastic range two-direction (tention and compression) repetitive test
4. Plastic range two-direction (tention and compression) repetitive test
5. Elastic and Plastic range two-direction (tention and compression) repetitive test (both range at the same time)

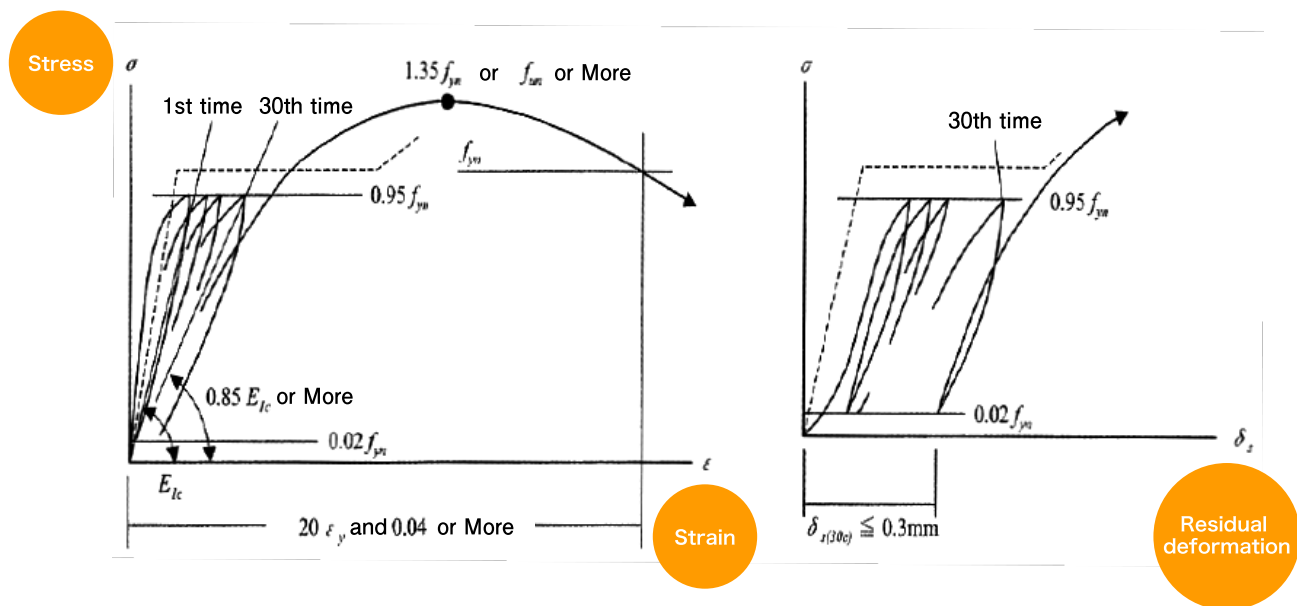
one-way tensile test

Test Overview	One-way tensile test with accurate testing instrument
Objective	Evaluate the axial stiffness and residual deformation equivalent to the rebar itself



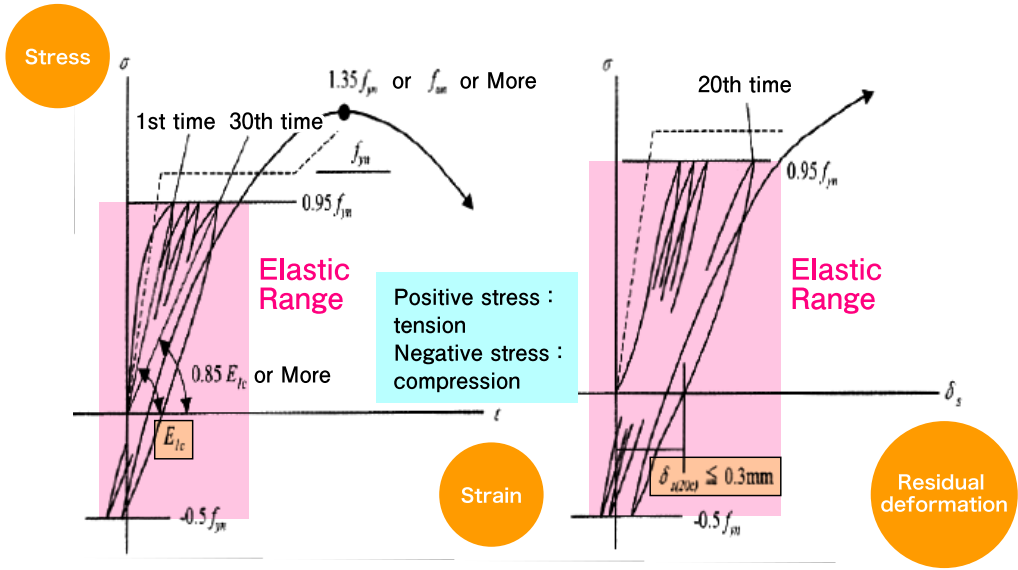
one-way repetitive test

Test Overview	30 times repetitive one-way tensile Test
Objective	Evaluate the Axial stiffness decreasing and residual deformation increase at the range of elastic range



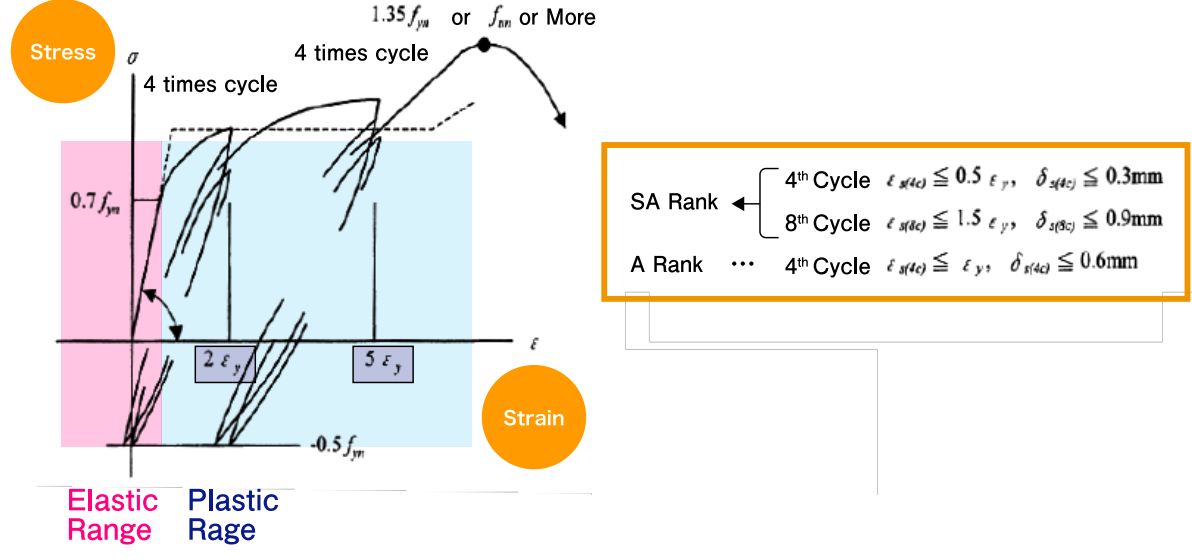
Elastic range two-direction (tension and compression) repetitive test

Test Overview	Evaluate the 20 cycle stiffness/ 1 cycle stiffness with loading Tension and compression
Objective	Measurement the decrease of axial stiffness in the elastic range



Plastic range two-direction (tention and compression) repetitive test

Test Overview	Perform 4 cycle repetition (tension and compression) at the stress of Twice larger than Yield strain and perform 4 cycle repetition at the stress of fifth larger than Yield strain
Objective	Measurement of the slippage (Residual deformation)



performance evaluations using simple substance tests

	SA RANK	A RANK	B RANK	C RANK
one-way tensile test (static proof test)	Tensile Strength	$f_y \geq 1.35 f_{pn}$ or f_{un}	$f_y \geq 1.35 f_{pn}$ or f_{un}	$f_y \geq f_{pn}$
	Axial Stiffness	$E_{0.7f_{pn}} \geq E_s$ $E_{0.95f_{pn}} \geq 0.9 E_s$	$E_{0.7f_{pn}} \geq 0.9 E_s$ $E_{0.95f_{pn}} \geq 0.7 E_s$	$E_{0.5f_{pn}} \geq 0.9 E_s$ $E_{0.7f_{pn}} \geq 0.9 E_s$ $E_{0.95f_{pn}} \geq 0.5 E_s$
	Measured Strain	$\epsilon_u \geq 20 \epsilon_y$ and $\epsilon_u \geq 0.04$	$\epsilon_u \geq 10 \epsilon_y$ and $\epsilon_u \geq 0.02$	$\epsilon_u \geq 5 \epsilon_y$ and $\epsilon_u \geq 0.01$
	Residual deformation	$\delta_s \leq 0.3 \text{ mm}$	$\delta_s \leq 0.3 \text{ mm}$	—
one-way repetitive test (high stress load repetitive strength test)	Tensile Strength	$f_y \geq 1.35 f_{pn}$ or f_{un}	$f_y \geq 1.35 f_{pn}$ or f_{un}	—
	Axial Stiffness	$E_{30c} \geq 0.85 E_{1c}$	$E_{30c} \geq 0.5 E_{1c}$	$E_{30c} \geq 0.25 E_{1c}$
	Measured Strain	$\epsilon_u \geq 20 \epsilon_y$ and $\epsilon_u \geq 0.04$	$\epsilon_u \geq 10 \epsilon_y$ and $\epsilon_u \geq 0.02$	$\epsilon_u \geq 5 \epsilon_y$ and $\epsilon_u \geq 0.01$
	Residual deformation	$\delta_{sl(30c)} \leq 0.3 \text{ mm}$	$\delta_{sl(30c)} \leq 0.3 \text{ mm}$	—
Elastic range two-direction repetitive test	Tensile Strength	$f_y \geq 1.35 f_{pn}$ or f_{un}	$f_y \geq 1.35 f_{pn}$ or f_{un}	—
	Axial Stiffness	$E_{20c} \geq 0.85 E_{1c}$	$E_{20c} \geq 0.5 E_{1c}$	$E_{20c} \geq 0.25 E_{1c}$
	Residual deformation	$\delta_{sl(20c)} \leq 0.3 \text{ mm}$	$\delta_{sl(20c)} \leq 0.3 \text{ mm}$	—
Elastic range two-direction repetitive test	Tensile Strength	$f_y \geq 1.35 f_{pn}$ or f_{un}	$f_y \geq 1.35 f_{pn}$ or f_{un}	—
	Residual deformation	$\epsilon_{sl(4c)} \leq 0.5 \epsilon_y$ $\delta_{sl(4c)} \leq 0.3 \text{ mm}$ $\epsilon_{sl(8c)} \leq 1.5 \epsilon_y$ $\delta_{sl(8c)} \leq 0.9 \text{ mm}$	$\epsilon_{sl(4c)} \leq \epsilon_y$ $\delta_{sl(4c)} \leq 0.6 \text{ mm}$	—

f_{pn} : specified yielding point of rebar
 f_{un} : specified Tensile Strength of rebar
 f_y : tensile Strength of spliced rebar
 ϵ_y : yielding strain of spliced rebar
 ϵ_u : ultimate strain of spliced rebar
 ϵ_{sl} : slippage strain of spliced rebar
 δ_s : amount of slippage deformity in spliced rebar
 E_s : secant stiffness of rebar at 70% of specified rebar yielding point
 $E_{0.5f_{pn}}, E_{0.7f_{pn}}, E_{0.95f_{pn}}$: secant stiffness of spliced rebar at strength of 0.5f_{pn}, 0.7f_{pn} or 0.95f_{pn} respectively
 E_{1c}, E_{20c}, E_{30c} : secant stiffness of spliced rebar at strength of 0.96f_{pn} yo, at times of first, twentieth and thirtieth processing respectively
 $\epsilon_{sl(4c)}, \epsilon_{sl(8c)}$: slippage strain during fourth and eighth processing respectively
 $\delta_{sl(4c)}, \delta_{sl(8c)}, \delta_{sl(20c)}, \delta_{sl(30c)}$: slippage amount during fourth, eighth twentieth and thirtieth processing respectively