Zwick / Roell

Intelligent Testing

The new standard for r-value measurement to ISO 10113:2020, ASTM E517, JIS Z2254:

videoXtens T-160 HP

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Agenda

The new standard for reliable r-values to ISO 10113:2020 – videoXtens T-160 HP

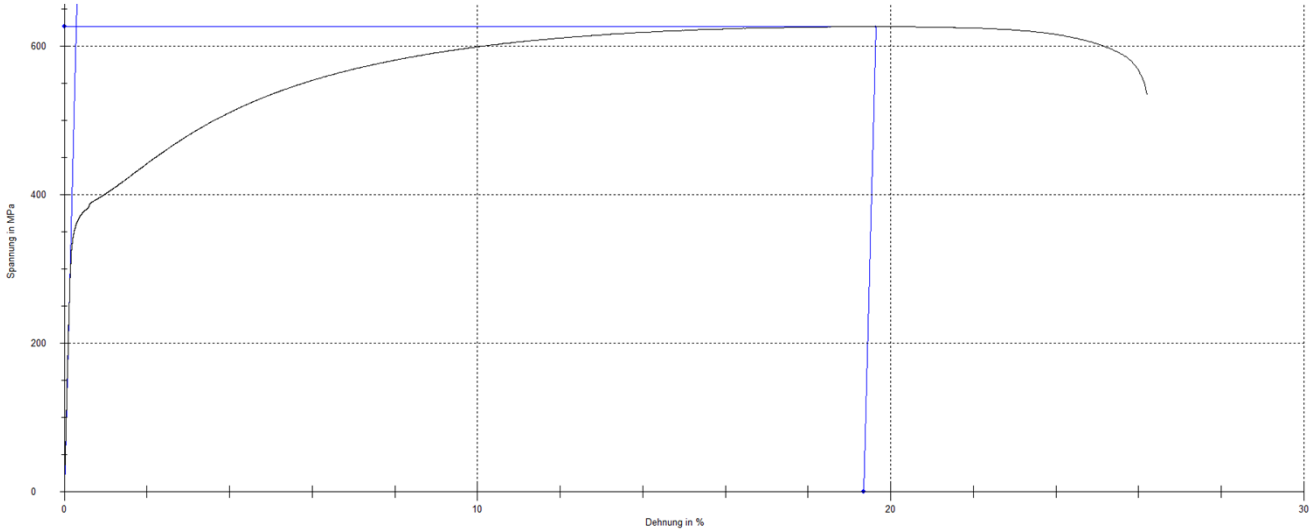
The *r*-value: Basics to ISO 10113; previous measuring solutions

New for ISO 10113:2020 : Measurement over the entire gauge length

videoXtens T-160 HP in action (video + explanations)

Summary: reliable *r*-values with low scatter by videoXtens T-160 HP

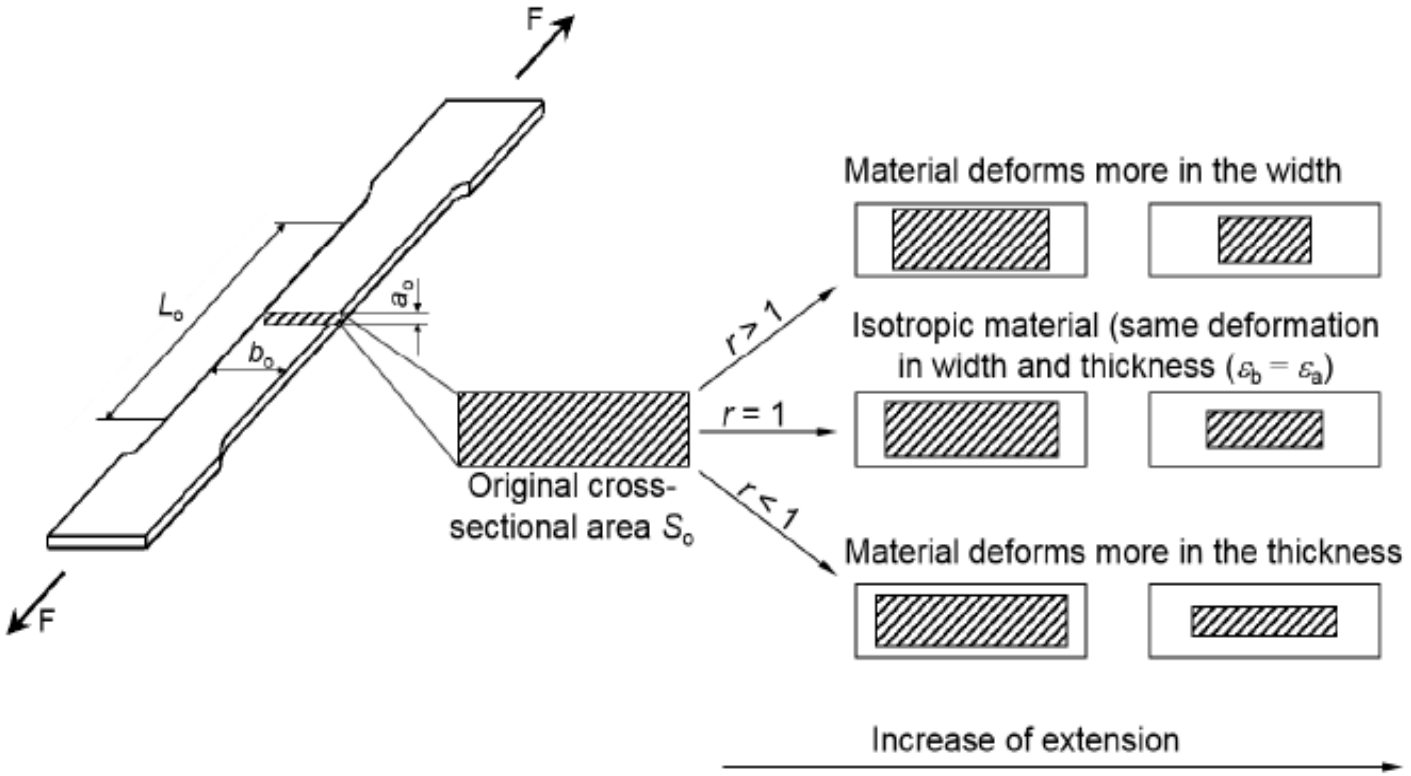
Basic information for *r*-value determination



- *r*-value is based on standard tensile test to ISO 6892-1 / ASTM E 8
- *r*-value = vertical anisotropy: ratio between true plastic transverse strain and true plastic thickness strain
- Model of constant volume in the range up to uniform extension A_g

→ Measurement of axial strain instead of thickness strain

Interpretation of *r*-value



Soruce: Aegerter, J., Keller, S., Bestimmung der senkrechten Anisotropie (r-Wert) — Probleme und Lösungsvorschläge zur reproduzierbaren Versuchsdurchführung und Auswertung, Tagungsband der Tagung „Werkstoffprüfung 2016“, Verlag Stahleisen GmbH, Düsseldorf (2016), S. 167-172, ISBN 978-3-514-00830-4

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Procedures/methods to ISO 10113

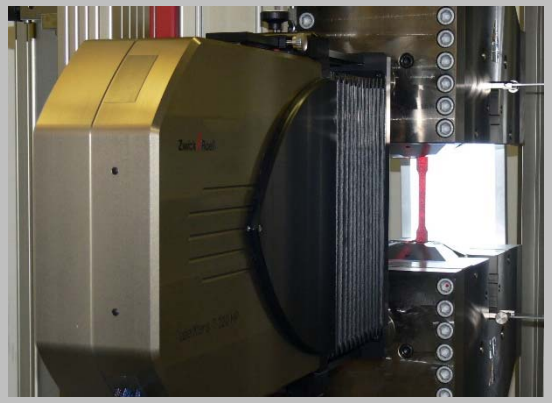
Procedure/method	Procedures		
	Manual	**Semi-automatic**	**Automatic**
Length measurement	Caliper	Extensometer	Extensometer
Accuracy	±0.01 mm	Min. class 1 (ISO 9513)	Min. class 1 (ISO 9513)
Width measurement	Micrometer	Micrometer	Extensometer *
Accuracy	±0.005 mm	±0.005 mm	Min. class 1 (ISO 9513)
Methods	**1-point method**	**1-point method**	**1-point method**
			Regression method

* Accuracy of the measuring device for measurement of the original width ±0,1 %

Previous measuring solutions for automatic *r*-value measurement

Optical change in width measurement

makroXtens, multiXtens & videoXtens transverse strain extensometer T-40 HP

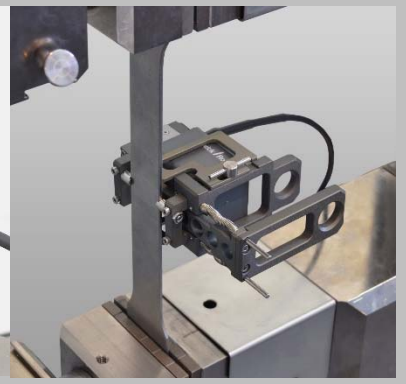


laserXtens 7-220 HP & videoXtens transverse strain extensometer

Contacting change in width measurement

makroXtens, multiXtens & mechanical transverse strain extensometer

digiClip Biax



digiClip width

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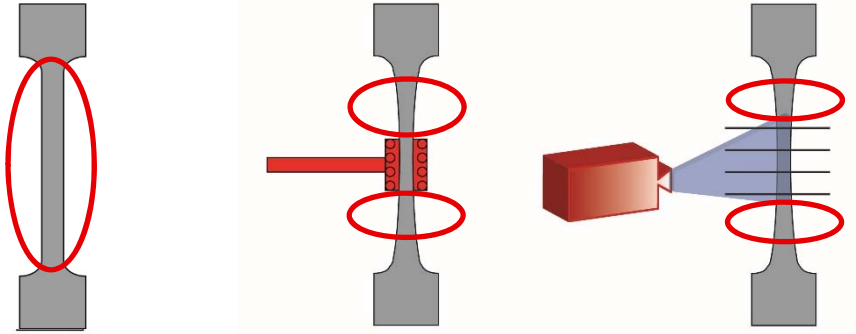
New for ISO 10113:2020

Application

Change in width measurement on metals: *r*-value to ISO 10113, ASTM E517 and JIS Z2254

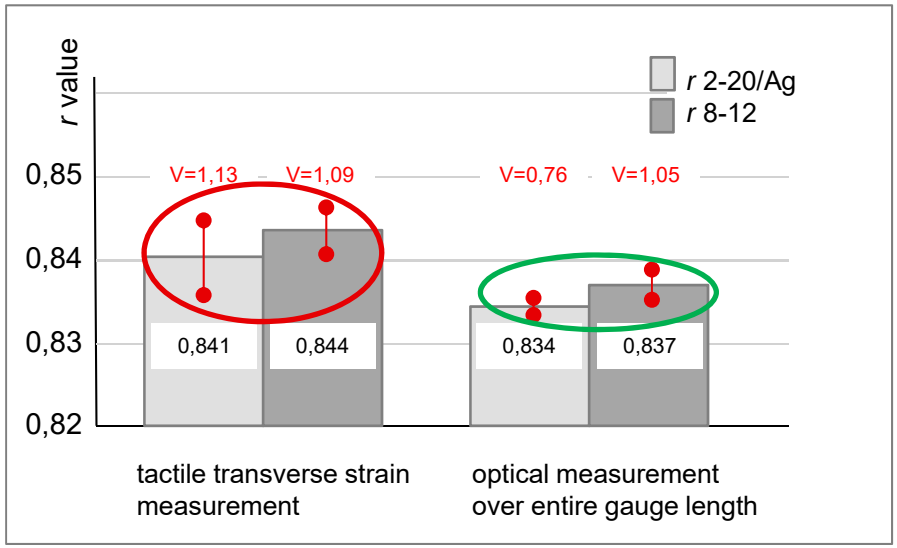
All metallic materials exhibit tapers within the parallel length before reaching uniform extension



With the typical methods for change in width measurement, this effect is not taken completely into account

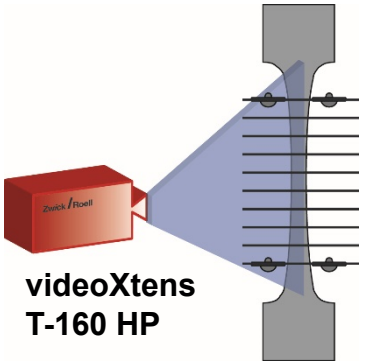
New for ISO 10113:2020

This can lead to a high variation of the *r*-values



IFEP Stahlprobe / steel specimen

A determination of the transverse strain measurement **over the entire measuring length** includes a local constriction of the material



→ Measurement values are close to reality: they consider the same specimen volumina for transverse and axial strain measurement

→ Low variance of *r*-values

New for ISO 10113:2020

That is why this procedure is now a recommendation in DIN EN ISO 10113 since August 2020.

Abstract 5: Short description	„...to measure the current reduction in width, extensometers should be used which are able **to measure the reduction in width at several points, ideally evenly distributed over the entire measuring length”**

Source: ISO 10113:2020-08

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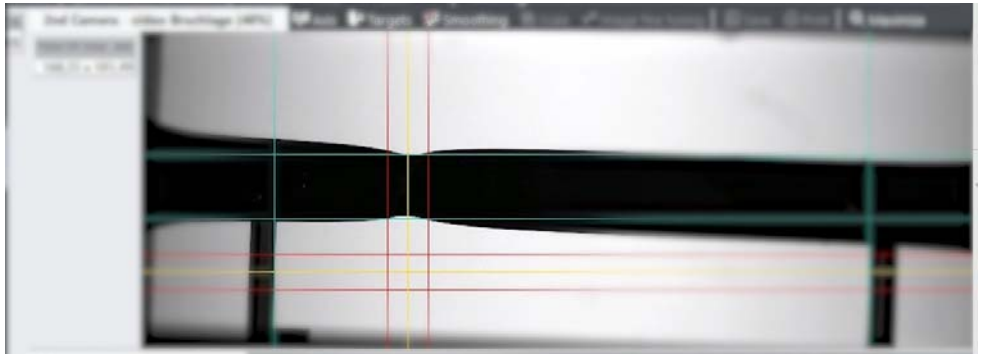
Das videoXtens T-160 HP:
The New Standard for Reliable *r*-Values

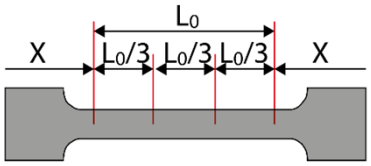
videoXtens T-160 HP - classification

Automatic identification of the breaks location and classification to Standard.

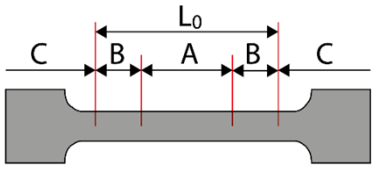
- **Automatic detection of the break point and break classification** to ISO 6892-1 or JIS Z2254. Invalid tests are automatically and reliably excluded. This saves time and results in valid and traceable data.
- **The break location is traceable** and can be additionally confirmed through image recording (Video Capturing).



Automatic monitoring of location of minimum transverse strain



Classification to ISO 6892-1



Classification to JIS Z2254

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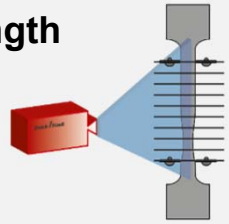
Reliable *r*-values

videoXtens T-160 HP: reliable *r*-values with low scatter

Accurate r-values = correct and precise values

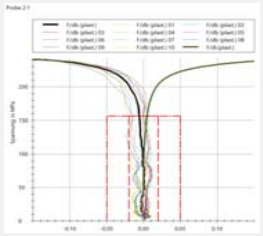
Correct r-values:

Evaluation of the entire gauge length
(ISO 10113:2020)



Display of all 10 measurement axes:
Verification of the specimen geometry in terms or parallelism and shape tolerances

Identification of sources of error in the test arrangement and artifacts
(to ISO 10113 Annex A)



Correct and precise

Precise r-values through:

High system accuracy (accuracy class 0.5 / ISO 9513)

- **Specially configured camera** and intelligent algorithm
- Measurement of the change in width based on 10 measurement axes that evaluate a total of **600 measuring lines**.
- Scaling **on all 10 measurement axes**

No operator influence due to automated processes and measurement without gauge marks

Reliable test results: Reliable r-values to ISO 10113 with low scatter.

Traceable

Reproducible

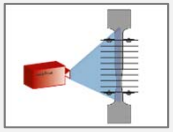
Repeatable

Accurate = correct & precise

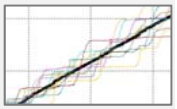
Precise r-values through high system accuracy,
accuracy class 0.5 (ISO 9513)
Correct r-values through measurement to ISO 10113:2020 over the entire measurement range and **tracking of the measurement axes**

No user influence from the measuring system, no gauge marks,
many automated functions/sequences

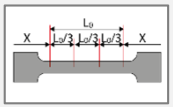
To ISO 10113:2020 **measurement over the entire gauge length & tracking of the measurement axes, permissible deviation** of the plastic axial and width strain of +/-0.05%
minimum influence of test& measurement system on test



Individual evaluation of all ten measurement axes: This way it is possible to verify at any time whether values are plausible



Automatic detection of the break location and break classification to ISO 6892 or JIS Z2254. The break location is traceable and can be additionally confirmed through image recording (Video Capturing).

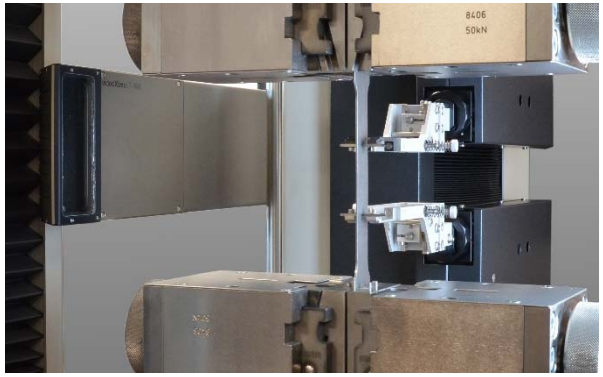


>>The videoXtens T-160 HP ensures reliable *r*-values to ISO 10113:2020 with low scatter, easy handling and many extras.

The New Standard for Reliable r-Values to ISO 10113:2020

videoXtens T-160 HP

Thank you for your attention!



Please visit our website:

www.zwickroell.com

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