

## Recommended symbols in forming technology for CIRP unified terminology

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RECOMMENDED SYMBOLS IN FORMING TECHNOLOGY

for CIRP UNIFIED TERMINOLOGY

compiled by: L.J.A. Houtackers

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C. I. R. P.

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COLLEGE INTERNATIONAL POUR L'ETUDE SCIENTIFIQUE DES TECHNIQUES DE PRODUCTION  
MECHANIQUE

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Scientific Technical Committee "F" (Forming)

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RECOMMENDED

SYMBOLS IN FORMING TECHNOLOGY

(for C. I. R. P. UNIFIED TERMINOLOGY)

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- Explanation:
- Numbers in column 3 refer to terms and texts in C.I.R.P. dictionary (part 5) in which the symbol of column 1 is used in a meaning which conforms to that in column 4;
  - + behind number of term: no symbol mentioned in dictionary;
  - (d) behind number of term: definition;
  - E = English text only; G = German text only; F = French text only.
  - number in column 5 = CIRP Nr. in CIRP UNIFIED TERMINOLOGY (Annals of the CIRP Vol. 33/2/1984 p. 575-581)

SYMBOL		C.I.R.P. dictionary vol. 5	RECOMMENDED MEANING	SEE
Pref.	CIRP-UT 33/2/1984			
a	a		- acceleration - Beschleunigung - accélération	1.10
A	A	5302 EG	- area, cross-section - Fläche, Querschnitt - aire, section	1.4
$\alpha$	$\alpha$		- angle - Winkel - angle	1.1
b	b		- width - Breite - largeur	1.3
$\beta$			- engineering deformation number, deep drawing ratio - Proceszkenzahl, Tiefziehverhältnis - Parametre du procédé de deformation, rapport d'emboutissage	1.1

c	c		<ul style="list-style-type: none"> <li>- specific heat capacity</li> <li>- spezifische Wärme Kapazität</li> <li>- chaleur massique</li> </ul>	A4.1 also 4.11
C			<ul style="list-style-type: none"> <li>- constant</li> <li>- Konstante</li> <li>- constante</li> </ul>	
d	d		<ul style="list-style-type: none"> <li>- diameter</li> <li>- Durchmesser</li> <li>- diamètre</li> </ul>	1.3
δ			used for differentials, increments or differences	
e		5331 E(d)	<ul style="list-style-type: none"> <li>- linear engineering strain</li> <li>- Lineare Dehnung (bezogen auf Ausgangslänge)</li> <li>- allongement brut, dilatation linique</li> </ul> See also ε	3.15
E	E		<ul style="list-style-type: none"> <li>- Young's modulus of elasticity</li> <li>- Elastizitätsmodul</li> <li>- module de Young, module d'elasticité (longitudinal)</li> </ul>	3.19
ε	ε	5331 EF(d)	<ul style="list-style-type: none"> <li>- natural strain (true strain)</li> <li>- natürl. (log.) Dehnung (Lokalwert)</li> <li>- déformation vraie (déf. rationelle)</li> </ul> See also e	3.15
ε̇		5334 EF(d)	<ul style="list-style-type: none"> <li>- natural strain rate</li> <li>- natürliche Dehnungsgeschwindigkeit (Lokalwert)</li> <li>- vitesse de déformation</li> </ul>	

$\bar{\epsilon}$		5338 EF(d)	<ul style="list-style-type: none"> <li>- equivalent (effective, generalized) strain</li> <li>- Vergleichsformänderung (Lokalwert)</li> <li>- déformation équivalente</li> </ul>	
$\dot{\bar{\epsilon}}$			<ul style="list-style-type: none"> <li>- equivalent strain rate</li> <li>- Vergleichsformänderungsgeschwindigkeit (Lokalwert)</li> <li>- vitesse de déformation équivalente</li> </ul>	
$\eta$		5330	<ul style="list-style-type: none"> <li>- efficiency (factor), work ratio (factor)</li> <li>- Wirkungsgrad</li> <li>- (coefficient de) rendement</li> </ul>	
f			- see $\mu$	3.23
F	F	5301 GF(d)	<ul style="list-style-type: none"> <li>- force (load)</li> <li>- Kraft (Belastung)</li> <li>- force (effort)</li> </ul>	3.8
$\varphi$			<ul style="list-style-type: none"> <li>- value of natural strain *)</li> <li>- Umformgrad (log. Formänderungsverhältnis)</li> <li>- valeur de la déformation vraie ou rationelle</li> <li>*) under the assumption of uniform deformation</li> </ul>	1.1
$\dot{\varphi}$			<ul style="list-style-type: none"> <li>- natural strain rate *)</li> <li>- Formänderungsgeschwindigkeit</li> <li>- valeur de la vitesse de déformation</li> <li>*) under the assumption of uniform deformation</li> </ul>	

$\bar{\phi}$			<ul style="list-style-type: none"> <li>- equivalent strain *)</li> <li>- Vergleichsformänderung</li> <li>- valeur de la déformation totale équivalente</li> <li>*) under the assumption of uniform deformation</li> </ul>	
$\dot{\bar{\phi}}$			<ul style="list-style-type: none"> <li>- equivalent strain rate *)</li> <li>- Vergleichsformänderungsgeschwindigkeit</li> <li>- valeur de la vitesse de déformation équivalente</li> <li>*) under the assumption of uniform deformation</li> </ul>	
g	g			1.11
G	G		<ul style="list-style-type: none"> <li>- shear modulus</li> <li>- Schubmodul</li> <li>- module de cisaillement</li> </ul>	3.20
$\gamma$	$\gamma$	5331 5338	<ul style="list-style-type: none"> <li>- shear strain, shear angle</li> <li>- Schiebung, Schiebung(swinkel)</li> <li>- déformation de cisaillement</li> </ul>	3.16
$\dot{\gamma}$			<ul style="list-style-type: none"> <li>- shear strain rate</li> <li>- Schiebungsgeschwindigkeit</li> <li>- vitesse de déformation de cisaillement</li> </ul>	
h	h		<ul style="list-style-type: none"> <li>- height</li> <li>- Höhe</li> <li>- hauteur</li> </ul>	1.3

H		5304 (d)+ 5651 (d)+ 5654 +	- stroke length - Hub - course	
k		5348 (d) 5349 (d)	- shear flow stress - Schubfließspannung (von Mises) - limite d'élasticité au cisaillement	
K	K		- compression modulus - Kompressions modul - module de compression	3.21
l	l	5331 5736 etc.	- length - Länge - longueur	1.3
m	m		- mass - Masse - masse	3.1
M	M		- moment - Moment - moment	3.10
$\mu$	$\mu$	5381 (d)	- coefficient of friction - Reibungsbeiwert (Reibwert)(-faktor) - coefficient de frottement	3.23
n		5470 (d)	- strain hardening exponent - Verfestigungsexponent - coefficient d'écrouissage	
$\nu$	$\nu$		- Poisson ratio - Poissonzahl - coefficient de Poisson	3.18



w	w		<ul style="list-style-type: none"> <li>- angular velocity</li> <li>- Winkelgeschwindigkeit</li> <li>- vitesse angulaire</li> </ul>	1.7
p	p	5302	<ul style="list-style-type: none"> <li>- pressure</li> <li>- Flächenpressung (Druck)</li> <li>- pression</li> </ul>	3.12
P	P		<ul style="list-style-type: none"> <li>- power (work per unit time)</li> <li>- Leistung</li> <li>- puissance</li> </ul>	3.29
Q	Q		<ul style="list-style-type: none"> <li>- quantity (of heat, fluid)</li> <li>- Menge (Wärme-, Flüssigkeits-)</li> <li>- quantité (de chaleur, liquide)</li> </ul>	4.6
r	r		<ul style="list-style-type: none"> <li>- radius (polar coordinate)</li> <li>- Radius (Polarkoordinate)</li> <li>- rayon (coordonée polaire)</li> </ul>	1.3
R		5309 EF(d)	<ul style="list-style-type: none"> <li>- anisotropy parameter, area reduction ratio</li> <li>- Kennwert für Anisotropie, bezogene Querschnittsänderung</li> <li>- coefficient d'anisotropie, variation de la section transversale</li> </ul>	
ρ			<ul style="list-style-type: none"> <li>- bending radius</li> <li>- Biegeradius</li> <li>- rayon de pliage</li> </ul>	
s			<ul style="list-style-type: none"> <li>- thickness</li> <li>- Dicke, Blechstärke</li> <li>- épaisseur</li> </ul>	1.3
S				

$\sigma$	$\sigma$	5339 (d) 5341 (d)	<ul style="list-style-type: none"> <li>- components of stress tensor (in orthonormal vectorbasis)</li> <li>- Komponenten des Spannungstensors (in orthonormale vektrobasis)</li> <li>- composantes du tenseur des contraintes (...)</li> </ul>	3.13
$\sigma'$		5344 (d)	<ul style="list-style-type: none"> <li>- components of deviatoric (reduced) stress tensor (in orthonormal vectorbasis)</li> <li>- Komponenten des deviatorischen (reduzierten) Spannungstensors (in orthonormale vektorbasis)</li> <li>- composantes du tenseur déviatorique (reduit) des contraintes (...)</li> </ul>	
$\sigma_m$			<ul style="list-style-type: none"> <li>- hydrostatic or mean stress</li> <li>- hydrostatische Spannungskomponente</li> <li>- contrainte hydrostatique</li> </ul>	
$\sigma_F$			<ul style="list-style-type: none"> <li>- flow stress value</li> <li>- Fließspannungswert</li> <li>- tension d'écoulement</li> </ul>	
$\bar{\sigma}$		5345 E(d)	<ul style="list-style-type: none"> <li>- effective (generalized, equivalent) stress</li> <li>- Vergleichspannung</li> <li>- contrainte équivalente (effective, généralisé)</li> </ul>	
$\tau$	$\tau$	5342 (d)	<ul style="list-style-type: none"> <li>- shear stress</li> <li>- Schubspannung, (Scherspannung)</li> <li>- contrainte de cisaillement</li> </ul>	
$t$	$t$		<ul style="list-style-type: none"> <li>- time</li> <li>- Zeit</li> <li>- temps</li> </ul>	1.6

T	T		<ul style="list-style-type: none"> <li>- temperature</li> <li>- Temperature</li> <li>- température</li> </ul>	4.1
θ			<ul style="list-style-type: none"> <li>- angle</li> <li>- Winkel</li> <li>- angle</li> </ul>	
u v w	u v w	5306 G	<ul style="list-style-type: none"> <li>- displacement, velocity</li> <li>- Verschiebung, Geschwindigkeit</li> <li>- déplacement, vitesse</li> </ul>	1.9
U			<ul style="list-style-type: none"> <li>- clearance</li> <li>- (Zieh)spalt</li> <li>- marge d'outil</li> </ul>	
V	V		<ul style="list-style-type: none"> <li>- volume</li> <li>- Volumen, Rauminhalt</li> <li>- volume</li> </ul>	1.5
W	W		<ul style="list-style-type: none"> <li>- work, energy</li> <li>- Arbeit, Energie</li> <li>- travail, énergie</li> </ul>	3.27 and 3.28

GENERAL SUBSCRIPTS      ALLGEMEINE INDIZES      SYMBOLES INDICES

Pref.	meaning	Bedeutung	signification
a	<ul style="list-style-type: none"> <li>- axial</li> <li>- Axial</li> <li>- axial</li> </ul>		
b	<ul style="list-style-type: none"> <li>- width, bottom</li> <li>- Breite, Boden</li> <li>- largeur, fond</li> </ul>		
B	<ul style="list-style-type: none"> <li>- bending</li> <li>- Biegung</li> <li>- pliage</li> </ul>		
c	<ul style="list-style-type: none"> <li>- critical</li> <li>- kritisch</li> <li>- critique</li> </ul>		
C	<ul style="list-style-type: none"> <li>- contact</li> <li>- kontakt</li> <li>- contact</li> </ul>		
D	<ul style="list-style-type: none"> <li>- die, drawing</li> <li>- Matrize, ziehen</li> <li>- matrice, étirage</li> </ul>		
def	<ul style="list-style-type: none"> <li>- deformation      ex: T<sub>def</sub></li> <li>- Umform</li> <li>- déformation</li> </ul>		
e	<ul style="list-style-type: none"> <li>- final, electric</li> <li>- Endwert, elektrisch</li> <li>- final, électrique</li> </ul>		

eff	<ul style="list-style-type: none"> <li>- effective</li> <li>- Effektivwert</li> <li>- effectif</li> </ul>
el	<ul style="list-style-type: none"> <li>- elastic</li> <li>- elastisch</li> <li>- élastique</li> </ul>
F	<ul style="list-style-type: none"> <li>- flow</li> <li>- Fliesz</li> <li>- écoulement</li> </ul>
Fr	<ul style="list-style-type: none"> <li>- friction</li> <li>- Reibung</li> <li>- frottement</li> </ul>
h	<ul style="list-style-type: none"> <li>- height</li> <li>- Höhe</li> <li>- hauteur</li> </ul>
i, j	<ul style="list-style-type: none"> <li>- denoting components of a tensor</li> <li>- Bezeichnung für Tensorkomponente</li> <li>- indices des composants d'un tenseur</li> </ul>
id	<ul style="list-style-type: none"> <li>- ideal</li> <li>- ideell</li> <li>- idéal</li> </ul>
I	<ul style="list-style-type: none"> <li>- inner</li> <li>- innen</li> <li>- interne</li> </ul>
l	<ul style="list-style-type: none"> <li>- length, longitudinal</li> <li>- Länge (Längskomponente), longitudinal</li> <li>- longueur, longitudinal</li> </ul>

L	<ul style="list-style-type: none"> <li>- lower</li> <li>- unter</li> <li>- inférieure</li> </ul>
m	<ul style="list-style-type: none"> <li>- average</li> <li>- Mittelwert</li> <li>- moyenne</li> </ul>
M	<ul style="list-style-type: none"> <li>- machine</li> <li>- Maschine</li> <li>- machine</li> </ul>
max	<ul style="list-style-type: none"> <li>- maximum</li> <li>- Maximalwert, Grenzwert</li> <li>- maximum</li> </ul>
min	<ul style="list-style-type: none"> <li>- minimum</li> <li>- Minimalwert, Grenzwert</li> <li>- minimum</li> </ul>
n	<ul style="list-style-type: none"> <li>- normal</li> <li>- Normal      ex: normal Force = <math>F_n</math></li> <li>- normal</li> </ul>
N	<ul style="list-style-type: none"> <li>- nominal</li> <li>- nominal (Nennwert)</li> <li>- nominal</li> </ul>
o	<ul style="list-style-type: none"> <li>- initial, original</li> <li>- Anfangswert</li> <li>- initial</li> </ul>
O	<ul style="list-style-type: none"> <li>- outer</li> <li>- auszer</li> <li>- externe</li> </ul>

opt.	<ul style="list-style-type: none"> <li>- optimal</li> <li>- Optimalwert</li> <li>- optimal</li> </ul>
p	<ul style="list-style-type: none"> <li>- pressure</li> <li>- Druck</li> <li>- pression</li> </ul>
P	<ul style="list-style-type: none"> <li>- punch</li> <li>- Stanze</li> <li>- poinçon</li> </ul>
pl	<ul style="list-style-type: none"> <li>- plastic</li> <li>- plastisch</li> <li>- plastique</li> </ul>
r	<ul style="list-style-type: none"> <li>- radial</li> <li>- Radial</li> <li>- radial</li> </ul>
rel	<ul style="list-style-type: none"> <li>- relative</li> <li>- Relativ</li> <li>- relatif</li> </ul>
S	<ul style="list-style-type: none"> <li>- shearing, blanking</li> <li>- Stanzen</li> <li>- poinçonnage</li> </ul>
s	<ul style="list-style-type: none"> <li>- specific</li> <li>- spezifisch</li> <li>- spécifique</li> </ul>
t	<ul style="list-style-type: none"> <li>- tangential</li> <li>- Tangential</li> <li>- tangential</li> </ul>

tot	<ul style="list-style-type: none"> <li>- total</li> <li>- total</li> <li>- total</li> </ul>
T	<ul style="list-style-type: none"> <li>- torsion, tensile</li> <li>- Torsion, Zug</li> <li>- torsion, traction</li> </ul>
u	<ul style="list-style-type: none"> <li>- uniform, ultimate</li> <li>- gleichmässig, äusserste</li> <li>- uniforme, ultime</li> </ul>
U	<ul style="list-style-type: none"> <li>- upper</li> <li>- oben</li> <li>- supérieure</li> </ul>
W	<ul style="list-style-type: none"> <li>- workpiece</li> <li>- Wertstück</li> <li>- éprouvette</li> </ul>
x y z	<ul style="list-style-type: none"> <li>- in direction x etc.</li> <li>- in x-Richtung usw.</li> <li>- en direction x etc.</li> </ul>
1 2 3	<ul style="list-style-type: none"> <li>- principal directions</li> <li>- Hauptrichtungen</li> <li>- directions principal</li> </ul>
r θ z	<ul style="list-style-type: none"> <li>- polar coordinates</li> <li>- Polarkoordinaten</li> <li>- coordonnées polaires</li> </ul>