**Size and Shape Parameter in DiaTest-ASM and DiaInspect software**

*the citation of ISO refers to E DIN ISO 9276-6:2010-02*

| Abbreviation in Vers. 1.9 / DiaInspect 2010 | | DIN - ISO descriptor | also allowed | also used | old DiaInspect | description | Value range | formula |
|---|---|---|---|---|---|---|---|---|
| | | ***Size parameters for the normalization of shape descriptors*** | | | | | | |
| **A** | X | **A** | | | **A** | **projection area** | **0 ...** | A |
| **xA** | X | **xA** | **dA** | **ECD** | **dCirc** | **equivalent circle diameter** | **0 ...** | $xA = \sqrt{\frac{4 * A}{\pi}}$ |
| **P** | X | **P** | | | | **Perimeter** | **0 ...** | |
| **xP** | X | **xP** | **dP** | | | **Diameter of circle with same perimeter** | **0 ...** | $xP = \frac{P}{\pi}$ |
| | | ***Shape descriptors -> macro descriptors -> geometrical descriptors*** | | | | | | |
| **xLmax** | X | **xLmax** | **dLmax** | | | **Axis and axis ratio of the Legendre-ellipse which has the same geometricals moments as the original particle area** | **0 ...** | |
| **xLmin** | X | **xLmin** | **dLmin** | | | | **0 ...** | |
| **xFmax** | X | **xFmax** | **dFmax** | | **dmin** | **Feret max diameter** | **0 ...** | |
| **xFmin** | X | **xFmin** | **dFmin** | | **dmax** | **Feret min diamater** | **0 ...** | |
| **xLF** | X | **xLF** | **dLF** | | | **Feret diameter 90° to min. Feret Diameter** | **0 ...** | |
| | | ***Shape descriptors -> macro descriptors -> proportion descriptor*** | | | | | | |
| **Er** | X | **Ellipse ratio** | | | | | **0...1** | $Er = \frac{xLmin}{xLmax}$ |
| **Ellipticity** | X | **elliptical shape factor** | | | **Ellipticity** | | **1...** | $Ellipticity = \frac{xLmax}{xLmin}$ |
| **Xr** | X | **Aspect ratio** | **Chunkiness** | **elongation** | | | **0...1** | $Xr = \frac{xFmin}{xFmax}$ |
| **F-elong** | X | | | | **F-elong** | | **1...** | $F - elong = \frac{xFmax}{xFmin}$ |

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| | | DIN - ISO descriptor | also allowed | also used | old DiaInspect | description | Value range | formula |
|---|---|---|---|---|---|---|---|---|
| **Co** | X | **Compactness** | | | | **to which degree is the particle similar to a circle** | **0...1** | $Co = \frac{\sqrt{\frac{4*A}{\pi}}}{xFmax} = \frac{xA}{xFmax}$ |
| **Ro** | X | | | **Roundness** | | **related to area and max. Diameter** | **0...1** | $Ro = \frac{4*A}{\pi * xFmax^2} = \left(\frac{xA}{xFmax}\right)^2$ |
| **Comp** | X | | | | **Compactness** | **related to true perimeter and area** | **1...** | $Comp = \frac{P^2}{4*\pi*A}$ |
| **Coutl** | X | | | | **convex Outline** | **related to convex perimeter and area** | **1...** | $cOutl = \frac{Pc^2}{4*\pi*A}$ |
| **Ex** | X | **Extent** | | | | | **0...1** | $Ex = \frac{A}{xFmax * xFmin}$ |
| **Br** | X | **Boxratio Br** | | | | **ratio of the projected surface to the feret box** | **0...1** | $Br = \frac{A}{xFmin * xLF}$ |
| DiaInspect 2010 | | **Shape descriptors -> meso descriptors** | | | | | | |
| **C** | X | **Circularity C** | | | **1/Compactness^1/2** | **to which degree is the particle similar to a circle, considering the smotthness of the perimeter** | **0...1** | $c = \sqrt{\frac{4*\pi*A}{P^2}} = \frac{xA}{xP}$ |
| **S** | X | **Solidity** | | | | **overall convexity of an object, using area of convex hull and area** | **0...1** | $S = \frac{A}{A_c}$ |
| **CI** | X | **global surface concavity index** | | | | | | $CI = \frac{Ac - A}{A}$ |
| **Cc** | X | | | **Concavity** | | | **0...1** | $Cc = \frac{Ac - A}{Ac}$ |
| **Cv** | X | **Convexity** | | | **1/Roughness** | **Perimeter convex / Perimeter** | | $Cv = \frac{Pc}{P}$ |

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|---|---|---|---|---|---|---|---|
| **Rb** - | **Particle robustness** | **Ω1** | | | **defined by the number of erosions (omega2) necessary to let the particle disappear** | | $\boldsymbol{\Omega}_1 = \frac{2 * \omega_2}{\sqrt{A}}$ |
| | **Shape descriptors Roughness descriptor** | | | | | | |
| **DF** - | **Fractal Dimensions DF** | | | | **The relation between the length of perimeter P(lambda) and the length lambda of the steps is liinear on log-log plot, known as Richardson plot. The data are first normalized by the maximum feret diameter. The upper border for the step size is lambda= 0.3* xFmax. The equation of the straight line;** | | $\log\left(P(\boldsymbol{\lambda})\right) = (1 - D_F) * \log(\boldsymbol{\lambda}) + \log(b)$ |

## Greyscale and color parameters in DiaInspect 2010

| Abbreviation | avail. in DiaInspect 2010 Vers. 1.9 | DIN - ISO descriptor | also allowed | also used | old DiaInspect | description | Value range | formula |
|---|---|---|---|---|---|---|---|---|
| | | **Size parameters for the normalization of shape descriptors** | | | | | | |
| **Atr** | x | | | | | **transparent area related to the total area** | **0...1** | Atransparent / Atotal |
| **AtrLum** | x | | | | | **brightness of the transparent area related to the maximum possible brightness** | **0...1** | Brightness / maxBrightness |
| **CIEL** | x | | | | | **L*-Value of the particle in the CIELab color coordinate system** | **0 ...100** | |
| **CIEa** | x | | | | **CIEa** | **a*-Value of the particle in the CIELab color coordinate system** | **-100...+100** | |
| **CIEb** | x | | | | **CIEb** | **b*-Value of the particle in the CIELab color coordinate system** | **-100...+100** | |

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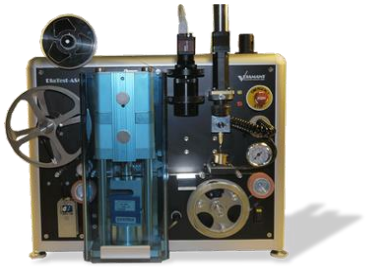

| | DIN - ISO descriptor | also allowed | also used | old DiaInspect | description | Value range | formula |
|---|---|---|---|---|---|---|---|
| ***DiaTest-ASM*** | ***Fracture and 3D parameters*** | | | | | | |
| **CFFFt** | | | | | CFF calculated from the F(t) plot | N | |
| **CFF1st** | | | | | CFF of the first fracture calculated from the F(d) plot (Force vs. anvil displacement) | N | |
| **CFFmp** | | | | | CFF of the most prominent fracture calculated from the F(d) plot (Force vs. anvil displacement), is connected to the largest anvil displacement | N | |
| **Nob** | | | | | Number of breakings for this particle | 1 … | |
| **CFF1 … CFF10** | | | | | CFF of the observed breakings #1 to #10 | N | |
| **dH1 … dH10** | | | | | anvil displacement related to the breaking | | |
| **CFSFtd** | | | | | CFFFt divided by Pi/4*xFmin^2 | N/mm^2 | |
| **CFSFtA** | | | | | CFFFt divided by A | N/mm^2 | |
| **CFS1std** | | | | | CFF1st divided by Pi/4*xFmin^2 | N/mm^2 | |
| **CFS1stA** | | | | | CFF1st divided by A | N/mm^2 | |
| **CFSmpd** | | | | | CFFmp divided by Pi/4*xFmin^2 | N/mm^2 | |
| **CFSmpA** | | | | | CFFmp divided by A | N/mm^2 | |
| **xH** | | | | | particle height | mm | |
| **Hr** | | | | | ratio between xH and xFmin | 0 … | |