

DIN SPEC 91472:2023-06 (E)

Remanufacturing (Reman) - Quality classification for circular processes

Contents		Page
Foreword		4
Introduction		5
1	Scope	6
2	Normative references	6
3	Terms and definitions	6
4	Value-retention processes and remanufacturing	8
4.1	Circular Economy	8
4.2	Value-retention processes	9
4.3	Remanufacturing	11
4.3.1	Generic process description	11
4.3.2	Classification of remanufacturing	12
4.3.3	Remanufacturing example	14
5	Process quality classification	14
5.1	Process quality	14
5.2	Evaluation methodology	15
5.2.1	Process quality matrix for remanufacturing processes	15
5.2.2	Classification procedure	17
5.3	Classification example	17
6	Quality of remanufactured products	22
7	Determining the product circularity of remanufactured products	23
7.1	Product circularity	23
7.2	Calculation methodology	23
7.2.1	General	23
7.2.2	Data preparation	23
7.2.3	Calculation of the (remanufactured) product composition circularity indicator (PCI)	25
7.2.4	Calculation of the end of use circularity indicator (ECI) of (remanufactured) products	25
7.2.5	Cumulative indicators as key metrics at site or company level	27
7.2.6	Aggregated indicators for complex products	27
7.3	Calculation examples	28
7.3.1	Data preparation	28
7.3.2	PCI - Example	29
7.3.3	ECI - Example	29
7.3.4	Accumulation of indicators - Example	30
7.3.5	Aggregation of indicators - Example	31
8	Communication, transparency and labelling	32
8.1	Requirements on communication and transparency	32
8.2	Label	32
8.2.1	General	32
8.2.2	Label for remanufactured products	32
8.2.3	Label for used parts	34
8.2.4	Label for potential used parts	34
Bibliography		36

Figures

Figure 1 — Overview of the most important value retention strategies of the Circular Economy.....	10
Figure 2 — Potential of value-retention processes to enable additional service life of products compared to the as-expected functioning new product originating from a new manufacturing process	11
Figure 3 — Generic process chain of remanufacturing	11
Figure 4 — Label for remanufactured products	33
Figure 5 — Label for used parts	34
Figure 6 — Label for potential used parts.....	35

Tables

Table 1 — Process quality matrix for remanufacturing processes.....	16
Table 2 — Example of the classification of a remanufacturing process into the process quality classes for remanufacturing process quality criteria	18
Table 3 — Presentation of results of the process matrix based on the example evaluation in Table 2. Results of process quality classification are to be communicated in this form.	21
Table 4 — Generic differences and similarities of various quality aspects of remanufactured products compared to new products originating from new manufacturing processes.....	22
Table 5 — Classification of the targeted component origin and the targeted component destination in the context of the calculation of PCI and ECI.....	24
Table 6 — Table of an example for data preparation for the calculation of the PCI and ECI for a product with a total mass of 4 kg.....	25
Table 7 — Table for assigning take-back systems and take-back rates for calculating the ECI	26
Table 8 — Example of the data preparation for the calculation of the PCI and ECI.....	28
Table 9 — Example raw data for calculating cumulative circularity indicators	30
Table 10 — Raw data for calculating aggregated circularity indicators for an example of a complex product	31