

# MEGA evaluations for the preparation of REACH exposure scenarios for MDI and TDI (2000 to 2009) in Germany

## 1 Introduction

The measured data for workplace exposure evaluated in the following have been gathered and documented in accordance with the principles of the measurement system of the German social accident insurance institutions for exposure assessment (MGU<sup>1</sup>, formerly BGMG). The quality of the MGU is upheld by a quality management system that in essence satisfies the requirements of DIN EN ISO 9001. The test laboratories are operated in accordance with DIN EN ISO 17025 “General requirements for the competence of testing and calibration laboratories”.

With consideration given to data security, the principles for the statistical evaluation of the data gathered in the MGU are governed by an administrative agreement between the accident insurance institutions (AIs) and the German Social Accident Insurance (DGUV). The process ensures that it is not possible to trace the identity of an insured firm or of an AI; the measured values concerned are otherwise disregarded.

All the surveyed data in the MGU are brought together in the MEGA exposure database (measured data on exposure to hazardous substances at the workplace). If individual values fall below the measurement method’s analytical quantification limit, half the value is adopted in the evaluation. The MEGAPro software developed by the IFA (formerly BGIA) makes it possible to statistically analyse the data of the MEGA exposure database on the basis of various selection criteria and evaluation strategies.

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<sup>1</sup> Gabriel, S.; Koppisch, D.; Range, D.: The MGU – a monitoring system for the collection and documentation of valid workplace exposure data. Gefahrstoffe – Reinhalt. Luft 70 (2010) No. 1/2, pp. 43-49  
<http://www.dguv.de/ifa>, Webcode [m200066](#)

## 2 Data situation and evaluation strategy

### 2.1 Hazardous substances

BG Code	CAS No.	Abbreviation	Hazardous substance
15451	101-68-8	4,4'-MDI	4,4'-methylene diphenyl diisocyanate (diphenylmethane-4,4'-diisocyanate (MDI))
154511	5873-54-1	2,4'-MDI	2,4'-methylene diphenyl diisocyanate (diphenylmethane-2,4'-diisocyanate)
15455	91-08-7	2,6-TDI	2-methyl-m-phenylene diisocyanate (2,6-toluene diisocyanate)
15456	584-84-9	2,4-TDI	4-methyl-m-phenylene diisocyanate (2,4-toluene diisocyanate)

### 2.2 Overview of the measured values collected in the MGU, data period 2000 to 2009

Hazardous substance	Number of measurements			
	4,4'-MDI	2,4'-MDI	2,6-TDI	2,4-TDI
<b>Total</b>	4484	1810	2113	2134
<b>Exposure time ≥ 6 h</b>	3907	1586	1783	1794
<b>Exposure time &lt; 6 h</b>	536	214	317	327
<b>Sampling time ≥ 1 h</b>	4208	1697	2002	2018
<b>&gt; AQL</b>	553	107	243	245
<b>&lt; AQL</b>	3931	1703	1870	1889
<b>&gt; LW</b>	41	9	49	32
<b>Stationary measurement</b>	2050	812	971	975
<b>Personal measurement</b>	2432	998	1142	1159
<b>Measurement representative for exposure time</b>	4413	1808	2093	2110
<b>Work place without local exhaust ventilation</b>	1480	603	609	616
<b>Work place with local exhaust ventilation</b>	2329	906	1252	1269

### 2.3 Criteria for inclusion of measured data in the evaluation (Sections 4 to 7)

- Data period 2000 to 2009
- Measured data relating to exposure
- Personal sampling

- Sampling time  $\geq$  1 hour
- Exposure time  $\geq$  6 hours
- In consultation with the TDI Group, the work areas are combined to form sensible work area groups (see Section 8) and evaluated.
- The work area groups are evaluated according to work area group with and without local exhaust ventilation (see Column 2 of the results tables in Sections 4 to 7). By local exhaust ventilation is meant equipment for extraction of the hazardous substances at the emission source (e.g. extractor hoods).
- The work area group “All work areas” comprises all measured data (taking account of the constraints mentioned above).
- For the “Foaming” and “Spraying” work area groups, different subgroups have been additionally created.
- Work area groups comprising fewer than ten measured data or measured data from fewer than two different accident insurance institutions or from fewer than five different firms are not evaluated (administrative agreement between the accident insurance institutions and DGUV for the purpose of data security).

## 2.4 Measurement distribution for industry groups

Industry group	Number of measurements											
	4,4'-MDI			2,4'-MDI			2,6-TDI			2,4-TDI		
	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW
<b>Construction</b>	226	216	1	81	81		161	147	2	163	158	1
<b>Chemical Industry</b>	203	158	2	97	92		90	72	2	91	72	3
<b>Services</b>	10	10					10	10		10	10	
<b>Printing office</b>	46	45	2	16	16		36	34		36	35	
<b>Electrical engineering, fine mechanics, optics</b>	369	358		149	148		225	222		224	218	
<b>Glass</b>	97	95		44	44		78	78		78	78	
<b>Whole and retail sale</b>	73	66		28	27		17	14		18	14	
<b>Manufacture of rubber products</b>	40	38					17	11	3	17	12	2
<b>Wood and paper</b>	588	528	6	210	195	2	352	340	6	346	330	
<b>Ceramics</b>	102	94		48	48		36	35		37	36	
<b>Plastic industry</b>	1213	996	20	466	423	2	382	287	22	384	282	18
<b>Leather and textile industry</b>	301	235	1	71	70		168	110	11	174	120	4
<b>Processing of metals/ Mechanical engineering</b>	938	829	8	486	445	5	470	450		480	458	1
<b>Metal production</b>	233	218		81	81		28	28		30	30	
<b>Manufacture and treatment of friction lining (single specification)</b>							19	11		19	11	
<b>Transport</b>	13	13	1									

**2.5 Measurement distribution  
for work area groups**

Work area group	Number of measurements											
	4,4'-MDI			2,4'-MDI			2,6-TDI			2,4-TDI		
	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW
Processing, subsequent treatment	250	237		96	95		105	89	4	106	92	2
Printing	31	29	1	8	8		37	35		36	35	
Flaming, singeing, burning	32	32		19	19		35	4	9	35	5	3
Moulding	93	77	1	46	40	1	19	18		15	14	
Casting	331	304	1	169	168		101	89		102	87	5
Gluing	821	647	7	378	348	2	315	285	3	304	280	1
Storing, conveying, filling, weighing	171	140	4	78	73		57	47	3	59	49	3
Mixing, stirring	76	68		22	22		29	26	2	30	28	2
Surface coating processes, miscellaneous	274	224	5	91	78		193	182		207	194	1
Brushing, rollering, painting	37	33					32	32		37	37	
Pressing, extrusion	104	69	1	34	27		28	21	4	28	21	2
Quality inspection laboratory	45	45		19	19		44	28	2	44	29	2
Cleaning	31	27		16	14		14	12	2	14	12	
Foam-filling (all work areas)	778	698	4	293	281	1	222	157	18	223	154	11
Foaming blocks	207	186	3	71	66	1	59	39	4	59	39	

Work area group	Number of measurements											
	4,4'-MDI			2,4'-MDI			2,6-TDI			2,4-TDI		
	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW	tot.	< AQL	> LW
<b>Foaming, expanding and insulating foam</b>	69	61		16	16		29	23	5	29	23	1
<b>Foaming moulds</b>	315	290	3	119	113	1	68	59		69	57	
<b>Foaming (other)</b>	364	319	1	144	138		81	68	3	81	65	5
<b>Spraying (all work areas)</b>	535	492	10	163	148	4	500	480	1	506	482	
<b>Spraying (Airless)</b>	116	109		21	20		100	99		99	97	
<b>Spraying (Airmix)</b>	31	28	2	16	13		29	28		31	29	
<b>Spraying (pressurised air)</b>	305	277	8	99	89	4	301	285	1	306	290	
<b>Spraying (electrostatic)</b>	17	16		1	1		14	12		14	12	
<b>Laying, gluing</b>	20	20		20	20		15	8		15	13	
<b>Processing, subsequent treatment</b>	250	237		96	95		105	89	4	106	92	2
<b>Other</b>	558	509	4	237	228	1	231	222	1	230	215	

### 3 Abbreviations and indices

The following abbreviations and indices are used in the evaluation tables:

AQL	analytical quantification limit
LW	limit value; in this case, workplace limit value
tot.	Total
WA	work area
Number < values	number of measured values below the analytical quantification limit
Arithm. Mean	arithmetic mean
SD	arithmetic standard deviation
!	The number of measured values below the analytical quantification limit (AQL) is greater than the number of measured values represented by this cumulative frequency value. No concentration is therefore given for this cumulative frequency value.
+	The distribution value is below the largest analytical quantification limit in the data set.

**4 Statistical evaluations for  
4,4'-MDI**

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m³)	SD	≤ LW [%]	50 per-centile	75 per-centile	90 per-centile	95 per-centile
All work area groups	yes	1110	941	0.00302	0.0139	99.5	AQL !	AQL !	0.004 +	0.009 +
All work area groups	no	658	577	0.00337	0.0256	99.5	AQL !	AQL !	0.003 +	0.007 +
Processing, subsequent treatment	yes	52	46	0.00141	0.00157	100	AQL !	AQL !	0.002 +	0.0024 +
Processing, subsequent treatment	no	35	32	0.00123	0.00069	100	AQL !	AQL !	AQL !	0.003 +
Moulding	yes	22	16	0.00482	0.00988	100	AQL !	0.002 +	0.018	0.0229
Moulding	no	11	9	0.00364	0.0059	100	AQL !	AQL !	0.0127	0.0154
Casting	yes	82	61	0.00293	0.00529	100	AQL !	0.002 +	0.005	0.0108
Casting	no	54	54	0.00105	0.000176	100	AQL !	AQL !	AQL !	AQL !
Gluing	yes	165	127	0.006	0.0319	98.8	AQL !	AQL !	0.0065	0.0138
Gluing	no	196	169	0.00265	0.0123	99.5	AQL !	AQL !	0.003 +	0.006
Storing, conveying, filling, weighing	yes	37	26	0.00399	0.00789	100	AQL !	0.002 +	0.0083	0.0129
Storing, conveying, filling, weighing	no	34	30	0.002	0.00452	100	AQL !	AQL !	0.0016 +	0.005
Mixing, stirring	yes	19	17	0.00116	0.000501	100	AQL !	AQL !	0.002 +	0.00205
Surface coating processes, miscellaneous	yes	64	47	0.0063	0.0115	100	AQL !	0.004	0.0188	0.037
Surface coating processes, miscellaneous	no	21	21	0.00157	0.00263	100	AQL !	AQL !	AQL !	AQL !
Pressing, extrusion	yes	38	18	0.00716	0.0126	97.4	0.002 +	0.006	0.0174	0.028
Pressing, extrusion	no	11	10	0.00145	0.00151	100	AQL !	AQL !	AQL !	0.00325
Foaming (all WA)	yes	250	231	0.00143	0.00209	100	AQL !	AQL !	AQL !	0.003 +
Foaming (all WA)	no	180	158	0.00258	0.00702	99.4	AQL !	AQL !	0.002 +	0.008
Foaming blocks	yes	73	62	0.00182	0.00234	100	AQL !	AQL !	0.005	0.007



Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m <sup>3</sup> )	SD	≤ LW [%]	50 per-centile		75 per-centile		90 per-centile		95 per-centile	
<b>Foaming blocks</b>	no	43	41	0.00107	0.000338	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Foaming, expanding and insulating foam</b>	yes	11	10	0.00173	0.00241	100	AQL	!	AQL	!	AQL	!	0.0046	
<b>Foaming, expanding and insulating foam</b>	no	22	20	0.00207	0.00447	100	AQL	!	AQL	!	AQL	!	0.00285	+
<b>Foaming moulds</b>	yes	141	127	0.00162	0.00264	100	AQL	!	AQL	!	AQL	!	0.005	
<b>Foaming moulds</b>	no	56	53	0.00107	0.000322	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Foaming (other)</b>	yes	82	78	0.00115	0.000723	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Foaming (other)</b>	no	98	81	0.00363	0.00917	99	AQL	!	AQL	!	0.0042		0.0182	
<b>Spraying (all WA)</b>	yes	210	196	0.00216	0.00935	99.5	AQL	!	AQL	!	AQL	!	0.0025	+
<b>Spraying (all WA)</b>	no	21	18	0.00355	0.00881	100	AQL	!	AQL	!	0.00555		0.00885	
<b>Spraying (Airless)</b>	yes	51	48	0.00143	0.00187	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Spraying (Airmix)</b>	yes	14	13	0.00175	0.00267	100	AQL	!	AQL	!	AQL	!	0.00435	
<b>Spraying (pressurised air)</b>	yes	119	111	0.00266	0.0123	99.2	AQL	!	AQL	!	AQL	!	0.00205	+
<b>Spraying (pressurised air)</b>	no	15	14	0.00153	0.00207	100	AQL	!	AQL	!	AQL	!	0.003	

**5 Statistical evaluations for  
2,4'-MDI**

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m³)	SD	≤ LW	50 percentile	75 percentile	90 percentile	95 percentile				
All work areas	yes	426	402	0.00141	0.00429	99.8	AQL	!	AQL	!	AQL	!	0.002	+
All work areas	no	288	277	0.00158	0.00511	99.7	AQL	!	AQL	!	AQL	!	AQL	!
Processing, subsequent treatment	yes	17	16	0.00109	0.000264	100	AQL	!	AQL	!	AQL	!	0.002	+
Processing, subsequent treatment	no	13	13	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Moulding	yes	13	11	0.00131	0.000855	100	AQL	!	AQL	!	0.002	+	0.0027	
Casting	yes	39	38	0.00106	0.000366	100	AQL	!	AQL	!	AQL	!	AQL	!
Casting	no	26	26	0.0011	0.000246	100	AQL	!	AQL	!	AQL	!	AQL	!
Gluing	yes	60	60	0.001	0.0000921	100	AQL	!	AQL	!	AQL	!	AQL	!
Gluing	no	112	108	0.00112	0.000975	100	AQL	!	AQL	!	AQL	!	AQL	!
Storing, conveying, filling, weighing	yes	19	18	0.00147	0.00115	100	AQL	!	AQL	!	AQL	!	0.0022	+
Storing, conveying, filling, weighing	no	14	13	0.0045	0.0131	100	AQL	!	AQL	!	AQL	!	0.0157	
Surface coating processes, miscellaneous	yes	29	24	0.00128	0.000635	100	AQL	!	AQL	!	0.002	+	0.002	+
Pressing, extrusion	yes	17	11	0.00324	0.00378	100	AQL	!	0.003		0.0083		0.0096	
Foaming (all WA)	yes	93	89	0.00106	0.000323	100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming (all WA)	no	63	59	0.00138	0.00156	100	AQL	!	AQL	!	AQL	!	0.00285	+
Foaming blocks	yes	25	22	0.00112	0.000506	100	AQL	!	AQL	!	0.0015	+	0.002	+
Foaming moulds	yes	52	48	0.00107	0.000384	100	AQL	!	AQL	!	AQL	!	0.002	+
Foaming moulds	no	14	14	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming (other)	yes	32	32	0.00108	0.000257	100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming (other)	no	41	37	0.00159	0.00191	100	AQL	!	AQL	!	AQL	!	0.00585	+

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m <sup>3</sup> )	SD	≤ LW	50 percentile	75 percentile	90 percentile	95 percentile				
<b>Spraying (all WA)</b>	yes	81	77	0.0023	0.00959	98.8	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (Airless)</b>	yes	15	15	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (pressurised air)</b>	yes	45	42	0.00328	0.0128	97.8	AQL	!	AQL	!	AQL	!	0.0035	+

**6 Statistical evaluations for  
2,6-TDI**

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m³)	SD	≤ LW [%]	50 percentile	75 percentile	90 percentile	95 percentile				
All work areas	yes	557	465	0.00482	0.0182	97.5	AQL	!	AQL	!	0.005	+	0.022	
All work areas	no	236	220	0.00125	0.00132	100	AQL	!	AQL	!	AQL	!	0.002	+
Processing, subsequent treatment	yes	29	21	0.0153	0.0453	93.1	AQL	!	0.002	+	0.0221		0.0961	
Processing, subsequent treatment	no	12	12	0.00113	0.000311	100	AQL	!	AQL	!	AQL	!	AQL	!
Flaming, singeing, burning	yes	10	2	0.0216	0.0149	90	0.017		0.0295		0.031		0.041	
Casting	yes	29	23	0.00362	0.00658	100	AQL	!	AQL	!	0.0078		0.0177	
Casting	no	13	13	0.00108	0.000277	100	AQL	!	AQL	!	AQL	!	AQL	!
Gluing	yes	77	68	0.00231	0.00659	98.7	AQL	!	AQL	!	0.0023	+	0.005	
Gluing	no	85	77	0.00136	0.00193	100	AQL	!	AQL	!	AQL	!	0.002	+
Mixing, stirring	yes	10	10	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Surface coating processes, miscellaneous	yes	43	35	0.00227	0.00468	100	AQL	!	AQL	!	0.004		0.00585	
Surface coating processes, miscellaneous	no	17	17	0.00106	0.000243	100	AQL	!	AQL	!	AQL	!	AQL	!
Pressing, extrusion	yes	10	4	0.03	0.0332	60	0.004		0.055		0.068		0.076	
Foaming (all WA)	yes	63	40	0.0105	0.0313	93.7	AQL	!	0.00425		0.0217		0.0355	
Foaming (all WA)	no	44	42	0.00108	0.00034	100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming blocks	yes	11	10	0.00109	0.000302	100	AQL	!	AQL	!	AQL	!	0.002	+
Foaming blocks	no	13	13	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming moulds	yes	28	24	0.00164	0.00266	100	AQL	!	AQL	!	0.002	+	0.0026	
Foaming moulds	no	13	13	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming (other)	yes	14	8	0.00457	0.00947	92.9	AQL	!	0.0035		0.0052		0.0153	

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m <sup>3</sup> )	SD	≤ LW [%]	50 percentile	75 percentile	90 percentile	95 percentile				
<b>Foaming (other)</b>	no	28	26	0.00111	0.000416	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Spraying (all WA)</b>	yes	201	191	0.00122	0.000907	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (all WA)</b>	no	20	20	0.00108	0.000245	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (Airless)</b>	yes	45	45	0.00107	0.000229	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (Airmix)</b>	yes	16	15	0.00125	0.001	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Spraying (pressurised air)</b>	yes	118	110	0.00128	0.00105	100	AQL	!	AQL	!	AQL	!	0.003	+
<b>Spraying (pressurised air)</b>	no	17	17	0.00106	0.000243	100	AQL	!	AQL	!	AQL	!	AQL	!

**7 Statistical evaluations for  
2,4-TDI**

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m³)	SD	≤ LW [%]	50 percentile	75 percentile	90 percentile		95 percentile			
All work areas	yes	570	473	0.00298	0.00703	98.8	AQL	!	AQL	!	0.005	+	0.014	
All work areas	no	239	226	0.00129	0.00181	100	AQL	!	AQL	!	AQL	!	0.002	+
Processing, subsequent treatment	yes	30	24	0.00347	0.00645	100	AQL	!	AQL	!	0.008		0.017	
Processing, subsequent treatment	no	12	12	0.00113	0.000311	100	AQL	!	AQL	!	AQL	!	AQL	!
Flaming, singeing, burning	yes	10	2	0.0115	0.00918	100	0.011		0.013		0.014		0.024	
Casting	yes	29	22	0.00517	0.0102	96.6	AQL	!	AQL	!	0.015		0.0255	
Casting	no	13	13	0.00108	0.000277	100	AQL	!	AQL	!	AQL	!	AQL	!
Gluing	yes	74	66	0.00163	0.00311	100	AQL	!	AQL	!	0.0018	+	0.002	+
Gluing	no	83	79	0.00143	0.00282	100	AQL	!	AQL	!	AQL	!	AQL	!
Storing, conveying, filling, weighing	yes	11	10	0.00227	0.0039	100	AQL	!	AQL	!	AQL	!	0.0074	
Mixing, stirring	yes	10	10	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Surface coating processes, miscellaneous	yes	45	35	0.00266	0.00635	97.8	AQL	!	AQL	!	0.0045		0.00575	
Surface coating processes, miscellaneous	no	18	18	0.00106	0.000236	100	AQL	!	AQL	!	AQL	!	AQL	!
Pressing, extrusion	yes	10	4	0.0181	0.0206	80	0.003		0.0315		0.045		0.0495	
Foaming (all WA)	yes	64	40	0.00684	0.013	95.3	AQL	!	0.005		0.0212		0.0342	
Foaming (all WA)	no	44	39	0.00122	0.000668	100	AQL	!	AQL	!	0.002	+	0.002	+
Foaming blocks	yes	11	9	0.00264	0.00375	100	AQL	!	AQL	!	0.0073		0.0098	
Foaming blocks	no	13	13	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!
Foaming moulds	yes	29	24	0.00245	0.00415	100	AQL	!	AQL	!	0.0044		0.0102	
Foaming moulds	no	13	13	0.001		100	AQL	!	AQL	!	AQL	!	AQL	!

Work area group	Local exhaust ventilation	Number of measured data	Number < values	Arithm. mean (mg/m <sup>3</sup> )	SD	≤ LW [%]	50 percentile	75 percentile	90 percentile	95 percentile				
<b>Foaming (other)</b>	yes	14	8	0.0085	0.0164	85.7	AQL	!	0.0055	0.0246	0.0424			
<b>Foaming (other)</b>	no	28	23	0.00132	0.000819	100	AQL	!	AQL	!	0.002	+	0.0032	
<b>Spraying (all WA)</b>	yes	212	200	0.00118	0.000648	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Spraying (all WA)</b>	no	21	21	0.00107	0.000239	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (Airless)</b>	yes	43	43	0.00107	0.000234	100	AQL	!	AQL	!	AQL	!	AQL	!
<b>Spraying (Airmix)</b>	yes	17	16	0.00118	0.000728	100	AQL	!	AQL	!	AQL	!	0.002	+
<b>Spraying (pressurised air)</b>	yes	130	121	0.0012	0.000709	100	AQL	!	AQL	!	AQL	!	0.00225	+
<b>Spraying (pressurised air)</b>	no	18	18	0.00106	0.000236	100	AQL	!	AQL	!	AQL	!	AQL	!

**Annex: Assignment of work areas to work area groups**

<b>Work area group</b>	<b>Work area</b>
Processing, subsequent treatment	Subsequent treatment
Processing, subsequent treatment	Processing, room
Processing, subsequent treatment	Separating and processing methods, room
Processing, subsequent treatment	Sawing
Processing, subsequent treatment	Grinding
Processing, subsequent treatment	Sanding
Processing, subsequent treatment	Punching, cutting
Processing, subsequent treatment	Rolling
Processing, subsequent treatment	Processing methods, miscellaneous
Processing, subsequent treatment	Processing methods, miscellaneous
Processing, subsequent treatment	Installation, general
Processing, subsequent treatment	Laser beam cutting
Processing, subsequent treatment	Dry sanding
Processing, subsequent treatment	Blasting room, blasting, quartz sand abrasive, sand-caked workpiece, room
Processing, subsequent treatment	Subsequent treatment, preservation of rubber-metal parts
Processing, subsequent treatment	Preparation, general
Processing, subsequent treatment	Subsequent treatment of plastic items, general
Processing, subsequent treatment	Subsequent treatment of plastic items, sanding
Processing, subsequent treatment	Subsequent treatment of plastic items, grinding
Processing, subsequent treatment	Subsequent treatment of plastic items, turning
Processing, subsequent treatment	Subsequent treatment of plastic items, cutting
Processing, subsequent treatment	Subsequent treatment, general
Processing, subsequent treatment	Subsequent treatment, embossing techniques
Printing	Pad printing
Printing	Printing
Printing	Printing office, other printing machines
Printing	Rotating-roll flexographic printing, general
Printing	Flexographic proofing press, general
Printing	Flexographic printing, other work areas, general
Printing	Automatic sheet-fed screenprinting machine, general
Printing	Screenprinting machines, manually operated, general
Printing	Screenprinting, other work areas, general



Work area group	Work area
Printing	Special printing machines, lacquer printing presses
Printing	Special printing machines, pad printing presses
Printing	Special printing techniques, further processing
Printing	Post-treatment, printing process, others
Flaming, singeing, burning	Flaming, singeing, burning
Flaming, singeing, burning	Flame piercing
Moulding	Moulded forms, laminating
Moulding	Plastic mouldmaking
Moulding	Moulding shop, room
Moulding	Moulding shop, loose moulds, moulding sand bonded with clay (natural sand/synthetic sand), box moulds (medium-size)
Moulding	Moulding shop, loose moulds, moulding sand bonded with synthetic resin, box moulds (small)
Moulding	Moulding shop, loose moulds, moulding sand bonded with synthetic resin, box moulds (medium-size)
Moulding	Moulding shop, machine moulds (shell moulding process), moulding sand bonded with synthetic resin, automatic shell moulding line
Moulding	Mouldings production, genreal
Moulding	Mouldings production, manual lamination
Moulding	Mouldings production, spray-up moulding
Moulding	Mouldings production, hot forming
Moulding	Mouldings production, rotational moulding
Casting	Casting methods, miscellaneous
Casting	Surface coating, casting process
Casting	Casting of electronic/electrical components
Casting	Foundry operations, room
Casting	Foundry operations, casting, moulding sand bonded with synthetic resin
Casting	Mouldings production, injection moulding
Casting	Mouldings production, reaction casting
Gluing	Fixing
Gluing	Gluing, room
Gluing	Gluing, hot melt adhesive
Gluing	Gluing, contact adhesives
Gluing	Gluing, pressure sensitive adhesives
Gluing	Gluing, reaction adhesives
Gluing	Gluing, other processes
Gluing	Adhesives application, coating

Work area group	Work area
<b>Gluing</b>	Adhesives application, rolling
<b>Gluing</b>	Adhesives application, spraying
<b>Gluing</b>	Machines for joining, glue applicator roll
<b>Gluing</b>	Machines for joining, broadsheet gluing machine, through-feed press, continuous
<b>Gluing</b>	Machines for joining, edge presses
<b>Gluing</b>	Machines for joining, glued laminated timber presses
<b>Gluing</b>	Machines for joining, other presses
<b>Gluing</b>	Cutting to size, jiggling, stitching, adhesives application, manual, solvent-based
<b>Gluing</b>	Cutting to size, jiggling, stitching, adhesives application, mechanical, reactive hotmelt
<b>Gluing</b>	Floor construction, adhesives application, solvent-based
<b>Gluing</b>	Floor construction, adhesives application, general
<b>Gluing</b>	Floor construction, adhesives application, manual, solvent-based
<b>Gluing</b>	Floor construction, adhesives application, mechanical, reactive hotmelt
<b>Gluing</b>	Assembly, adhesives application, manual, solvent-based
<b>Gluing</b>	Printing, concealing, gluing
<b>Gluing</b>	Equipping, board processing, adhesives applicator, Gluing
<b>Gluing</b>	Book production, spine gluing
<b>Gluing</b>	Gluing
<b>Gluing</b>	Bodywork, bonding
<b>Gluing</b>	Subsequent treatment of plastic items, bonding
<b>Storing, conveying, filling, weighing</b>	Raw material, interim storage area, room
<b>Storing, conveying, filling, weighing</b>	Warehouse work, manual, packaged goods (in sacks etc.)
<b>Storing, conveying, filling, weighing</b>	Warehouse, general
<b>Storing, conveying, filling, weighing</b>	Warehouse work with semi-finished and finished goods (e.g. packaging, despatch)
<b>Storing, conveying, filling, weighing</b>	Tank storage, filling, decanting
<b>Storing, conveying, filling, weighing</b>	Barrel storage, filling, decanting
<b>Storing, conveying, filling, weighing</b>	Conveying, mechanical, open, feeding
<b>Storing, conveying, filling, weighing</b>	Conveying, mechanical, open, transfer
<b>Storing, conveying, filling, weighing</b>	Conveying, mechanical, in containers, filling
<b>Storing, conveying, filling, weighing</b>	Conveying, hydraulic, pumping, general
<b>Storing, conveying, filling, weighing</b>	Filling station, room
<b>Storing, conveying, filling, weighing</b>	Filling scale for barrels, pails etc.
<b>Storing, conveying, filling, weighing</b>	Automatic filling machine (feed regulating, weighing and packaging)
<b>Storing, conveying, filling, weighing</b>	Weighing by hand
<b>Storing, conveying, filling, weighing</b>	Decanting, general

<b>Work area group</b>	<b>Work area</b>
Storing, conveying, filling, weighing	Filling
Storing, conveying, filling, weighing	Packaging, dispatch
Storing, conveying, filling, weighing	Filling processes, miscellaneous
Storing, conveying, filling, weighing	Weighing processes, miscellaneous
Storing, conveying, filling, weighing	Warehouse, mixing room, mixing area
Storing, conveying, filling, weighing	Weighing-out, metering, refilling raw materials, general
Storing, conveying, filling, weighing	Filling and packaging, general
Storing, conveying, filling, weighing	Preparation, weighing-in, weighing-out station
Mixing stirring	Mixer, room
Mixing stirring	Open dry mixer, general
Mixing stirring	Wet (fat) mixer, general
Mixing stirring	Wet mixer, feeding
Mixing stirring	Wet mixer, output
Mixing stirring	Dissolver, general
Mixing stirring	Reaction container, general
Mixing stirring	Agitators, general
Mixing stirring	Agitation containers, open
Mixing stirring	Mixing, compacting, miscellaneous
Mixing stirring	Stirring, whisking
Mixing stirring	Forced mixer
Mixing stirring	Preparation, mixing
Mixing stirring	Reaction equipment and lines, reaction vessels for liquid phases
Surface coating processes, miscellaneous	Laser beam surface processing
Surface coating processes, miscellaneous	Surface coating, manual, room
Surface coating processes, miscellaneous	Surface coating, screed
Surface coating processes, miscellaneous	Surface coating, flooding
Surface coating processes, miscellaneous	Surface coating, immersing
Surface coating processes, miscellaneous	Surface coating, mechanical, room
Surface coating processes, miscellaneous	Surface coating, application with machines
Surface coating processes, miscellaneous	Surface coating, powder coating
Surface coating processes, miscellaneous	Surface coating, with foils, mats and similar
Surface coating processes, miscellaneous	Surface coating, general
Surface coating processes, miscellaneous	Surface coating processes, miscellaneous
Surface coating processes, miscellaneous	Coating facility, room
Surface coating processes, miscellaneous	Coating procedures, general

Work area group	Work area
Brushing, rolling	Surface coating, brushing, rolling
Brushing, rolling	Top-coating
Brushing, rolling	Rolling
Brushing, rolling	Rolling of liquid coating materials
Pressing, extrusion	Pressing, room
Pressing, extrusion	Pressing, general
Pressing, extrusion	Extruder for plastics, injection moulds
Pressing, extrusion	Hot presses
Pressing, extrusion	Cold presses
Pressing, extrusion	Moulded parts, pressing (prepreg)
Pressing, extrusion	Plastic welding, extrusion
Pressing, extrusion	Mouldings production, presses
Pressing, extrusion	Semi-finished product manufacture, extruding, general
Quality inspection laboratory	Quality inspection
Quality inspection laboratory	Laboratory table or laboratory station in the production facility
Quality inspection laboratory	Laboratory, room
Quality inspection laboratory	Laboratory, at facilities
Cleaning	Surface cleaning
Cleaning	Room cleaning, general
Cleaning	Material cleaning, general
Cleaning	Cleaning of facilities
Cleaning	Cleaning of containers, manual
Cleaning	Washing, cleaning
Foaming (all WA)	Processing plastic foam, room
Foaming (all WA)	Foam-filling of hollow spaces
Foaming (all WA)	Foaming moulds
Foaming (all WA)	Foaming blocks
Foaming (all WA)	Foaming, installation foam
Foaming (all WA)	Foaming, insulation foam
Foaming (all WA)	Packaging foaming
Foaming (all WA)	Foaming, expanding and insulating foam
Foaming (all WA)	Mouldings production, foaming, general
Foaming (all WA)	Mouldings production, foaming blocks
Foaming (all WA)	Mouldings production, foaming moulds
Foaming (all WA)	Mouldings production, reaction foaming

<b>Work area group</b>	<b>Work area</b>
<b>Foaming blocks</b>	Foaming moulds
<b>Foaming blocks</b>	Mouldings production, foaming blocks
<b>Foaming, expanding and insulating foam</b>	Foaming, installation foam
<b>Foaming, expanding and insulating foam</b>	Foaming, insulation foam
<b>Foaming, expanding and insulating foam</b>	Foaming, expanding and insulating foam
<b>Foaming moulds</b>	Foaming moulds
<b>Foaming moulds</b>	Mouldings production, foaming moulds
<b>Foaming (other)</b>	Processing plastic foam, room
<b>Foaming (other)</b>	Foam-filling of hollow spaces
<b>Foaming (other)</b>	Packaging foaming
<b>Foaming (other)</b>	Mouldings production, foaming, general
<b>Foaming (other)</b>	Mouldings production, reaction foaming
<b>Spraying (all WA)</b>	Caulking guns
<b>Spraying (all WA)</b>	Surface coating, airless spraying
<b>Spraying (all WA)</b>	Surface coating, spraying (e.g. with pressurised air)
<b>Spraying (all WA)</b>	Surface coating, airmix sprays
<b>Spraying (all WA)</b>	Surface coating, electrostatic application
<b>Spraying (all WA)</b>	Machines for wood finishing, painting room, spraying station
<b>Spraying (all WA)</b>	Machines for wood finishing, painting room, manual painting
<b>Spraying (all WA)</b>	Compressed-air spraying
<b>Spraying (all WA)</b>	Electrostatic spraying
<b>Spraying (all WA)</b>	Painting rooms (liquid coating materials)
<b>Spraying (all WA)</b>	Paintshop, spray wall, pressurised air, manual
<b>Spraying (all WA)</b>	Paintshop, spray wall, HVLP, manual
<b>Spraying (all WA)</b>	Paintshop, spray wall, Air-Mix
<b>Spraying (all WA)</b>	Paintshop, spraying station, general
<b>Spraying (all WA)</b>	Paintshop, spraying station, pressurised air, manual
<b>Spraying (all WA)</b>	Paintshop, spraying station, HVLP, manual
<b>Spraying (all WA)</b>	Paintshop, spraying station, Air-Mix
<b>Spraying (all WA)</b>	Paintshop, spray booth, general
<b>Spraying (all WA)</b>	Paintshop, spray booth, pressurised air, manual
<b>Spraying (all WA)</b>	Paintshop, spray booth, pressurised air, automatic
<b>Spraying (all WA)</b>	Paintshop, spray booth, Airless, manual
<b>Spraying (all WA)</b>	Paintshop, spray booth, HVLP, manual
<b>Spraying (all WA)</b>	Paintshop, spray booth, Air-Mix

<b>Work area group</b>	<b>Work area</b>
<b>Spraying (all WA)</b>	Workshop rooms (liquid coating materials), general
<b>Spraying (all WA)</b>	Workshop rooms, spraying station, pressurised air, manual
<b>Spraying (all WA)</b>	Workshop rooms, spray booth, pressurised air, manual
<b>Spraying (Airless)</b>	Surface coating, airless spraying
<b>Spraying (Airless)</b>	Paintshop, spray booth, Airless, manual
<b>Spraying (Airmix)</b>	Surface coating, airmix sprays
<b>Spraying (Airmix)</b>	Paintshop, spraying station, Air-Mix
<b>Spraying (Airmix)</b>	Paintshop, spray booth, Air-Mix
<b>Spraying (pressurised air)</b>	Surface coating, spraying (e.g. with pressurised air)
<b>Spraying (pressurised air)</b>	Compressed-air spraying
<b>Spraying (pressurised air)</b>	Paintshop, spray wall, pressurised air, manual
<b>Spraying (pressurised air)</b>	Paintshop, spraying station, pressurised air, manual
<b>Spraying (pressurised air)</b>	Paintshop, spray booth, pressurised air, manual
<b>Spraying (pressurised air)</b>	Paintshop, spray booth, pressurised air, automatic
<b>Spraying (pressurised air)</b>	Workshop rooms, spraying station, pressurised air, manual
<b>Spraying (pressurised air)</b>	Workshop rooms, spray booth, pressurised air, manual
<b>Spraying (electrostatic)</b>	Surface coating, electrostatic application
<b>Spraying (electrostatic)</b>	Electrostatic spraying
<b>Laying, gluing</b>	Laying