Oil nozzle type OD

Catalogue 2

Contents

Quality- and Environmental Management System

Danfoss A/S Burner Components Division operates a Quality- and Environmental Management System which has been certified to ISO 9001 and ISO 14001.

Application

Oil nozzle type OD is used to atomize fuel gas oils in high-pressure burners.

The oil nozzles have been improved in several ways and at the same time meet the requirements of the CEN standard.

All oil nozzles have a new shape which ensures problem-free location and setting up of the electrodes.

Nozzle dimensions, marking and filter have also been changed.

Danfoss oil nozzles are offered with different spray angles:

a: To CEN standard:
60°, 70°, 80°, 90° and 100° under four different atomizing indexes:
I - II - III - IV.

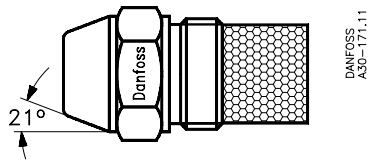
b: Non-CEN-standard oil nozzles (existing):
30°, 45°, 60° and 80° with three different spray patterns:
S, H and B (S = solid, H = hollow, B = semi-solid).

Combinations of the different spray angles and patterns together with different capacities are given in the ordering tables on pages 7 - 9.

New nozzle shape

All OD nozzles H, S and B have a new nozzle body - new nozzle shape.

The new shape gives a greater degree of flexibility in the location of the burner ignition electrodes.



Marking/capacity

The atomizing characteristics of Danfoss nozzles are retained.
Our oil nozzles remain unchanged as far as capacity, atomizing angle and spray pattern are concerned, i.e. for a given type/code number the cone and orifice insert data remain as previous.

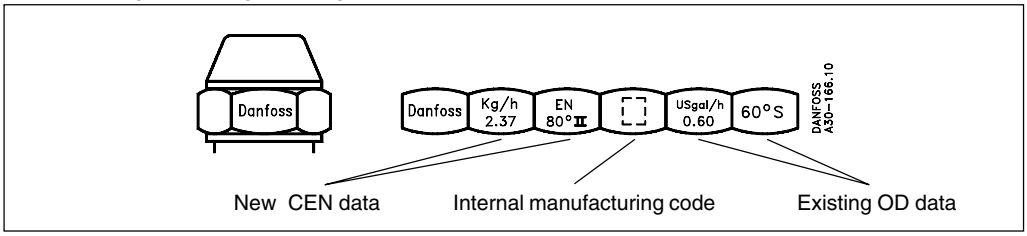
To meet the requirements/definitions of the CEN standard the capacity and spray pattern/ spray angle index must be stamped on the nozzle.

New CEN definition point

Test oil:	**Viscosity:**	**3,4 mm²/s**
	Density:	**840 kg/m³**
Atomizing pressure:		**1000 kPa (∞ 10⁻² bar)**

Existing oil nozzles must be tested under the above new test conditions. This of course produces new data on capacity, pattern and angle.

Example of new marking:
CEN marking + existing marking



The nozzles will in future carry the two different markings:

The new CEN marking gives information under the CEN definition point marked EN (European-standard).

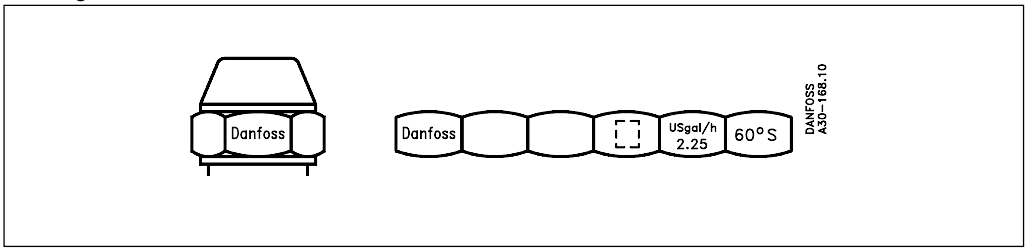
The existing marking gives information on the existing capacity in USgal/h, spray angle and spray pattern.

The new CEN marking gives: Nozzle capacity in kg/h at an atomizing pressure of 1000 kPa (∞ 10^{-2} bar) in test oil 3.4 mm²/s, 840 kg/m³.

Because the nozzles remain unchanged as regards cone and orifice insert, the new CEN test data on capacities will often give uneven figures, e.g. 2.37 kg/h.

Because the CEN standard contains a stricter requirement on capacity tolerance (±4%), we cannot round off the new nominal values.

Marking on standard nozzles



The existing marking (old) gives information on the existing capacity in USgal/h, spray angle and spray pattern at 700 kPa (∞ 10^{-2} bar) in test oil 3.4 mm²/s and 820 kg/m³.

New filter

Danfoss oil nozzles in the capacity range 0.4 - 1.35 USgal/h are fitted with a new sintered bronze filter which gives optimal filtration, see fig. 2.

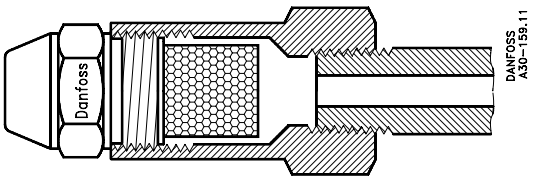
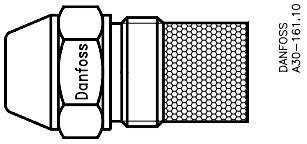


Fig. 2

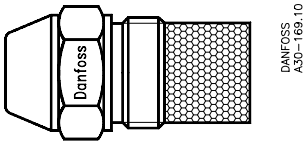
Danfoss oil nozzles are fitted with the following types of filter:

A. Capacity range:
0.40 - 0.45 USgal/h
45 μm sintered bronze filter



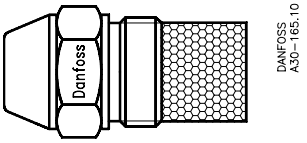
A

B. Capacity range:
0.50 - 1.00 USgal/h
75 μm sintered bronze filter



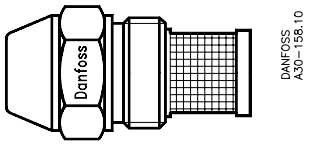
B

C. Capacity range:
1.10 - 1.35 USgal/h
120 μm sintered bronze filter



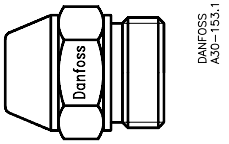
C

D. Capacity range:
1.50 - 11.0 USgal/h
140 μm monel mesh filter



D

E. Capacity range:
12.0 USgal/h and over without filter



E

Spray pattern index (CEN standard)

The nozzle spray pattern index indicates the respective hollow and solid atomizing pattern. Measurement in the patternator and associated patternator diagram forms the basis of the index calculation.

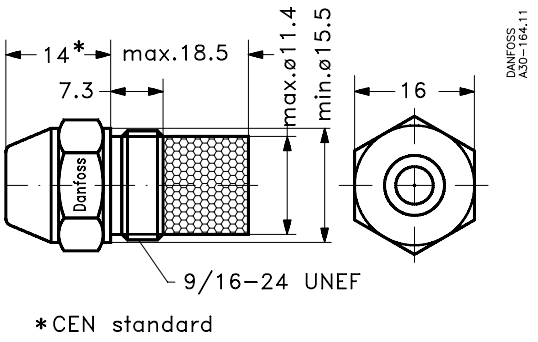
The following four indexes are used:
I indicates *very solid* atomizing.
II indicates *solid* atomizing.
III indicates *hollow* atomizing.
IV indicates *very hollow* atomizing.

Spray angle index (CEN standard)

The nozzle spray angle index forms the basis of calculation from the patternator diagram.

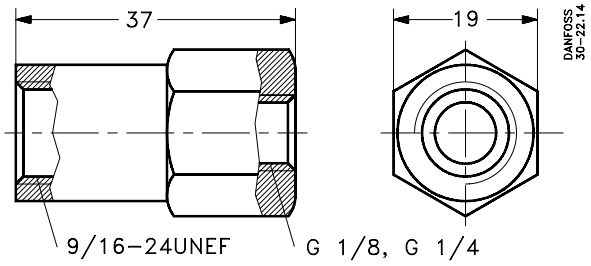
The angles used are: 60°, 70°, 80°, 90° and 100°.

Dimensioned sketch



The new modified nozzle meets the CEN standard in respect of dimensions and degree of filtering.

Dimensioned sketch, nozzle holder



Tightening torques

Torques for tightening the nozzle in its holder are given, assuming an extra spanner is used to apply counter torque.

Tightening torque for oil burner nozzles	
Recommended tightening torque	15 to 20 Nm (1.5 to 2.0 kpm)
Max. tightening torque	25 Nm (2.5 kpm)

New code numbers (CEN nozzles)

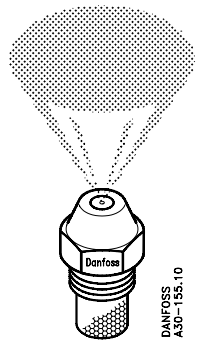
On OD nozzles types H and S with spray angles 45° - 60° - 80° in the capacity range up to and including 6.3 kg/h the second digit after the letter in the code number, will be changed to a figure 9.

Example: 030H8110 —> 030H8**9**10

The code number on *all other* OD nozzles will remain unchanged.

New angle and pattern marking tables

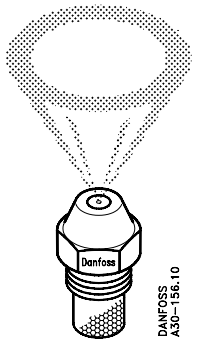
CEN



S

CEN	Existing marking			
kg/h	**45°**	**60°**	**80°**	**USgal/h**
1.46		90° II	100° I	0.40
1.66		80° II	100° II	0.45
1.87	60° I	80° II	100° II	0.50
2.11	60° I	80° II	100° III	0.55
2.37	60° I	80° II	100° III	0.60
2.67	60° II	70° III	80° IV	0.65
2.94	60° II	70° IV	90° IV	0.75
3.31	60° III	70° IV	80° IV	0.85
3.72	60° III	70° IV	80° IV	1.00
4.24	60° III	70° III	80° IV	1.10
4.45	60° III	70° IV	90° IV	1.20
4.71	60° IV	70° IV	80° IV	1.25
5.17	60° IV	70° IV	80° IV	1.35
5.84	60° IV	70° IV	80° IV	1.50
6.08	60° IV	70° IV	90° IV	1.65
6.55	60° IV	70° IV	80° IV	1.75

CEN

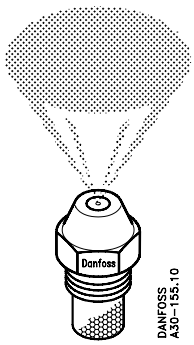


H

CEN	Existing marking			
kg/h	**45°**	**60°**	**80°**	**USgal/h**
1.46			100° III	0.40
1.66		80° II	90° III	0.45
1.87	60° II	80° II	90° III	0.50
2.11	60° II	80° III	90° IV	0.55
2.37	60° III	80° IV	90° IV	0.60
2.67	60° III	90° IV	80° IV	0.65
2.94	60° III	80° IV	80° IV	0.75
3.31	60° IV	70° IV	80° IV	0.85
3.72	60° IV	70° IV	80° IV	1.00
4.24	60° IV	70° IV	80° IV	1.10
4.45	60° IV	70° IV	90° IV	1.20
4.71	60° IV	70° IV	90° IV	1.25
5.17	60° IV	70° IV	90° IV	1.35
5.84	60° IV	70° IV	90° IV	1.50
6.08	60° IV	70° IV	90° IV	1.65
6.55	60° IV	70° IV	80° IV	1.75

Ordering tables

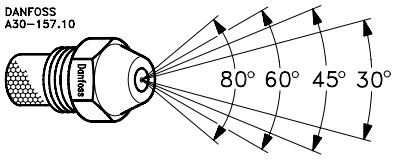
CEN

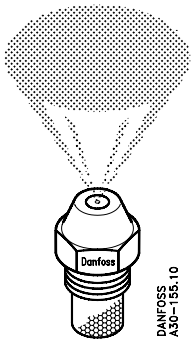


S

CEN	Existing marking			
kg/h	45°	60°	80°	USgal/h
1.46		030F6904	030F8904	0.40
1.66		030F6906	030F8906	0.45
1.87	030F4908	030F6908	030F8908	0.50
2.11	030F4910	030F6910	030F8910	0.55
2.37	030F4912	030F6912	030F8912	0.60
2.67	030F4914	030F6914	030F8914	0.65
2.94	030F4916	030F6916	030F8916	0.75
3.31	030F4918	030F6918	030F8918	0.85
3.72	030F4920	030F6920	030F8920	1.00
4.24	030F4922	030F6922	030F8922	1.10
4.45	030F4923	030F6923	030F8923	1.20
4.71	030F4924	030F6924	030F8924	1.25
5.17	030F4926	030F6926	030F8926	1.35
5.84	030F4928	030F6928	030F8928	1.50
6.08	030F4929	030F6929	030F8929	1.65
6.55	030F4930	030F6930	030F8930	1.75

	CEN	CEN	CEN	
	〃	〃	〃	



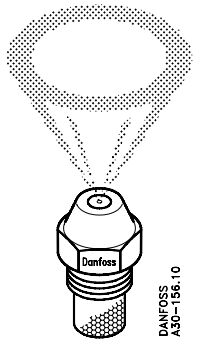


S

30°	45°	60°	80°	USgal/h
030F3108	〃	〃	〃	0.50
030F3110				0.55
030F3112				0.60
030F3114				0.65
030F3116	〃	〃	〃	0.75
030F3118				0.85
030F3120				1.00
030F3122				1.10
030F3123	〃	〃	〃	1.20
030F3124				1.25
030F3126				1.35
030F3128				1.50
030F3129	〃	〃	〃	1.65
030F3130				1.75
030F3132	030F4132	030F6132	030F8132	2.00
030F3134	030F4134	030F6134	030F8134	2.25
030F3136	030F4136	030F6136	030F8136	2.50
030F3138	030F4138	030F6138	030F8138	2.75
030F3140	030F4140	030F6140	030F8140	3.00
030F3142	030F4142	030F6142	030F8142	3.50
	030F4144	030F6144	030F8144	4.00
	030F4146	030F6146	030F8146	4.50
	030F4148	030F6148	030F8148	5.00
	030F4150	030F6150	030F8150	5.50
	030F4152	030F6152	030F8152	6.00

Ordering tables (cont.)

CEN



H

CEN	Existing marking			
kg/h	45°	60°	80°	USgal/h
1,46			**030H8904**	0,40
1,66		**030H6906**	**030H8906**	0,45
1,87	**030H4908**	**030H6908**	**030H8908**	0,50
2,11	**030H4910**	**030H6910**	**030H8910**	0,55
2,37	**030H4912**	**030H6912**	**030H8912**	0,60
2,67	**030H4914**	**030H6914**	**030H8914**	0,65
2,94	**030H4916**	**030H6916**	**030H8916**	0,75
3,31	**030H4918**	**030H6918**	**030H8918**	0,85
3,72	**030H4920**	**030H6920**	**030H8920**	1,00
4,24	**030H4922**	**030H6922**	**030H8922**	1,10
4,45	**030H4923**	**030H6923**	**030H8923**	1,20
4,71	**030H4924**	**030H6924**	**030H8924**	1,25
5,17	**030H4926**	**030H6926**	**030H8926**	1,35
5,84	**030H4928**	**030H6928**	**030H8928**	1,50
6,08	**030H4929**	**030H6929**	**030H8929**	1,65
6,55	**030H4930**	**030H6930**	**030H8930**	1,75

	CEN	**CEN**	**CEN**
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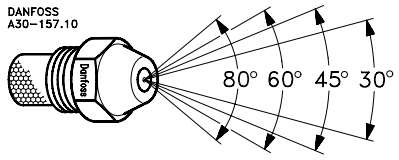
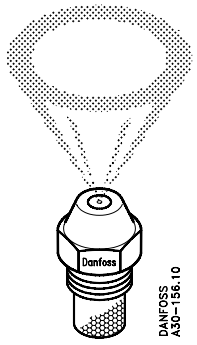
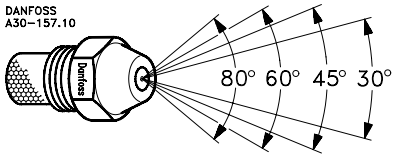




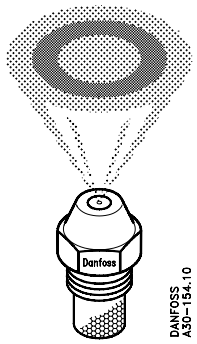
H

30°	45°	60°	80°	USgal/h
030H3108	〃	〃	〃	0.50
030H3110				0.55
030H3112				0.60
030H3114				0.65
030H3116	〃	〃	〃	0.75
030H3118				0.85
030H3120				1.00
030H3122				1.10
030H3123	〃	〃	〃	1.20
030H3124				1.25
030H3126				1.35
030H3128				1.50
030H3129	〃	〃	〃	1.65
030H3130				1.75
030H3132	**030H4132**	**030H6132**	**030H8132**	2.00
030H3134	**030H4134**	**030H6134**	**030H8134**	2.25
030H3136	**030H4136**	**030H6136**	**030H8136**	2.50
030H3138	**030H4138**	**030H6138**	**030H8138**	2.75
030H3140	**030H4140**	**030H6140**	**030H8140**	3.00

Ordering tables (cont.)



B



30°	45°	60°	80°	USgal/h
		030B0103	030B0203	0.60
030B0004	030B0054	030B0104	030B0204	0.65
030B0005	030B0055	030B0105	030B0205	0.75
030B0006	030B0056	030B0106	030B0206	0.85
030B0007	030B0057	030B0107	030B0207	1.00
030B0009	030B0059	030B0109	030B0209	1.25
030B0010	030B0060	030B0110	030B0210	1.35
030B0011	030B0061	030B0111	030B0211	1.50
030B0013	030B0063	030B0113	030B0213	2.00
030B0014	030B0064	030B0114	030B0214	2.25
030B0015	030B0065	030B0115	030B0215	2.50
030B0016	030B0066	030B0116	030B0216	2.75
030B0017	030B0067	030B0117	030B0217	3.00
030B0019	030B0069	030B0119	030B0219	3.75
	030B0071	030B0121	030B0221	4.50
	030B0073	030B0123	030B0223	5.00
	030B0075	030B0125	030B0225	5.50
	030B0077	030B0127	030B0227	6.00
	030B0079	030B0129	030B0229	6.50
	030B0081	030B0131	030B0231	7.50
	030B0083	030B0133	030B0233	8.50
	030B0085	030B0135	030B0235	10.00
	030B0087	030B0137	030B0237	11.00
	030B0089	030B0139	030B0239	12.00
	030B0091	030B0141	030B0241	13.50
	030B0093	030B0143	030B0243	15.00
		030B0145	030B0245	17.00
		030B0147	030B0247	19.50
	030B0096	030B0149	030B0249	22.00
		030B0151	030B0251	25.00
		030B0153	030B0253	28.00
	030B0099	030B0155	030B0255	31.50
	030B0100			35.00

Nozzle capacities

Nozzle capacities in USgal/h as a function of the atomizing pressure at a viscosity of 3.4 mm^2/s and a density of 820 kg/m^3.

Reference pressure					
6 bar GPH	**7 bar GPH**	8 bar GPH	10 bar GPH	12 bar GPH	14 bar GPH
0.37	**0.40**	0.43	0.48	0.52	0.56
0.46	**0.50**	0.53	0.60	0.65	0.71
0.51	**0.55**	0.59	0.66	0.72	0.78
0.55	**0.60**	0.64	0.72	0.78	0.85
0.60	**0.65**	0.69	0.78	0.85	0.92
0.69	**0.75**	0.80	0.90	0.98	1.06
0.79	**0.85**	0.91	1.02	1.11	1.20
0.92	**1.00**	1.07	1.19	1.31	1.41
1.01	**1.10**	1.17	1.31	1.44	1.55
1.11	**1.20**	1.28	1.43	1.57	1.70
1.16	**1.25**	1.34	1.49	1.64	1.77
1.25	**1.35**	1.44	1.61	1.77	1.97
1.39	**1.50**	1.60	1.79	1.96	2.12
1.52	**1.65**	1.76	1.97	2.16	2.33
1.62	**1.75**	1.87	2.09	2.29	2.47
1.85	**2.00**	2.14	2.39	2,62	2,83
2.08	**2.25**	2.41	2.69	2,95	3,18
2.31	**2.50**	2.67	2.99	3.27	3.54
2.54	**2.75**	2.92	3.29	3.60	3.89
2.78	**3.00**	3.21	3.59	3.93	4.24
3.24	**3.50**	3.74	4.18	4.58	4.95
3.47	**3.75**	4.01	4.48	4.91	5.30
3.70	**4.00**	4.28	4.78	5.24	5.66
4.17	**4.50**	4.81	5.38	5.89	6.36
4.64	**5.00**	5.35	5.98	6.55	7.07
5.09	**5.50**	5.88	6.57	7.20	7.78
5.55	**6.00**	6.41	7.17	7.85	8.48
6.02	**6.50**	6.95	7.77	8.51	9.19
6.94	**7.50**	8.02	8.96	9.82	10.61
7.87	**8.50**	9.09	10.16	11.13	12.02
9.26	**10.00**	10.69	11.95	13.09	14.14
10.18	**11.00**	11.76	13.15	14.40	15.56
11.11	**12.00**	12.83	14.34	15.71	16.97
12.50	**13.50**	14.43	16.14	17.67	19.09
13.89	**15.00**	16.04	17.93	19.64	21.21
15.74	**17.00**	18.17	20.32	22.26	24.04
18.05	**19.50**	20.85	23.31	25.53	27.58
20.37	**22.00**	23.52	26.29	28.80	31.11
23.14	**25.00**	26.73	29.88	32.73	35.35
25.92	**28.00**	29.93	33.47	36.66	39.60
29.16	**31.50**	33.67	37.65	41.24	44.55

$$Q_2 \sim Q_1 \times \sqrt{\frac{P_2}{P_1}}$$

1 USgal ~ 3.785 l

Nozzle capacities (cont.)

CEN
Nozzle capacities in kg/h as a function of the atomizing pressure at a viscosity of 3.4 mm^2/s and a density of 840 kg/m^3.

			Reference pressure		
6 bar kg/h	7 bar kg/h	8 bar kg/h	**10 bar kg/h**	12 bar kg/h	14 bar kg/h
1.13	1.22	1.30	**1.46**	1.59	1.72
1.28	1.38	1.48	**1.66**	1.81	1.96
1.44	1.56	1.67	**1.87**	2.04	2.21
1.63	1.76	1.88	**2.11**	2.31	2.49
1.83	1.98	2.11	**2.37**	2.59	2.80
2.06	2.23	2.38	**2.67**	2.92	3.15
2.27	2.45	2.62	**2.94**	3.22	3.47
2.56	2.76	2.96	**3.31**	3.62	3.91
2.88	3.11	3.32	**3.72**	4.07	4.40
3.28	3.54	3.79	**4.24**	4.64	5.01
3.44	3.72	3.98	**4.45**	4.87	5.26
3.64	3.94	4.21	**4.71**	5.15	5.57
4.00	4.32	4.62	**5.17**	5.66	6.11
4.52	4.88	5.22	**5.84**	6.39	6.90
4.70	5.08	5.43	**6.08**	6.66	7.19
5.07	5.48	5.85	**6.55**	7.17	7.55

Annual replacement of the oil nozzle reduces oil consumption and helps prevent pollution.