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Aerospace fluid systems — O-rings, inch series: Inside diameters and cross sections, tolerances and size-identification codes —

Part 1: Close tolerances for hydraulic systems

Systèmes aérospatiaux de fluides — Joints toriques, série en inches: diamètres intérieurs et sections, tolérances et codes d'identification dimensionnelle —

Partie 1: Tolérances serrées pour systèmes hydrauliques

Reference number
ISO 16031-1:2002(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 16031 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16031-1 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 10, *Aerospace fluid systems and components*.

ISO 16031 consists of the following parts, under the general title *Aerospace fluid systems — O-rings, inch series: Inside diameters and cross sections, tolerances and size-identification codes*:

— *Part 1: Close tolerances for hydraulic systems*

— *Part 2: Standard tolerances (for non-hydraulic systems)*

Introduction

In fluid power systems, power is transmitted through a fluid (liquid or gas) under pressure within an enclosed circuit. Components are designed to meet these requirements under varying conditions. Testing of components to meet performance requirements provides users with a basis of assurance for determining design applications and for checking component compliance with their stated requirements.

Aerospace fluid systems — O-rings, inch series: Inside diameters and cross sections, tolerances and size-identification codes —

Part 1: Close tolerances for hydraulic systems

1 Scope

This part of ISO 16031 specifies the inside diameters, cross-sections, tolerances and size identification codes for inch O-rings used in aerospace fluid systems.

The dimensions and high precision tolerances specified in this part of ISO 16031 are suitable for nitrile and ethylene propylene materials intended for use in high pressure hydraulic fluid systems provided that suitable tooling be available.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this part of ISO 16031. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However parties to agreements based on this part of ISO 16031 are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this part of ISO 16031 the terms and definitions given in ISO 5598 apply.

NOTE Throughout ISO 16301, the term “O-ring” has been adopted although the correct technical term is “toroidal sealing ring”.

4 Configuration

The shape of the O-ring shall be toroidal as shown in Figure 1.

5 Inside diameters, cross-sections and tolerances

The combinations of inside diameters, d_1, cross-sections, d_2, and O-ring tolerances shall be chosen from Tables 1 and 2. For each of these combinations there is a corresponding size identification code.

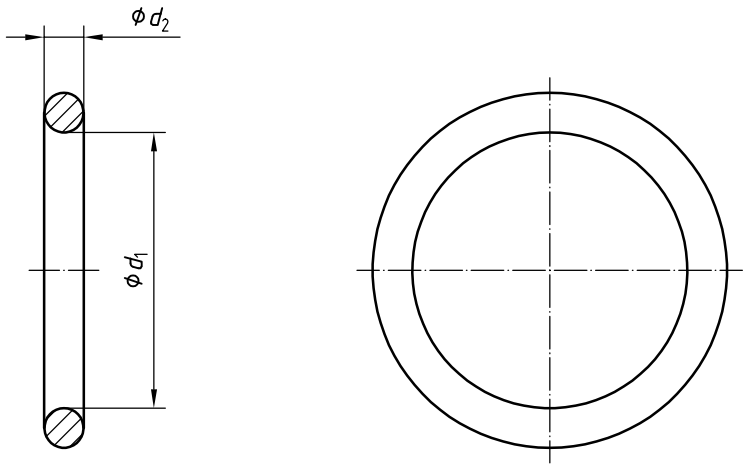

Figure 1 — Typical O-ring configuration

6 Size identification code

6.1 Table 1 lists the dimensions of O-rings and their corresponding size identification code from -001 to -475. The size identification codes are divided into groups of one hundred and within each group are sequential and not significant. Each group of one hundred identifies the cross-section size of the O-rings within the group (except for sizes -001 to -003 which have unique cross-section sizes).

EXAMPLE

- 0 2 5 O-ring size identification code
  - Reference number allocated to an O-ring internal diameter size
  - Signifies that the O-ring has a cross-section of 0,070 in (1,78 mm)

Reference to Table 1 establishes that -025 represents an O-ring with a cross-section of 0,070 in (1,78 mm) and an internal diameter of 1,170 in to 1,182 in (29,72 mm to 30,02 mm).

6.2 Table 2, lists the dimensions of O-rings and their corresponding size identification code for the 900 series, which includes all of the currently standardized O-rings for sealing straight thread tube fitting bosses. This series utilizes a significant dash numbering system, where the dash number designates the tube size in 1/16ths in, with the exception of the -901, which is intended for a 0,093 8 in (2,38 mm) nominal outside diameter tube.

EXAMPLE

- 9 1 8 O-ring size identification code
  - Signifies that the O-ring is for an 18/16ths, i.e. 1,125 in (28,58 mm) tube size
  - Signifies that the O-ring is for a straight thread tube fitting boss

Table 1 — Inside diameters, cross-sections and tolerances

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-001	0,025	0,033	0,64	0,84	0,037	0,043	0,94	1,09	0,000 3	0,005
-002	0,038	0,046	0,97	1,17	0,047	0,053	1,19	1,35	0,000 6	0,010
-003	0,052	0,060	1,32	1,52	0,057	0,063	1,45	1,60	0,001 0	0,016
-004	0,065	0,075	1,65	1,90	0,067	0,073	1,70	1,85	0,001 7	0,028
-005	0,096	0,106	2,44	2,69	0,067	0,073	1,70	1,85	0,002 1	0,034
-006	0,109	0,119	2,77	3,02	0,067	0,073	1,70	1,85	0,002 2	0,036
-007	0,140	0,150	3,56	3,81	0,067	0,073	1,70	1,85	0,002 6	0,043
-008	0,171	0,181	4,34	4,60	0,067	0,073	1,70	1,85	0,003 0	0,049
-009	0,203	0,213	5,16	5,41	0,067	0,073	1,70	1,85	0,003 4	0,056
-010	0,234	0,244	5,94	6,20	0,067	0,073	1,70	1,85	0,003 7	0,061
-011	0,296	0,306	7,52	7,77	0,067	0,073	1,70	1,85	0,004 5	0,074
-012	0,359	0,369	9,12	9,37	0,067	0,073	1,70	1,85	0,005 2	0,085
-013	0,421	0,431	10,69	10,95	0,067	0,073	1,70	1,85	0,006 0	0,098
-014	0,484	0,494	12,29	12,55	0,067	0,073	1,70	1,85	0,006 8	0,111
-015	0,546	0,556	13,87	14,12	0,067	0,073	1,70	1,85	0,007 5	0,123
-016	0,609	0,619	15,47	15,72	0,067	0,073	1,70	1,85	0,0083	0,136
-017	0,671	0,681	17,04	17,30	0,067	0,073	1,70	1,85	0,009 0	0,147
-018	0,734	0,744	18,64	18,90	0,067	0,073	1,70	1,85	0,009 8	0,161
-019	0,795	0,807	20,19	20,50	0,067	0,073	1,70	1,85	0,010 5	0,172
-020	0,858	0,870	21,79	22,10	0,067	0,073	1,70	1,85	0,011 3	0,185
-021	0,920	0,932	23,36	23,67	0,067	0,073	1,70	1,85	0,012 0	0,197
-022	0,983	0,995	24,97	25,27	0,067	0,073	1,70	1,85	0,012 8	0,210
-023	1,045	1,057	26,54	26,85	0,067	0,073	1,70	1,85	0,013 6	0,223
-024	1,108	1,120	28,14	28,45	0,067	0,073	1,70	1,85	0,014 3	0,234
-025	1,170	1,182	29,72	30,02	0,067	0,073	1,70	1,85	0,015 1	0,247
-026	1,233	1,245	31,32	31,62	0,067	0,073	1,70	1,85	0,015 8	0,259
-027	1,295	1,307	32,89	33,20	0,067	0,073	1,70	1,85	0,016 6	0,272
-028	1,358	1,370	34,49	34,80	0,067	0,073	1,70	1,85	0,017 3	0,283
-029	1,479	1,499	37,57	38,07	0,067	0,073	1,70	1,85	0,018 8	0,308
-030	1,604	1,624	40,74	41,25	0,067	0,073	1,70	1,85	0,020 4	0,334

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-031	1,729	1,749	43,92	44,42	0,067	0,073	1,70	1,85	0,021 9	0,359
-032	1,854	1,874	47,09	47,60	0,067	0,073	1,70	1,85	0,023 4	0,383
-033	1,979	1,999	50,27	50,77	0,067	0,073	1,70	1,85	0,024 9	0,408
-034	2,104	2,124	53,44	53,95	0,067	0,073	1,70	1,85	0,026 4	0,433
-035	2,229	2,249	56,62	57,12	0,067	0,073	1,70	1,85	0,027 9	0,457
-036	2,354	2,374	59,79	60,30	0,067	0,073	1,70	1,85	0,029 4	0,482
-037	2,479	2,499	62,97	63,47	0,067	0,073	1,70	1,85	0,030 9	0,506
-038	2,604	2,624	66,14	66,65	0,067	0,073	1,70	1,85	0,032 5	0,533
-039	2,724	2,754	69,19	69,95	0,067	0,073	1,70	1,85	0,034 0	0,557
-040	2,849	2,879	72,36	73,13	0,067	0,073	1,70	1,85	0,035 5	0,582
-041	2,974	3,004	75,54	76,30	0,067	0,073	1,70	1,85	0,037 0	0,606
-042	3,224	3,254	81,89	82,65	0,067	0,073	1,70	1,85	0,040 0	0,655
-043	3,474	3,504	88,24	89,00	0,067	0,073	1,70	1,85	0,043 0	0,705
-044	3,724	3,754	94,59	95,35	0,067	0,073	1,70	1,85	0,046 1	0,755
-045	3,974	4,004	100,94	101,70	0,067	0,073	1,70	1,85	0,049 1	0,805
-046	4,224	4,254	107,29	108,05	0,067	0,073	1,70	1,85	0,052 1	0,854
-047	4,474	4,504	113,64	114,40	0,067	0,073	1,70	1,85	0,055 1	0,903
-048	4,724	4,754	119,99	120,75	0,067	0,073	1,70	1,85	0,058 1	0,952
-049	4,966	5,012	126,14	127,30	0,067	0,073	1,70	1,85	0,061 2	1,003
-050	5,216	5,262	132,49	133,65	0,067	0,073	1,70	1,85	0,064 2	1,052
*051 THRU *101	O-ring sizes not assigned									
-102	0,044	0,054	1,12	1,37	0,100	0,106	2,54	2,69	0,004 0	0,066
-103	0,076	0,086	1,93	2,18	0,100	0,106	2,54	2,69	0,004 8	0,079
-104	0,107	0,117	2,72	2,97	0,100	0,106	2,54	2,69	0,005 6	0,092
-105	0,138	0,148	3,51	3,76	0,100	0,106	2,54	2,69	0,006 4	0,105
-106	0,169	0,179	4,29	4,55	0,100	0,106	2,54	2,69	0,007 3	0,120
-107	0,201	0,211	5,11	5,36	0,100	0,106	2,54	2,69	0,008 1	0,133
-108	0,232	0,242	5,89	6,15	0,100	0,106	2,54	2,69	0,008 9	0,146
-109	0,294	0,304	7,47	7,72	0,100	0,106	2,54	2,69	0,010 5	0,172
-110	0,357	0,367	9,07	9,32	0,100	0,106	2,54	2,69	0,012 2	0,200

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-111	0,419	0,429	10,64	10,90	0,100	0,106	2,54	2,69	0,013 8	0,226
-112	0,482	0,492	12,24	12,50	0,100	0,106	2,54	2,69	0,015 4	0,252
-113	0,544	0,554	13,82	14,07	0,100	0,106	2,54	2,69	0,017 1	0,280
-114	0,607	0,617	15,42	15,67	0,100	0,106	2,54	2,69	0,018 7	0,306
-115	0,669	0,679	16,99	17,25	0,100	0,106	2,54	2,69	0,020 3	0,333
-116	0,732	0,742	18,59	18,85	0,100	0,106	2,54	2,69	0,022 0	0,361
-117	0,793	0,805	20,14	20,45	0,100	0,106	2,54	2,69	0,023 6	0,387
-118	0,856	0,868	21,74	22,05	0,100	0,106	2,54	2,69	0,025 3	0,415
-119	0,918	0,930	23,32	23,62	0,100	0,106	2,54	2,69	0,026 9	0,441
-120	0,981	0,993	24,92	25,22	0,100	0,106	2,54	2,69	0,028 5	0,467
-121	1,043	1,055	26,49	26,80	0,100	0,106	2,54	2,69	0,030 2	0,495
-122	1,106	1,118	28,09	28,40	0,100	0,106	2,54	2,69	0,031 8	0,521
-123	1,168	1,180	29,67	29,97	0,100	0,106	2,54	2,69	0,033 4	0,547
-124	1,231	1,243	31,27	31,57	0,100	0,106	2,54	2,69	0,035 1	0,575
-125	1,293	1,305	32,84	33,15	0,100	0,106	2,54	2,69	0,036 7	0,601
-126	1,356	1,368	34,44	34,74	0,100	0,106	2,54	2,69	0,038 3	0,628
-127	1,418	1,430	36,02	36,32	0,100	0,106	2,54	2,69	0,040 0	0,655
-128	1,481	1,493	37,62	37,92	0,100	0,106	2,54	2,69	0,041 6	0,682
-129	1,539	1,559	39,09	39,60	0,100	0,106	2,54	2,69	0,043 2	0,708
-130	1,602	1,622	40,69	41,20	0,100	0,106	2,54	2,69	0,044 9	0,736
-131	1,664	1,684	42,27	42,77	0,100	0,106	2,54	2,69	0,046 5	0,762
-132	1,727	1,747	43,87	44,37	0,100	0,106	2,54	2,69	0,048 2	0,790
-133	1,789	1,809	45,44	45,95	0,100	0,106	2,54	2,69	0,049 8	0,816
-134	1,852	1,872	47,04	47,55	0,100	0,106	2,54	2,69	0,051 4	0,842
-135	1,915	1,935	48,64	49,15	0,100	0,106	2,54	2,69	0,053 1	0,870
-136	1,977	1,997	50,22	50,72	0,100	0,106	2,54	2,69	0,054 7	0,896
-137	2,040	2,060	51,82	52,32	0,100	0,106	2,54	2,69	0,056 4	0,924
-138	2,102	2,122	53,39	53,90	0,100	0,106	2,54	2,69	0,058 0	0,950
-139	2,165	2,185	54,99	55,50	0,100	0,106	2,54	2,69	0,059 6	0,977
-140	2,227	2,247	56,57	57,07	0,100	0,106	2,54	2,69	0,061 3	1,005

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-141	2,290	2,310	58,17	58,67	0,100	0,106	2,54	2,69	0,062 9	1,031
-142	2,352	2,372	59,74	60,25	0,100	0,106	2,54	2,69	0,064 5	1,057
-143	2,415	2,435	61,34	61,85	0,100	0,106	2,54	2,69	0,066 2	1,085
-144	2,477	2,497	62,92	63,42	0,100	0,106	2,54	2,69	0,067 8	1,111
-145	2,540	2,560	64,52	65,02	0,100	0,106	2,54	2,69	0,069 4	1,137
-146	2,602	2,622	66,09	66,60	0,100	0,106	2,54	2,69	0,071 1	1,165
-147	2,660	2,690	67,56	68,33	0,100	0,106	2,54	2,69	0,072 7	1,191
-148	2,722	2,752	69,14	69,90	0,100	0,106	2,54	2,69	0,074 3	1,218
-149	2,785	2,815	70,74	71,50	0,100	0,106	2,54	2,69	0,076 0	1,245
-150	2,847	2,877	72,31	73,07	0,100	0,106	2,54	2,69	0,077 6	1,272
-151	2,972	3,002	75,49	76,25	0,100	0,106	2,54	2,69	0,080 9	1,326
-152	3,222	3,252	81,84	82,60	0,100	0,106	2,54	2,69	0,087 4	1,432
-153	3,472	3,502	88,19	88,95	0,100	0,106	2,54	2,69	0,094 0	1,540
-154	3,722	3,752	94,54	95,30	0,100	0,106	2,54	2,69	0,100 5	1,647
-155	3,972	4,002	100,89	101,65	0,100	0,106	2,54	2,69	0,107 1	1,755
-156	4,222	4,252	107,24	108,00	0,100	0,106	2,54	2,69	0,113 6	1,862
-157	4,472	4,502	113,59	114,35	0,100	0,106	2,54	2,69	0,120 2	1,970
-158	4,722	4,752	119,94	120,70	0,100	0,106	2,54	2,69	0,126 7	2,076
-159	4,972	5,002	126,29	127,05	0,100	0,106	2,54	2,69	0,133 2	2,183
-160	5,214	5,260	132,43	133,60	0,100	0,106	2,54	2,69	0,139 8	2,291
-161	5,464	5,510	138,79	139,95	0,100	0,106	2,54	2,69	0,146 3	2,397
-162	5,714	5,760	145,14	146,30	0,100	0,106	2,54	2,69	0,152 9	2,506
-163	5,964	6,010	151,49	152,65	0,100	0,106	2,54	2,69	0,159 4	2,612
-164	6,214	6,260	157,84	159,00	0,100	0,106	2,54	2,69	0,166 0	2,720
-165	6,464	6,510	164,19	165,35	0,100	0,106	2,54	2,69	0,172 5	2,827
-166	6,714	6,760	170,54	171,70	0,100	0,106	2,54	2,69	0,179 0	2,933
-167	6,964	7,010	176,89	178,05	0,100	0,106	2,54	2,69	0,185 6	3,041
-168	7,207	7,267	183,06	184,58	0,100	0,106	2,54	2,69	0,192 1	3,148
-169	7,457	7,517	189,41	190,93	0,100	0,106	2,54	2,69	0,198 7	3,256
-170	7,707	7,767	195,76	197,28	0,100	0,106	2,54	2,69	0,205 2	3,363

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-171	7,957	8,017	202,11	203,63	0,100	0,106	2,54	2,69	0,211 8	3,471
-172	8,207	8,267	208,46	209,98	0,100	0,106	2,54	2,69	0,218 3	3,577
-173	8,457	8,517	214,81	216,33	0,100	0,106	2,54	2,69	0,224 9	3,685
-174	8,707	8,767	221,16	222,68	0,100	0,106	2,54	2,69	0,231 4	3,792
-175	8,957	9,017	227,51	229,03	0,100	0,106	2,54	2,69	0,237 9	3,898
-176	9,207	9,267	233,86	235,38	0,100	0,106	2,54	2,69	0,244 5	4,007
-177	9,457	9,517	240,21	241,73	0,100	0,106	2,54	2,69	0,251 0	4,113
-178	9,707	9,767	246,56	248,08	0,100	0,106	2,54	2,69	0,257 6	4,221
*179 THRU *200	O-ring sizes not assigned									
-201	0,166	0,176	4,22	4,47	0,135	0,143	3,43	3,63	0,014 8	0,243
-202	0,229	0,239	5,82	6,07	0,135	0,143	3,43	3,63	0,017 8	0,292
-203	0,291	0,301	7,39	7,65	0,135	0,143	3,43	3,63	0,020 7	0,339
-204	0,354	0,364	8,99	9,25	0,135	0,143	3,43	3,63	0,023 7	0,388
-205	0,416	0,426	10,57	10,82	0,135	0,143	3,43	3,63	0,026 7	0,438
-206	0,479	0,489	12,17	12,42	0,135	0,143	3,43	3,63	0,029 7	0,487
-207	0,541	0,551	13,74	14,00	0,135	0,143	3,43	3,63	0,032 7	0,536
-208	0,604	0,614	15,34	15,60	0,135	0,143	3,43	3,63	0,035 7	0,585
-209	0,666	0,676	16,92	17,17	0,135	0,143	3,43	3,63	0,038 6	0,633
-210	0,728	0,740	18,49	18,80	0,135	0,143	3,43	3,63	0,041 6	0,682
-211	0,790	0,802	20,07	20,37	0,135	0,143	3,43	3,63	0,044 6	0,731
-212	0,853	0,865	21,67	21,97	0,135	0,143	3,43	3,63	0,047 6	0,780
-213	0,915	0,927	23,24	23,55	0,135	0,143	3,43	3,63	0,050 5	0,828
-214	0,978	0,990	24,84	25,15	0,135	0,143	3,43	3,63	0,053 5	0,877
-215	1,040	1,052	26,42	26,72	0,135	0,143	3,43	3,63	0,056 5	0,926
-216	1,103	1,115	28,02	28,32	0,135	0,143	3,43	3,63	0,059 5	0,975
-217	1,165	1,177	29,59	29,90	0,135	0,143	3,43	3,63	0,062 5	1,024
-218	1,228	1,240	31,19	31,50	0,135	0,143	3,43	3,63	0,065 5	1,073
-219	1,290	1,302	32,77	33,07	0,135	0,143	3,43	3,63	0,068 4	1,121
-220	1,353	1,365	34,37	34,67	0,135	0,143	3,43	3,63	0,071 4	1,170

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-221	1,415	1,427	35,94	36,25	0,135	0,143	3,43	3,63	0,074 4	1,219
-222	1,478	1,490	37,54	37,85	0,135	0,143	3,43	3,63	0,077 4	1,268
-223	1,599	1,619	40,61	41,12	0,135	0,143	3,43	3,63	0,083 3	1,365
-224	1,724	1,744	43,79	44,30	0,135	0,143	3,43	3,63	0,089 3	1,463
-225	1,849	1,869	46,96	47,47	0,135	0,143	3,43	3,63	0,095 2	1,560
-226	1,974	1,994	50,14	50,65	0,135	0,143	3,43	3,63	0,101 2	1,658
-227	2,099	2,119	53,31	53,82	0,135	0,143	3,43	3,63	0,107 2	1,757
-228	2,224	2,244	56,49	57,00	0,135	0,143	3,43	3,63	0,113 1	1,853
-229	2,349	2,369	59,66	60,17	0,135	0,143	3,43	3,63	0,119 1	1,952
-230	2,474	2,494	62,84	63,35	0,135	0,143	3,43	3,63	0,125 0	2,048
-231	2,599	2,619	66,01	66,52	0,135	0,143	3,43	3,63	0,131 0	2,147
-232	2,719	2,749	69,06	69,82	0,135	0,143	3,43	3,63	0,137 0	2,245
-233	2,844	2,874	72,24	73,00	0,135	0,143	3,43	3,63	0,142 9	2,342
-234	2,969	2,999	75,41	76,17	0,135	0,143	3,43	3,63	0,148 9	2,440
-235	3,094	3,124	78,59	79,35	0,135	0,143	3,43	3,63	0,154 8	2,537
-236	3,219	3,249	81,76	82,52	0,135	0,143	3,43	3,63	0,160 8	2,635
-237	3,344	3,374	84,94	85,70	0,135	0,143	3,43	3,63	0,166 8	2,733
-238	3,469	3,499	88,11	88,87	0,135	0,143	3,43	3,63	0,172 7	2,830
-239	3,594	3,624	91,29	92,05	0,135	0,143	3,43	3,63	0,178 7	2,928
-240	3,719	3,749	94,46	95,22	0,135	0,143	3,43	3,63	0,184 6	3,025
-241	3,844	3,874	97,64	98,40	0,135	0,143	3,43	3,63	0,190 6	3,123
-242	3,969	3,999	100,81	101,57	0,135	0,143	3,43	3,63	0,196 6	3,222
-243	4,094	4,124	103,99	104,75	0,135	0,143	3,43	3,63	0,202 5	3,318
-244	4,219	4,249	107,16	107,92	0,135	0,143	3,43	3,63	0,208 5	3,417
-245	4,344	4,374	110,34	111,10	0,135	0,143	3,43	3,63	0,214 4	3,513
-246	4,469	4,499	113,51	114,27	0,135	0,143	3,43	3,63	0,220 4	3,612
-247	4,594	4,624	116,69	117,45	0,135	0,143	3,43	3,63	0,226 3	3,708
-248	4,719	4,749	119,86	120,62	0,135	0,143	3,43	3,63	0,232 3	3,807
-249	4,844	4,874	123,04	123,80	0,135	0,143	3,43	3,63	0,238 3	3,905
-250	4,969	4,999	126,21	126,97	0,135	0,143	3,43	3,63	0,244 2	4,002

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-251	5,086	5,132	129,18	130,35	0,135	0,143	3,43	3,63	0,250 2	4,100
-252	5,211	5,257	132,36	133,53	0,135	0,143	3,43	3,63	0,256 1	4,197
-253	5,336	5,382	135,53	136,70	0,135	0,143	3,43	3,63	0,262 1	4,295
-254	5,461	5,507	138,71	139,88	0,135	0,143	3,43	3,63	0,268 1	4,393
-255	5,586	5,632	141,88	143,05	0,135	0,143	3,43	3,63	0,274 0	4,490
-256	5,711	5,757	145,06	146,23	0,135	0,143	3,43	3,63	0,280 0	4,588
-257	5,836	5,882	148,23	149,40	0,135	0,143	3,43	3,63	0,285 9	4,685
-258	5,961	6,007	151,41	152,58	0,135	0,143	3,43	3,63	0,291 9	4,783
-259	6,211	6,257	157,76	158,93	0,135	0,143	3,43	3,63	0,303 8	4,978
-260	6,461	6,507	164,11	165,28	0,135	0,143	3,43	3,63	0,315 7	5,173
-261	6,711	6,757	170,46	171,63	0,135	0,143	3,43	3,63	0,327 7	5,370
-262	6,961	7,007	176,81	177,98	0,135	0,143	3,43	3,63	0,339 6	5,565
-263	7,204	7,264	182,98	184,51	0,135	0,143	3,43	3,63	0,351 5	5,760
-264	7,454	7,514	189,33	190,86	0,135	0,143	3,43	3,63	0,363 4	5,955
-265	7,704	7,764	195,68	197,21	0,135	0,143	3,43	3,63	0,375 3	6,150
-266	7,954	8,014	202,03	203,56	0,135	0,143	3,43	3,63	0,387 2	6,345
-267	8,204	8,264	208,38	209,91	0,135	0,143	3,43	3,63	0,399 2	6,542
-268	8,454	8,514	214,73	216,26	0,135	0,143	3,43	3,63	0,411 1	6,737
-269	8,704	8,764	221,08	222,61	0,135	0,143	3,43	3,63	0,423 0	6,932
-270	8,954	9,014	227,43	228,96	0,135	0,143	3,43	3,63	0,434 9	7,127
-271	9,204	9,264	233,78	235,31	0,135	0,143	3,43	3,63	0,446 8	7,322
-272	9,454	9,514	240,13	241,66	0,135	0,143	3,43	3,63	0,458 8	7,518
-273	9,704	9,764	246,48	248,00	0,135	0,143	3,43	3,63	0,470 7	7,713
-274	9,954	10,014	252,83	254,36	0,135	0,143	3,43	3,63	0,482 6	7,908
-275	10,454	10,514	265,53	267,06	0,135	0,143	3,43	3,63	0,506 4	8,298
-276	10,954	11,014	278,23	279,76	0,135	0,143	3,43	3,63	0,530 3	8,690
-277	11,454	11,514	290,93	292,46	0,135	0,143	3,43	3,63	0,554 1	9,080
-278	11,954	12,014	303,63	305,16	0,135	0,143	3,43	3,63	0,577 9	9,470
-279	12,954	13,014	329,03	330,56	0,135	0,143	3,43	3,63	0,625 6	10,252
-280	13,954	14,014	354,43	355,96	0,135	0,143	3,43	3,63	0,673 3	11,033

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-281	14,954	15,014	379,83	381,36	0,135	0,143	3,43	3,63	0,721 0	11,815
-282	15,910	16,000	404,11	406,40	0,135	0,143	3,43	3,63	0,767 2	12,572
-283	16,910	17,000	429,51	431,80	0,135	0,143	3,43	3,63	0,814 9	13,354
-284	17,910	18,000	454,91	457,20	0,135	0,143	3,43	3,63	0,862 6	14,136
*285 THRU *308	O-ring sizes not assigned									
-309	,407	,417	10,34	10,59	0,205	0,215	5,21	5,46	0,067 7	1,109
-310	,470	,480	11,94	12,19	0,205	0,215	5,21	5,46	0,074 5	1,221
-311	,532	,542	13,51	13,77	0,205	0,215	5,21	5,46	0,081 3	1,332
-312	,595	,605	15,11	15,37	0,205	0,215	5,21	5,46	0,088 1	1,444
-313	,657	,667	16,69	16,94	0,205	0,215	5,21	5,46	0,094 9	1,555
-314	,719	,731	18,26	18,57	0,205	0,215	5,21	5,46	0,101 7	1,667
-315	,781	,793	19,84	20,14	0,205	0,215	5,21	5,46	0,108 5	1,778
-316	,844	,856	21,44	21,74	0,205	0,215	5,21	5,46	0,115 3	1,889
-317	,906	,918	23,01	23,32	0,205	0,215	5,21	5,46	0,122 1	2,001
-318	,969	,981	24,61	24,92	0,205	0,215	5,21	5,46	0,128 9	2,112
-319	1,031	1,043	26,19	26,49	0,205	0,215	5,21	5,46	0,135 7	2,224
-320	1,094	1,106	27,79	28,09	0,205	0,215	5,21	5,46	0,142 5	2,335
-321	1,156	1,168	29,36	29,67	0,205	0,215	5,21	5,46	0,149 3	2,447
-322	1,219	1,231	30,96	31,27	0,205	0,215	5,21	5,46	0,156 1	2,558
-323	1,281	1,293	32,54	32,84	0,205	0,215	5,21	5,46	0,162 9	2,669
-324	1,344	1,356	34,14	34,44	0,205	0,215	5,21	5,46	0,169 7	2,781
-325	1,465	1,485	37,21	37,72	0,205	0,215	5,21	5,46	0,183 3	3,004
-326	1,590	1,610	40,39	40,89	0,205	0,215	5,21	5,46	0,197 0	3,228
-327	1,715	1,735	43,56	44,07	0,205	0,215	5,21	5,46	0,210 6	3,451
-328	1,840	1,860	46,74	47,24	0,205	0,215	5,21	5,46	0,224 2	3,674
-329	1,965	1,985	49,91	50,42	0,205	0,215	5,21	5,46	0,237 8	3,897
-330	2,090	2,110	53,09	53,59	0,205	0,215	5,21	5,46	0,251 4	4,120

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-331	2,215	2,235	56,26	56,77	0,205	0,215	5,21	5,46	0,265 0	4,343
-332	2,340	2,360	59,44	59,94	0,205	0,215	5,21	5,46	0,278 6	4,565
-333	2,465	2,485	62,61	63,12	0,205	0,215	5,21	5,46	0,292 2	4,788
-334	2,590	2,610	65,79	66,29	0,205	0,215	5,21	5,46	0,305 8	5,011
-335	2,710	2,740	68,83	69,60	0,205	0,215	5,21	5,46	0,319 4	5,234
-336	2,835	2,865	72,01	72,77	0,205	0,215	5,21	5,46	0,333 0	5,457
-337	2,960	2,990	75,18	75,95	0,205	0,215	5,21	5,46	0,346 6	5,680
-338	3,085	3,115	78,36	79,12	0,205	0,215	5,21	5,46	0,360 2	5,903
-339	3,210	3,240	81,53	82,30	0,205	0,215	5,21	5,46	0,373 8	6,125
-340	3,335	3,365	84,71	85,47	0,205	0,215	5,21	5,46	0,387 4	6,348
-341	3,460	3,490	87,88	88,65	0,205	0,215	5,21	5,46	0,401 0	6,571
-342	3,585	3,615	91,06	91,82	0,205	0,215	5,21	5,46	0,414 6	6,796
-343	3,710	3,740	94,23	95,00	0,205	0,215	5,21	5,46	0,428 2	7,017
-344	3,835	3,865	97,41	98,17	0,205	0,215	5,21	5,46	0,441 8	7,240
-345	3,960	3,990	100,58	101,35	0,205	0,215	5,21	5,46	0,455 4	7,463
-346	4,085	4,115	103,76	104,52	0,205	0,215	5,21	5,46	0,469 0	7,686
-347	4,210	4,240	106,93	107,70	0,205	0,215	5,21	5,46	0,482 6	7,908
-348	4,335	4,365	110,11	110,87	0,205	0,215	5,21	5,46	0,496 2	8,131
-349	4,460	4,490	113,28	114,05	0,205	0,215	5,21	5,46	0,509 8	8,354
-350	4,585	4,615	116,46	117,22	0,205	0,215	5,21	5,46	0,523 4	8,577
-351	4,710	4,740	119,63	120,40	0,205	0,215	5,21	5,46	0,537 0	8,800
-352	4,835	4,865	122,81	123,57	0,205	0,215	5,21	5,46	0,550 6	9,023
-353	4,960	4,990	125,98	126,75	0,205	0,215	5,21	5,46	0,564 2	9,246
-354	5,077	5,123	128,96	130,12	0,205	0,215	5,21	5,46	0,577 8	9,468
-355	5,202	5,248	132,13	133,30	0,205	0,215	5,21	5,46	0,591 4	9,691
-356	5,327	5,373	135,31	136,47	0,205	0,215	5,21	5,46	0,605 0	9,914
-357	5,452	5,498	138,48	139,65	0,205	0,215	5,21	5,46	0,618 6	10,137
-358	5,577	5,623	141,66	142,82	0,205	0,215	5,21	5,46	0,632 2	10,360
-359	5,702	5,748	144,83	146,00	0,205	0,215	5,21	5,46	0,645 8	10,583
-360	5,827	5,873	148,00	149,17	0,205	0,215	5,21	5,46	0,659 4	10,806

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-361	5,952	5,998	151,18	152,35	0,205	0,215	5,21	5,46	0,673 0	11,029
-362	6,202	6,248	157,53	158,70	0,205	0,215	5,21	5,46	0,700 2	11,474
-363	6,452	6,498	163,88	165,05	0,205	0,215	5,21	5,46	0,727 4	11,920
-364	6,702	6,748	170,23	171,40	0,205	0,215	5,21	5,46	0,754 6	12,366
-365	6,952	6,998	176,58	177,75	0,205	0,215	5,21	5,46	0,781 8	12,811
-366	7,195	7,255	182,75	184,28	0,205	0,215	5,21	5,46	0,809 0	13,257
-367	7,445	7,505	189,10	190,63	0,205	0,215	5,21	5,46	0,836 2	13,703
-368	7,695	7,755	195,45	196,98	0,205	0,215	5,21	5,46	0,863 4	14,149
-369	7,945	8,005	201,80	203,33	0,205	0,215	5,21	5,46	0,890 6	14,594
-370	8,195	8,255	208,15	209,68	0,205	0,215	5,21	5,46	0,917 8	15,040
-371	8,445	8,505	214,50	216,03	0,205	0,215	5,21	5,46	0,945 0	15,486
-372	8,695	8,755	220,85	222,38	0,205	0,215	5,21	5,46	0,972 2	15,932
-373	8,945	9,005	227,20	228,73	0,205	0,215	5,21	5,46	0,999 4	16,377
-374	9,195	9,255	233,55	235,08	0,205	0,215	5,21	5,46	1,026 6	16,823
-375	9,445	9,505	239,90	241,43	0,205	0,215	5,21	5,46	1,053 8	17,269
-376	9,695	9,755	246,25	247,78	0,205	0,215	5,21	5,46	1,081 1	17,716
-377	9,945	10,005	252,60	254,13	0,205	0,215	5,21	5,46	1,108 3	18,162
-378	10,445	10,505	265,30	266,83	0,205	0,215	5,21	5,46	1,162 7	19,053
-379	10,945	11,005	278,00	279,53	0,205	0,215	5,21	5,46	1,217 1	19,945
-380	11,445	11,505	290,70	292,23	0,205	0,215	5,21	5,46	1,271 5	20,836
-381	11,945	12,005	303,40	304,93	0,205	0,215	5,21	5,46	1,325 9	21,728
-382	12,945	13,005	328,80	330,33	0,205	0,215	5,21	5,46	1,434 7	23,511
-383	13,945	14,005	354,20	355,73	0,205	0,215	5,21	5,46	1,543 5	25,293
-384	14,945	15,005	379,60	381,13	0,205	0,215	5,21	5,46	1,652 3	27,076
-385	15,910	16,000	404,11	406,40	0,205	0,215	5,21	5,46	1,759 0	28,825
-386	16,910	17,000	429,51	431,80	0,205	0,215	5,21	5,46	1,867 8	30,608
-387	17,910	18,000	454,91	457,20	0,205	0,215	5,21	5,46	1,976 6	32,391
-388	18,910	19,000	480,31	482,60	0,205	0,215	5,21	5,46	2,085 4	34,174
-389	19,910	20,000	505,71	508,00	0,205	0,215	5,21	5,46	2,194 2	35,957
-390	20,910	21,000	531,11	533,40	0,205	0,215	5,21	5,46	2,303 0	37,739

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-391	21,910	22,000	556,51	558,80	0,205	0,215	5,21	5,46	2,411 8	39,522
-392	22,880	23,000	581,15	584,20	0,205	0,215	5,21	5,46	2,519 0	41,279
-393	23,880	24,000	606,55	609,60	0,205	0,215	5,21	5,46	2,627 8	43,062
-394	24,880	25,000	631,95	635,00	0,205	0,215	5,21	5,46	2,736 6	44,845
-395	25,880	26,000	657,35	660,40	0,205	0,215	5,21	5,46	2,845 4	46,628
-396 THRU -424	O-ring sizes not assigned									
-425	4,460	4,490	113,28	114,05	0,269	0,281	6,83	7,14	0,886 3	14,524
-426	4,585	4,615	116,46	117,22	0,269	0,281	6,83	7,14	0,909 7	14,907
-427	4,710	4,740	119,63	120,40	0,269	0,281	6,83	7,14	0,933 0	15,289
-428	4,835	4,865	122,81	123,57	0,269	0,281	6,83	7,14	0,956 3	15,671
-429	4,960	4,990	125,98	126,75	0,269	0,281	6,83	7,14	0,979 6	16,053
-430	5,077	5,123	128,96	130,12	0,269	0,281	6,83	7,14	1,003 0	16,436
-431	5,202	5,248	132,13	133,30	0,269	0,281	6,83	7,14	1,026 3	16,818
-432	5,327	5,373	135,31	136,47	0,269	0,281	6,83	7,14	1,049 6	17,200
-433	5,452	5,498	138,48	139,65	0,269	0,281	6,83	7,14	1,072 9	17,582
-434	5,577	5,623	141,66	142,82	0,269	0,281	6,83	7,14	1,096 3	17,965
-435	5,702	5,748	144,83	146,00	0,269	0,281	6,83	7,14	1,119 6	18,347
-436	5,827	5,873	148,01	149,17	0,269	0,281	6,83	7,14	1,142 9	18,729
-437	5,952	5,998	151,18	152,35	0,269	0,281	6,83	7,14	1,166 2	19,111
-438	6,202	6,248	157,53	158,70	0,269	0,281	6,83	7,14	1,212 9	19,876
-439	6,452	6,498	163,88	165,05	0,269	0,281	6,83	7,14	1,259 5	20,640
-440	6,702	6,748	170,23	171,40	0,269	0,281	6,83	7,14	1,306 2	21,405
-441	6,952	6,998	176,58	177,75	0,269	0,281	6,83	7,14	1,352 8	22,168
-442	7,195	7,255	182,75	184,28	0,269	0,281	6,83	7,14	1,399 5	22,934
-443	7,445	7,505	189,10	190,63	0,269	0,281	6,83	7,14	1,446 1	23,697
-444	7,695	7,755	195,45	196,98	0,269	0,281	6,83	7,14	1,492 8	24,463
-445	7,945	8,005	201,80	203,33	0,269	0,281	6,83	7,14	1,539 4	25,226

Table 1 (*continued*)

Size identification code	Internal diameter d_1				Cross section d_2				Volume (Ref.)	
	in		mm		in		mm			
	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-446	8,445	8,505	214,50	216,03	0,269	0,281	6,83	7,14	1,632 7	26,755
-447	8,945	9,005	227,20	228,73	0,269	0,281	6,83	7,14	1,726 0	28,284
-448	9,445	9,505	239,90	241,43	0,269	0,281	6,83	7,14	1,819 3	29,813
-449	9,945	10,005	252,60	254,13	0,269	0,281	6,83	7,14	1,912 6	31,342
-450	10,445	10,505	265,30	266,83	0,269	0,281	6,83	7,14	2,005 9	32,871
-451	10,945	11,005	278,00	279,53	0,269	0,281	6,83	7,14	2,099 2	34,400
-452	11,445	11,505	290,70	292,23	0,269	0,281	6,83	7,14	2,192 5	35,929
-453	11,945	12,005	303,40	304,93	0,269	0,281	6,83	7,14	2,285 8	37,458
-454	12,445	12,505	316,10	317,63	0,269	0,281	6,83	7,14	2,379 1	38,987
-455	12,945	13,005	328,80	330,33	0,269	0,281	6,83	7,14	2,472 4	40,515
-456	13,445	13,505	341,50	343,03	0,269	0,281	6,83	7,14	2,565 7	42,044
-457	13,945	14,005	354,20	355,73	0,269	0,281	6,83	7,14	2,659 0	43,573
-458	14,445	14,505	366,90	368,43	0,269	0,281	6,83	7,14	2,752 3	45,102
-459	14,945	15,005	379,60	381,13	0,269	0,281	6,83	7,14	2,845 6	46,631
-460	15,445	15,505	392,30	393,83	0,269	0,281	6,83	7,14	2,938 9	48,160
-461	15,910	16,000	404,11	406,40	0,269	0,281	6,83	7,14	3,028 5	49,628
-462	16,410	16,500	416,81	419,10	0,269	0,281	6,83	7,14	3,121 8	51,157
-463	16,910	17,000	429,51	431,80	0,269	0,281	6,83	7,14	3,215 1	52,686
-464	17,410	17,500	442,21	444,50	0,269	0,281	6,83	7,14	3,308 4	54,215
-465	17,910	18,000	454,91	457,20	0,269	0,281	6,83	7,14	3,401 7	55,744
-466	18,410	18,500	467,61	469,90	0,269	0,281	6,83	7,14	3,495 0	57,273
-467	18,910	19,000	480,31	482,60	0,269	0,281	6,83	7,14	3,588 3	58,802
-468	19,410	19,500	493,01	495,30	0,269	0,281	6,83	7,14	3,681 6	60,331
-469	19,910	20,000	505,71	508,00	0,269	0,281	6,83	7,14	3,774 9	61,860
-470	20,910	21,000	531,11	533,40	0,269	0,281	6,83	7,14	3,961 5	64,917
-471	21,910	22,000	556,51	558,80	0,269	0,281	6,83	7,14	4,148 1	67,975
-472	22,880	23,000	581,15	584,20	0,269	0,281	6,83	7,14	4,331 9	70,987
-473	23,880	24,000	606,55	609,60	0,269	0,281	6,83	7,14	4,518 4	74,043
-474	24,880	25,000	631,95	635,00	0,269	0,281	6,83	7,14	4,705 0	77,101
-475	25,880	26,000	657,35	660,40	0,269	0,281	6,83	7,14	4,891 6	80,159

Table 2 — Inside diameters, cross-sections and tolerances for sealing straight thread tube fitting bosses

Size identification code	Nominal tube size		Internal diameter d_1				Cross section d_2				Volume (Ref.)	
			in		mm		in		mm			
	in	mm	min.	max.	min.	max.	min.	max.	min.	max.	in^3	cm^3
-901	0,093 8	2,383	0,180	0,190	4,57	4,83	0,053	0,059	1,35	1,50	0,001 9	0,031
-902	0,125	3,18	0,234	0,244	5,94	6,20	0,061	0,067	1,55	1,70	0,003 1	0,051
-903	0,187 5	4,763	0,296	0,306	7,52	7,77	0,061	0,067	1,55	1,70	0,003 7	0,061
-904	0,250	6,35	0,346	0,356	8,79	9,04	0,069	0,075	1,75	1,90	0,005 4	0,088
-905	0,312 5	7,938	0,409	0,419	10,39	10,64	0,069	0,075	1,75	1,90	0,006 2	0,102
-906	0,375	9,53	0,463	0,473	11,76	12,01	0,075	0,081	1,90	2,06	0,008 2	0,134
-907	0,437 5	11,11	0,525	0,535	13,33	13,59	0,079	0,085	2,01	2,16	0,010 2	0,167
-908	0,500	12,70	0,639	0,649	16,23	16,48	0,084	0,090	2,13	2,29	0,013 7	0,225
-909	0,562 5	14,28	0,701	0,711	17,81	18,06	0,094	0,100	2,39	2,54	0,018 6	0,305
-910	0,625	15,88	0,750	0,760	19,05	19,30	0,094	0,100	2,39	2,54	0,019 8	0,324
-911	0,687 5	17,46	0,858	0,868	21,79	22,05	0,112	0,120	2,84	3,05	0,032 5	0,533
-912	0,750	19,05	0,918	0,930	23,32	23,62	0,112	0,120	2,84	3,05	0,034 5	0,565
-913	0,812 5	20,64	0,980	0,992	24,89	25,20	0,112	0,120	2,84	3,05	0,036 6	0,600
-914	0,875	22,23	1,041	1,053	26,44	26,75	0,112	0,120	2,84	3,05	0,038 6	0,633
-916	1,000	25,40	1,165	1,177	29,59	29,90	0,112	0,120	2,84	3,05	0,042 7	0,700
-918	1,125	28,58	1,345	1,365	34,16	34,67	0,112	0,120	2,84	3,05	0,048 8	0,800
-920	1,250	31,75	1,465	1,485	37,21	37,72	0,114	0,122	2,90	3,10	0,054 7	0,896
-924	1,500	38,10	1,710	1,730	43,43	43,94	0,114	0,122	2,90	3,10	0,063 1	1,034
-928	1,750	44,45	2,080	2,100	52,83	53,34	0,114	0,122	2,90	3,10	0,075 9	1,244
-932	2,000	50,80	2,327	2,347	59,11	59,61	0,114	0,122	2,90	3,10	0,084 3	1,381

ICS 49.080

Price based on 15 pages