THREADED FITTINGS TO ISO 4144 STANDARD

BY KIM BURTON

For many years there has not been a standard to cover the low pressure stainless steel cast pipe fittings commonly used in Australia and other countries around the world.

These are commonly termed "150lb" or "BSP" pipe fittings. In most cases the fittings that have been supplied were a mismatch of various standards.

The fittings were dimensionally in accordance with a number of American Standards, whilst British Standard threads were used. This led to the fittings having threads that in some cases were non-compliant - basically there was insufficient length to accommodate the thread.

ASSDA through its Technical Committee identified this problem in the early 90's and through the publication of ASSDA Technical Bulletin No 1 highlighted the problems to the Australian market. ASSDA also looked for a mechanism to have these problems rectified.

ISO 4144 "PIPEWORK - STAINLESS STEEL FITTINGS THREADED IN ACCORDANCE WITH ISO 7-1"

After investigating the alternatives it was decided that International Standard ISO 4144 could be the conduit to rectifying the problems.

ISO 4144 in its 1979 form covered most of the committee's concerns, but it did not allow for cast fittings, it only allowed wrought stainless steel.

After correspondence with the Australian and International Standard bodies it was ascertained that ISO 4144 was due for revision, which presented a golden opportunity to have the standard rewritten to cover all of the Technical Committee's concerns.

ASSDA was invited to represent Australia on the committee established to review the standard we and actively took part in the full process of its revision. Not all of our recommendations were accepted however.

Finally, in early 2003 the new standard was published.

WHAT HAS BEEN ACHIEVED

The major improvements that have been adopted in the new standard are: -

Above: the wall thicknesses of old (left) and new (right) threaded fittings

a. The use of castings as well as wrought materials.
b. All cast fittings are to be properly heat-treated by solution annealing.
c. The reduction in dimension, a more economical fitting.
d The thread standards allowed have been clearly defined.
e. The introduction of pressure-temperature ratings for application of the fittings.
f. The inclusion of six new types of fittings into the standard.
g. The inclusion of Size 100 (4") fittings.

Now that ISO 4144:2003 allows for the use of castings we finally have a standard in Australia that covers the products that have been in common use for many years.

The requirement that all castings are to be fully heat-treated will alleviate some of the corrosion problems that have been encountered in the past.

TABLE 1: PRESSURE-TEMPERATURE RATING

TEMPERATURE (°C)	NO-SHOCK MAXIMUM WORKING PRESSURE (Bar)
-20 to 40	-20 to 40
100	100
150	150
200	200
220	220

Note 1 Pressure for intermediate temperatures may be determined by the interpolation method
Note 2 Temperature indicated are those of the internal fluid
Note 3 Piping loads, stresses and moments are not taken into account



The dimensions of the fittings have been revised dramatically, thus giving a lighter and more economical fitting. The wall thickness is the major dimension that has been reduced and it can be reduced by a further 20% if the fitting is made from wrought material.

ISO 7-1 sealing pipe threads are to be used on all fittings. The external and internal threads are to be tapered, but the internal threads may be parallel. The only exception to this is the threads on the Unions and their mating Nut, which are allowed to have a variety of parallel threads.

Pressure-Temperature Ratings for application of fittings have been specified.

Some fitting types supplied into Australia were not covered in the old ISO 4144 standard.

Seven new types have been included in the new standard: these are 90° Reducing Female Elbows, Reducing Female Tees, 45° Equal Female Elbows, 90° Male x Female Elbows, Crosses, Reducing Nipples, Male x Female Unions and Male x Male Unions.

With the inclusion of the Size 100 (4") fittings, the standard now has a comprehensive range of products.

SOME DISAPPOINTMENTS WITH THE NEW STANDARD

In the new Standard, apart from some minor editorial errors, there are two major points of concern to the ASSDA Technical Committee.

Firstly, the new wall thicknesses that are stated as minimum could lead to sub-standard product being supplied.

Even though the standard allows for thin wall product, such thin walled fittings could be subject to distortion during the threading process or during installation. Care must be taken that this does not occur.

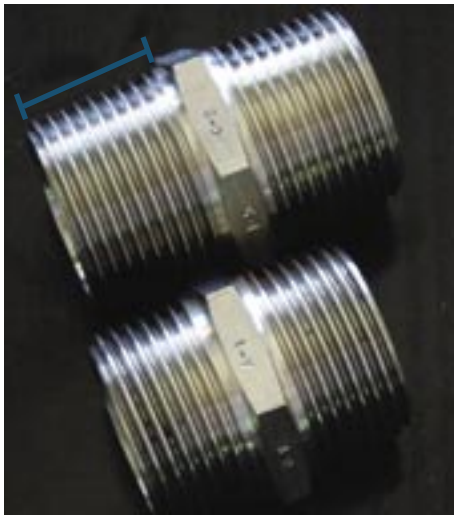
The second major concern within the standard is the length of thread that has been adopted. Whilst the length that is specified can accept a thread that will be in accordance with the standard if it is machined to very close tolerances, it has been found in the past that not all manufacturers verify the threads are correct.

It was recommended on numerous occasions to the International Committee that they accept thread lengths that could accommodate a thread at both ends of the tolerance range.. The International Committee did not adopt these recommendations.

Table 2 highlights the thread lengths that were adopted compared to the thread lengths that were recommended by ASSDA.

TABLE 2: THREAD LENGTH COMPARISONS

THREAD SIZE	ADOPTED LENGTH "l"	RECOMM. LENGTH "l"
6 (1/8")	8	9.5
8 (1/4")	10.5	13
10 (3/8")	11	13.5
15 (1/2")	14.5	18
20 (3/4")	15.5	19.5
25 (1")	18	23
32 (1-1/4")	20.5	25
40 (1-1/2")	20.5	25
50 (2")	25	29.5
65 (2-1/2"	27	34
80 (3")	30	37
100 (4")	36	43



Above: Typical size 25 Hex Nipples - new overall length (as indicated by dimension marking) compared to the old overall length.

CONCLUSIONS

ASSDA still believes it is a concern to all suppliers and users of these fittings and that care should be taken in their selection. It is recommended that fittings should only be sourced from reputable and experienced manufacturers, requesting supply to ISO 4144: 2003.

Overall, the Standard is a very big improvement on what was available, and with care in selection the end user will be in a more certain and much safer environment than in the past.

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