34th International North Sea Flow Measurement Workshop
25-28 October 2016

Extended Abstract

ISO/AWI 21354 Measurement of Multiphase Fluid Flow

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1 INTRODUCTION

It has been recognized for some time that standards are an important enabler of innovation and international technology transfer. They have an important role in national and international trade and in wealth creation. Standards contributed to about 13 per cent of the growth in labour productivity in the UK over the period 1948-2002 [1], and contribute £2.5 billion annually to the UK economy. Many other national economies have benefited similarly.

By developing and adopting standards, barriers to trade are lowered, transaction costs are reduced and the operation of markets is improved through the smooth flow of goods and services. Standards enable compliance to be demonstrated, provide confidence in product performance, and help to eliminate or reduce disputes between companies and across borders. They help smaller firms by transferring technology from larger ones. Poorer countries may benefit similarly.

Flow measurement is an important area of standardization. For example UK natural gas demand is around £5 billion annually, and most of this is measured (generally more than once) using the ISO standard for flow measurement using differential-pressure meters, ISO 5167. Avoidance of both inaccuracy through inadequate specification and excessive cost through over-specification is absolutely vital. Standards give consistency. Accuracy in taxation is of great importance to Government.

Standardization is not only important for economic reasons. Accurate measurement of discharges, of produced water, for instance, is important to ensure a cleaner environment.

2 ISO STANDARDS

ISO standards are produced by more than 200 technical committees (TCs) and their subcommittees (SCs). The voting members (i.e. P-members) of these committees are the national standards bodies, e.g. BSI (the British Standards Institution). A TC covers a specific technical area, and its SCs are appointed to concentrate on specific areas within the remit of the TC. Under an SC (or under the TC directly) Working Groups (WGs) draft the text of the standards. The members of a WG are individual experts nominated by the national standards bodies. Participation in standards-making is an opportunity not only to share knowledge but also to gain it. The national standards bodies vote on the standards.

From a search of the ISO website it appears that about 160 standards from about 40 technical committees have reference to fluid flow measurement. Two thirds of the ISO standards that include reference to fluid flow measurement are produced by four technical committees: TC 28 Petroleum products and lubricants, TC 30 Measurement of fluid flow in closed conduits, TC 113 Hydrometry, and TC 131

Fluid power systems. Many standards on natural gas properties are produced by TC 193 Natural gas.

ISO/TC 30's remit is to produce standards on flow measurement in pipes for general use: TC 30/SC 2 covers differential-pressure meters (and sonic nozzles); TC 30/SC 5 covers velocity and mass methods (e.g tracer and velocity-area methods and electromagnetic, Coriolis, thermal mass and ultrasonic meters). As a result standards produced by ISO/TC 30 are referred to by many other technical committees.

In order to produce an ISO standard a country puts forward a New Work Item Proposal and nominates a project leader: for the project to be approved not only must a majority of those voting support the proposal but at least five countries (if there are at least 17 P-members) must agree to work on the project and nominate an expert. The Working Group consisting of these experts then produces a series of Working Drafts. When they are happy with a Working Draft it is sent to the SC (or if no SC the TC) as a CD (Committee Draft). The SC seeks comments on the CD, and considers them. Once the SC is happy with the CD it is sent to ISO CS (Central Secretariat) and becomes a DIS (Draft International Standard). It is sent out for ballot by ISO CS. Comments on the CD are considered by the SC, and an FDIS (Final Draft International Standard) is produced. The FDIS is balloted: no technical changes can be made after the FDIS ballot, but it is possible for the voters to check that all the changes agreed at the DIS stage have been correctly included. Then the new standard is published. Under certain circumstances the FDIS stage may be omitted. The procedure is described in much more detail in [2].

The procedure to publish a Technical Report is much simpler: once a committee draft is available a single ballot by the SC is sufficient.

3 MULTIPHASE FLOW MEASUREMENT

An SC within TC 28, TC 30 or TC 193 could have produced a multiphase flow measurement standard, but the honour has fallen to TC 28/SC 2, responsible for oil flow measurement.

A New Work Item Proposal was made by BSI with Michael Reader-Harris as Project Leader and sent out in October 2015. The outline section titles were:

1. Scope
2. Normative references
3. Terms and definitions
4. Symbols and subscripts
5. Multiphase flow
6. Multiphase meter technologies
7. Aims of multiphase flow measurement
8. Production envelope
9. Performance specification
10. Testing
11. Field installation and commissioning
12. Verification during operation

Annex A Intercomparison between laboratories

Extended Abstract

The NWIP passed by 10 votes (China, France, Iran, Japan, Malaysia, Netherlands, Norway, Singapore, Sweden, UK) to 1 (USA). Five countries agreed to nominate members of the Working Group. There were 13 abstentions. In January 2016 work commenced. The first activity was for the Project Leader to convert the NFOGM (Norwegian Society for Oil and Gas Measurement) Handbook of Multiphase Flow Metering [3] into the format of an ISO Technical Report: NFOGM had very kindly given their document to form the basis of the TR. It took time for countries to nominate the WG members.

In May 2016 the first draft of the TR was sent to the WG members and they were asked to volunteer to review sections: the WG members are:

- China
  - Chen Liang, Petrochina
  - Gao Jun, Petrochina
- France
  - Jean-Paul Couput, Total
- Netherlands
  - Rick de Leeuw, Shell
  - Jankees Hogendoorn, Krohne
- UK
  - Wes Maru, Oil & Gas Measurement Limited
  - Bill Priddy (then BP)
  - Rogerio Ramos, Coventry University
- USA
  - Phil Lawrence, Enable Midstream
  - Richard Steven, CEESI

In June those who had volunteered were given their tasks. The volunteers revised their sections in July and early August. In mid-August the Project Leader sent out the 2nd draft to WG members for comment.

Comments were submitted in September. They were collated and circulated with non-controversial comments marked in October. A meeting to go through the comments has been planned for the day before the North Sea Flow Measurement Workshop. Following the meeting a 3rd draft will be sent to WG members.

In 2017 the results of the EMRP Multiphase Flow Metrology project will be available. They should provide material on how to test multiphase flow meters and on how well test laboratories agree. In 2018 the TR will be balloted.

4 ACKNOWLEDGMENTS

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5 REFERENCES

1 DEPARTMENT OF TRADE AND INDUSTRY The Empirical Economics of Standards. DTI Economics Paper No 12, 2005. Available as *www.berr.gov.uk/files/file9655.pdf* London: DTI

2 INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. ISO/IEC Directives, Part 1 — Consolidated ISO Supplement — Procedures specific to ISO (7th edition). Geneva: ISO/IEC, 2016.

3 NORWEGIAN SOCIETY FOR OIL AND GAS MEASUREMENT. Handbook of multiphase flow metering. NFOGM:2005